ASSESSMENT AND THE BEST FIT SELECTION OF THE LONG TAIL BEHAVIOUR OF SCALABLE VIDEO CODEC VIDEO FRAME SIZE DISTRIBUTION

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ABSTRACT

Video traffic in the form of Scalable Video Codec (SVC) is expected to account for most multimedia traffic in future heterogeneous networks. On the other hand, it is necessary to determine the performance of communication networks. Particularly, the video frame size modeling is in high demand for simulation studies, statistical analysis, and production of synthetic video traces for use in testing and the performance evaluations. In this work, a statistical analysis method was used to identify the distribution that can be the fit for video frame sizes generated by the SVC compression technique. The work focused on the particular distributions that exhibit the characteristics of the probability density function (PDF) of the traces. Some of the common distributions were tested, including the log-logistic, Erlang, inverse Gaussian, and Pearson family distributions. Ultimately, the Pearson type IV distribution was the best fit for the video frame traces, as determined using both the graphical method and hypothesis testing.

KEYWORDS

Traffic Modeling, Fitting Distributions, SVC, Frame Size Analysis etc.

INTRODUCTION

Convergence is the most dynamic enabler of cross-disciplinary researches. In science, technology, medicine, management, computer science, Information Technology and statistical tools and techniques are used to describe fundamental variables. The probability distribution, which links the values of random variables to the probability of their occurrence, is the most widely used model in such cross-disciplinary researches. In the several current studies, modeling is widely used to represent the reality on a scale that one can handle [1]. This is the main thrust of current researchers that they are using fitting distributions extensively.

Multimedia applications and services generate a huge amount of traffic over computer and mobile communication networks. Modeling video traffic involves mathematical analysis, simulation, and generation of video traces to test performance and compliance of real traffic[2]. Raw video data requires high bandwidth and space for storage [3]. Consequently, many studies have focused on reducing the redundancy of video sequences as part of the compression process. Therefore, using video compression techniques is highly recommended.

Many different types of network traffic exist based on their applications. In this work, the author focused on video packet traces generated from the Scalable Video Codec (SVC) compression technique. SVC is an extension of H.264/AVC, which was standardized by The Joint Video Team of the ITU-T VCEG and the ISO/IEC MPEG H.264/AVC standard. SVC has been proposed to support bandwidth efficient and loss resilient video streaming[4]. The encoding structure of SVC includes one base layer and one or more enhancement layers. In this work, quality scalability, known as coarse grain scalability (CGS), was analyzed. The data set used in this work consisted of different 60-minute-long videos divided into one base layer and one enhancement layer in which the frame types were Intra-frames (I frames) and Bidirectional frames (B frames)[5]. Their attributes are resolution with G16B15 GOP pattern, DQP 10, 3 EL. The quantization scale for base layer is I=48, P=N/A, B=48 and for enhancement layer is I=38, P=N/A, B=48 taken from. The proposed models are employed using both types of frame (I and B) to base and enhancement layer in each movie. In order to do simulation and performance evaluation practically, MATLAB and R software are utilized. Three video traces used were NBC News, Silence of the Lambs, and a Sony Demo with low or moderate scene changes. The organization of this paper is as follows. Section II describes the related works that have been done in frame size analysis. Different distributions and their statistical properties are explained in detail in section III. Section IV in parameter estimation method that will be provided. After all, the best model will be chosen in section V. The result and discussion is presented in section VI and finally, Section VII presents the conclusions of this paper.

REVIEW OF LITERATURE

Maglaris et al. [6] proposed two models for analyzing frame sizes. Krunz and Hughes [7] modeled frame sizes that were compressed using the MPEG-2 standard. In their study, the gamma, Weibull, and log-normal distributions were tested, and the log-normal distribution was the best fit for the distribution of frame sizes. Koumaras et al. [3] reported that the gamma distribution is the best fit for frame sizes compressed using the H.264 standard, and this was true for all three types of video frame. Masi et al. [8] found that the Erlang or gamma distributions best fit the three data sets consisting of actual video frame sizes. Salah et al. [2]reported that the gamma and Weibull distributions best fit the distribution of their data and that the inverse

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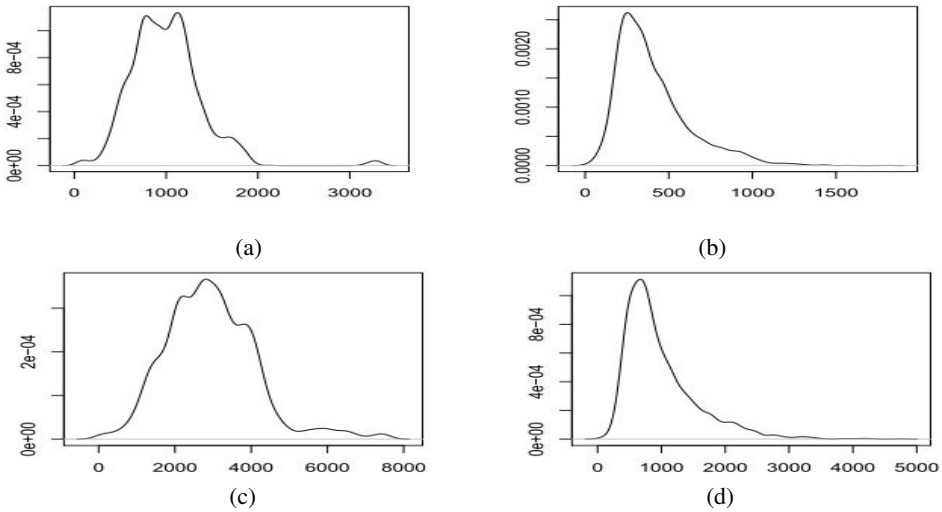
Gaussian distribution ranked second after these distributions. Feldmann and Whitt [9] proposed an algorithm for approximating a large family of probability distributions of hyperexponential distributions.

The best distribution needs to be found for modeling a single source trace. The aim is to derive a statistical distribution to fit the real data accurately. These data have probability distributions with high skewness, which are difficult to analyze using common statistical models. Therefore, non-symmetric distributions were addressed in this paper. The analysis is performed in three steps: 1) investigate the distributions that might fit the overall shape of the data; 2) estimate the parameters of the selected distributions; and 3) use goodness of fit tests to identify the best distribution for the data. These three steps are described in detail below. As the distributions tested are well known and widely used, here they are discussed specifically in terms of statistical theory and applications relevant to video traffic modeling.

BACKGROUND

Too many statistical distributions exist and it is not feasible to investigate all of them when trying to find the best fit for a given data set. However, plotting the density function of the data is a good way to narrow down the list of possible distributions. The shape of the density functions for the data used in this paper were not symmetric (i.e., they exhibited high skewness) "Fig. 1", Therefore, the following common distributions characterized by skewness were tested: log-logistic, Erlang, inverse Gaussian, and Pearson family distributions.

Figure-1: The pdf of NBC News in different layers and frame types (a) I frames of base layer, (b) B frames of base layer, (c) I frames of enhancement layer, (d) B frames of enhancement layer.



Sources: Authors Compilation

Log-logistic Distribution

As in this heading, they should be Times New Roman 11-point boldface, initially capitalized, flush left, with one blank line before, and one after. The log-logistic distribution is useful for describing a non-negative continuous random variable. It can be used as a parametric model for an event with a rate that first increases and later decreases. This distribution also describes a random variable whose logarithm has a logistic distribution. The shape of this distribution is similar to that of the log-normal distribution except its tails are heavier. The following parameterizations of the distribution are common: $\alpha > 0$ is a scale parameter and the median of the distribution; $\beta > 0$ is a shape parameter whose distribution is unimodal when $\beta > 1$, and as its value increases, its dispersion decreases.

The pdf of the log-logistic distribution is written as:

$$f(x,\alpha,\beta) = \frac{(\beta/\alpha)(x/\alpha)^{\beta-1}}{[1+(x/\alpha)^{\beta}]^2}$$

Log-Logistic Distribution

Erlang distribution is widely applicable to many situations, mainly because of its relationship to the gamma and exponential distributions. A. K. Erlang originally developed this distribution to analyze the number of telephone calls that could be made simultaneously to the operators of switching stations. It also is applicable to telephone traffic engineering, where it can be used to analyze waiting times in queuing systems. The Erlang distribution is a continuous probability distribution that has a positive value

for all real numbers greater than zero. The shape k , which is a positive integer, and the rate λ , which is a positive real number, is two parameters that describe this distribution.

The pdf of the Erlang distribution is written as:

$$f(x,k,\lambda) = \frac{\lambda^k x^{k-1} e^{-\lambda x}}{(k-1)!} \quad x,\lambda \geq 0$$

Inverse Gassian distribution

The inverse Gaussian distribution is a two-parameter family of continuous probability distributions with support on $(0,\infty)$. It has several properties that are similar to those of a Gaussian distribution. The probability density function for the inverse Gaussian distribution is given by:

$$f(x,\mu,\lambda) = [\frac{\lambda}{2\pi x^3}]\exp\frac{-\lambda(x-\mu)^2}{2\mu^2 x}$$

For $x > 0$, where $\mu > 0$ is the mean and $\lambda > 0$ is the shape parameter.

Apply Pearson Distribution

The Pearson distribution, which is a four parameter system, is one of the most commonly used distributions in the literature [10, 11]. The four parameters are location, scale, skewness, and kurtosis of the distribution, and they describe the data better than density functions with fewer parameters. Five Pearson distribution types exist, and they are characterized by skewness and kurtosis.

Depending on the discriminate of equation in denominator, two general cases lead to the different kinds of Pearson distribution.

Case 1: Non-negative Discriminant

If the Discriminant is positive, it means that the equation has the roots a_1 and a_2 , being maybe the equal:

$$a_1 = \frac{\sqrt{b_1^2 - 4b_0 b_2}}{2b_2}$$

If the roots are real, the quadratic function can be rewritten as follows:

$$f(x) = b_2(x-a_1)(x-a_2) \text{ so: } p(x) \propto \exp\{-\frac{1}{b_2}\int \frac{x-a}{(x-a_1)(x-a_2)}dx\}$$

and then: $k = \frac{1}{b_2(a_1-a_2)} \Rightarrow p(x) \propto (x-a_1)^{-k(a_1-a)}(x-a_2)^{k(a_2-a)}$

Because the density is only proportional to this mathematical phase, four of the five Pearson distribution types can be obtained as follows:

a) Pearson type I distribution

To find the density function of X, it can be written as a linear function of Y, whose density function is known [12]. Thus:

$$f(x) = \frac{\Gamma(m_1+m_2+2)}{\Gamma(m_1+4)\Gamma(m_1+1)}\left(\frac{x-\lambda}{a_2-a_1}\right)^{m_1}\left(1-\frac{x-\lambda}{a_2-a_1}\right)^{m_2}$$

b) Pearson type II distribution

This distribution is a specified case of the beta distribution, which is symmetric [13]. The pdf is written as follows:

$$f(x) = \frac{\Gamma(2(m_1+1))}{\Gamma(m_1+1)^2}\left(\frac{x-\lambda}{a_2-a_1}\left[1-\frac{x-\lambda}{a_2-a_1}\right]^{m_1}\right)$$

c) Pearson type III distribution

If the scale parameter is allowed to be negative (i.e., negative skewness), the Pearson type III distribution is obtained as follows [14]:

$$f(x) = \frac{1}{\left|a_2 - a_1\right|^{m_1+1} \Gamma(m_1+1)} \left|x-\lambda\right|^{m_1} e^{-\frac{x-\lambda}{a_2-a_1}}$$

d) Pearson type V distribution

The Pearson type V distribution is an inverse gamma distribution in which a negative scale parameter is allowed [15]. Its pdf is written as follows:

$$f(x) = \frac{1}{\left|a_2 - a_1\right|^{m_1+1} \Gamma(m_1+1)} \left|x-\lambda\right|^{-m_1-2} e^{-\frac{a_2-a_1}{x-\lambda}}$$

Case 2: Negative Discriminant (Pearson type IV distribution)

The Pearson type IV distribution is produced and $p(x)$ can be obtained as follows[16]:

$$p(x) = \frac{\left|\frac{\Gamma(m+\frac{v}{2}i)}{\Gamma(m)}\right|^2}{\alpha\beta(m-\frac{1}{2},\frac{1}{2})} [1+(\frac{x-\lambda}{\alpha})^2]^{-m} \exp[-v \arctan g(\frac{x-\lambda}{\alpha})]$$

Parameter Estimation Using Maximum Likelihood Method

In statistics, the least square estimation method is the maximum likelihood estimation method [17]. The moment estimation method is often used for parameter estimation. The maximum likelihood method is the most common method used because it produces unbiased, consistent, and efficient estimates [18]. Therefore, in this research paper we used maximum likelihood method.

Assessment of the Best Distribution

To approach the last step of the process we identify the distribution that best fits the data set. Modern Graphical methods with supporting tools and hypothesis testing methods were used in assessment process.

5.1. The Q-Q plot and the P-P plot as Graphical methods: The Q-Q plot and the P-P plot are two graphical methods that were used to analyze data. In a Q-Q plot, quartiles of two probability distributions are calculated and plotted against each other. A point (x, y) on the plot is related to one of the quartiles of the data (x-axis) plotted against the quartiles of the distribution being considered (y-axis). The points in the Q-Q plot will approximately lie on the line y = x if the data set is distribution is similar to that of the distribution being tested.

5.2. Hypothesis testing using Kolmogorov-Smirnov (K-S) statistic: Hypothesis testing is essential if research study is initiated with a well-defined tentative guess. A most popular statistic for testing a hypothesis is the Kolmogorov-Smirnov (K-S) statistic, which is constructed based on the distribution functions. The main result needs to be obtained based on the p-value. If the p-value is < 0.05, the usual significance level, the null hypothesis is rejected. Therefore, the examined distribution is a suitable probability function for the data if the p-value is > 0.05.

Analytics of Observations

To approach the critical point of concluding research investigation, this paper analyzed the SVC video traces and included both a base layer and an enhancement layer, and each layer consisted of I frames and B frames. The video traces evaluated were NBC News, Silence of the Lambs, and a Sony Demo with low or moderate scene changes. To fit the different distributions and choose the best one, the data were analyzed using R software [19]. R software is a statistical software program that calculates the K-S statistic, its p-value, and the Q-Q plot. Finally, following observations were recorded:

Table-1: Statistical Evaluation of Distributions Used to Fit NBC News

	Distributions	Parameters	K-S statistic	P-value	Best Fit
I frame in base layer	Log-logistic	scale = 4.5213, shape = 948.8618	0.0449	0.000159	Pearson IV
	Erlang	shape = 6.5123, rate = 153.5758	0.0981	2.2e-16	
	Inverse Gaussian	m = 1000.138, shape = 4553.553	0.0899	2.2e-16	
	Pearson IV	m = 4.5861,nu = –3.8308, location = 556.857, scale = 827.1577	0.0364	0.004	
B frame in base layer	Log-logistic	scale = 3.3919, shape = 351.7502	0.03	0.0297	Pearson IV
	Erlang	shape = 102.5856, rate = 3.9225	0.0709	1.14e-10	
	Inverse Gaussian	m = 1241.9514, shape = 402.3932	0.026	0.0845	
	Pearson IV	m = 4.5861, nu = –3.8308, location = 556.857, scale = 827.1577	0.0206	0.275	
I frame enhancement layer	Log-logistic	scale = 4.0949, shape = 2776.4921	0.0573	4.115e-07	Pearson IV
	Erlang	shape = 5.4420, rate = 539.4231	0.1291	2.2e-16	
	Inverse Gaussian	m = 2935.563, shape = 8036.294	0.1528	2.2e-16	
	Pearson IV	m = 6.0096, nu = –5.9500, location = 1151.835, scale = 3020.802	0.0206	0.275	
B frame enhancement layer	Log-logistic	scale = 3.3158, shape = 839.0944	0.0279	0.05218	Pearson IV
	Erlang	shape = 3.6775, rate = 266.5884	0.1427	2.2e-16	
	Inverse Gaussian	m = 980.3883, shape = 2992.6860	0.0315	0.01929	
	Pearson IV	m = 2.6435, nu = –9.4961, location = 62.4044, scale = 320.4285	0.0264	0.0758	

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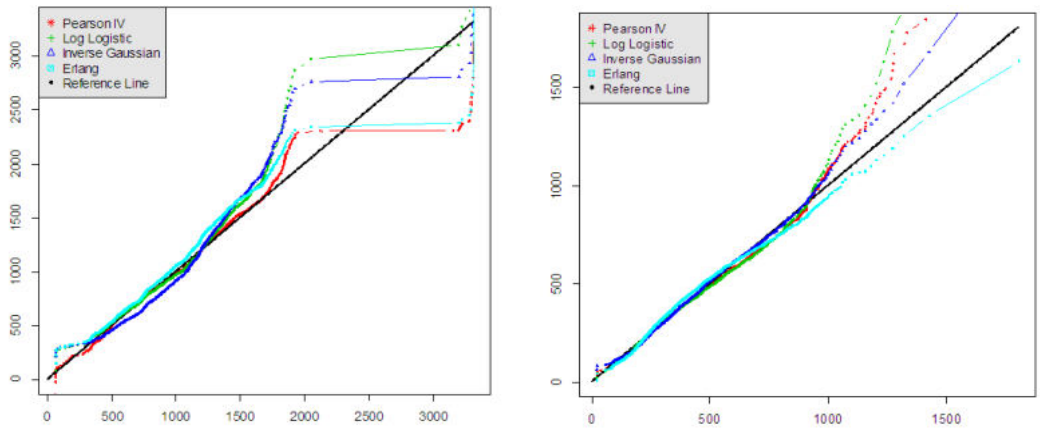
Table 2 shows that the Pearson type IV distribution best fit the NBC News data in both the base layer and the enhancement layer for both I frames and B frames. These results were derived using K-S tests and p-values. In the base layer of I frames, the K-S statistic and its p-value for this distribution were found better than those of the other three distributions tested. Although the p-value was < 0.05, the value was better than those of the other distributions. Hence, it was chosen as the best distribution for these data sets. In the same vein, the corresponding values for the B frames in the base layer and the I and B frames in the enhancement layer were better for the Pearson type IV distribution (p-values > 0.05) than for the log-logistic, Erlang, or inverse Gaussian distributions. . All of the p-values were < 0.05, so none of the distributions tested fit these data well. However, the lowest K-S test value or the maximum p-value can be used to select an appropriate distribution for the data. This result can be illustrated using Q-Q plots (Fig. 2) as integrity of fit test.

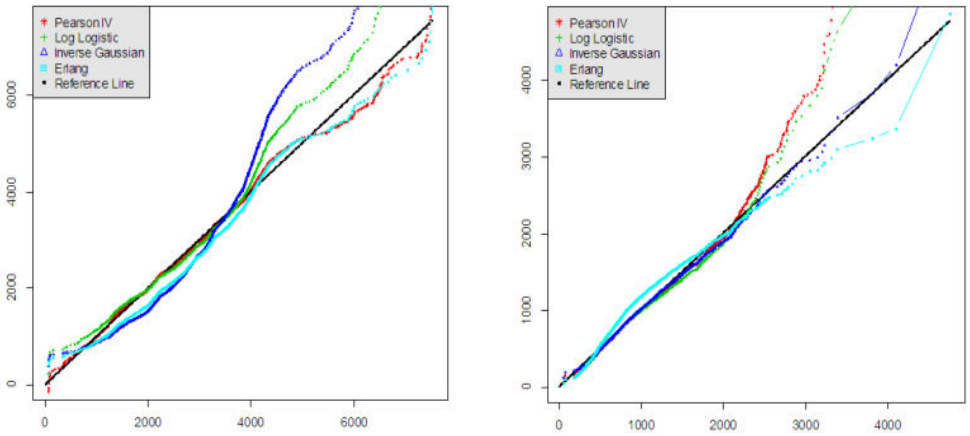
The same analysis was performed for both Silence of the Lambs and the Sony Demo for I frames and B frames of the base layer and enhancement layer. Due to certain limitation of space, the results of those two movies are not shown here.

Figure-2: Indicates Q-Q plot of the base layer of NBC News I frames, and
b) Q-Q plot of the base layer of NBC News B frames



Sources: Authors Compilation

Figure-3: a) Q-Q plot of the enhancement layer of NBC News I frames, and b) Q-Q plot of the enhancement layer of NBC News B frames



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CONCLUSIONS

Conclusion is the final note on research findings. In this research paper, different distributions were tested on a data set consisting of frame types and the corresponding layers of SVC video traces. At last, the density function of frame sizes exhibited a right-skewed tail. After thorough analysis, it is observed that this was also true for the other video traces studied in this paper, but they are not revealed due to space limitations. The research investigation, analysis and involved plotting the density function of the data, applying the Q-Q plot and K-S test, and fitting each distribution to the data. Based on the K-S statistic and the p-value, the best distribution was chosen, and it was confirmed by the Q-Q plot. The results clearly indicated that Pearson distributions the best fit this data set. If we compare it with previous studies, the Pearson distributions were found to be the best distributions for H.264 encoded video data.

The methodical review of literature and the best of our knowledge, this is the first time that this research paper prove that the Pearson distributions are the best fit for SVC video data. However, extension research studies may test the premise that applying a conversion or using a mixture distribution to fit the data may be a useful approach to finding the best distribution for a given data set under conditions in which none of the tested distributions can be chosen based on statistical criteria and conditions.

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A STUDY ON CHALLENGES FOR IT PROFESSIONALS TOWARDS INTERNATIONAL TRAVEL: SPECIAL REFERENCE TO IT EMPLOYEES IN CHENNAI

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ABSTRACT

'Expatriates' are referred to employees who travel on international assignments. Many organizations relatively new to the international scene underestimate the complex nature of human resource (HR) problems in the international arena and that business failures in the international arena may often be linked to the poor performance of expatriates (Forster, 2000). Many of the reasons for this failure were due to insufficient selection standards, issues of gender and race, substance abuse, and insufficient training of the expatriates (Minter, 2008). The family has been found to be the most important factor contributing to expatriate success or failure. The results reveals that, place of work plays a dominant role in problem coping skills of the employees in IT sector and seems to be high level challenge.

KEYWORDS

Expatriates Challenges, Business Skills, Training off Shore Assignments etc.

INTRODUCTION

'Expatriates' play a crucial role for their organization and performance of a company in the international arena is largely reliant on the performance of its expatriate employees (Tung, 1981). Multiple factors have discerning impact upon expatriate assignments and organisations need to respect that simply prioritising international business in terms of revenue would be incomplete without sound expatriate management policies. The human and financial costs of underperformance / failure in the international business area are considerably more severe than in the domestic area. Many organisations relatively new to the international scene underestimate the complex nature of human resource (HR) problems in the international arena and that business failures in the international arena may often be linked to the poor performance of expatriates (Forster, 2000). As organizations become globalised, there is an increasing challenge to use expatriates on international assignments to complete strategically critical tasks (Gregersen & Black 1996, Brewster 1998, and Downes & Thomas 1999

NEED FOR THE STUDY

MNC managers should enhance discussion and communication between expatriates and their families to increase the exchange of views among family members to reduce conflict and disagreement arising from international assignments. Indian IT employees are known for their work diversity and cross-cultural issues at work with the wide spread work place movements in the career. A foreign country may be new to them in terms of language, demographics, environment and local customs. Hence, present study is conducted to know the issues and concerns of Indian expatriates.

OBJECTIVES OF THE STUDY

- To study the relationship between place of work, Work domain, Language and challenges of expatriate environment among the employees from IT sector.
- To find out suggestions for the expatriate challenges in cross-cultural environment to manage stress and performance.

METHODOLOGY USED

Employees who had travelled on international assignments for a minimum period of three months to three years were considered as respondents for this study. The respondents were chosen by adopting snowball-sampling technique. A total of 334 expatriates were contacted for a response rate of 82 percent. Structured questionnaire along with semi-structured interview was used for collecting data. The questionnaire consisted of demographic details of expatriates, followed by questions relating to job, motivational factors, socio and cultural issues of expatriates. During the interview, the respondents were allowed to explain his own experiences and problems during expatriation leading to fewer questions from the researcher. This helped the researcher to identify micro level difficulties of expatriates. The questionnaire tested for cronbach's alpha revealed 0.823, 0.811 and 0.824 on job-related, work related and socio culture related questions respectively.

DATA ANALYSIS AND DISCUSSION

***Null Hypothesis*:** There is no relationship between Place of work and the perceptions on the motivating factors and intentions of expatriation among the sample.

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Table-1: ANOVA Results

Motivating Factors of Expatriation		Place of Work						F value	P value
		USA	Canada	Japan	Middle East	Malaysia	Singapore		
Job Advancement	Mean	**16.37**	14.15	15.86	14.07	14.83	15.89	2.754	0.019*
	SD	(5.04)	(5.00)	(4.57)	(5.31)	(4.35)	(4.49)		
Job Security	Mean	15.94	14.35	14.19	12.71	14.54	**16.28**	5.082	0.000**
	SD	(5.16)	(5.48)	(4.20)	(5.06)	(5.06)	(4.96)		
Overall Organisational Motivating Factors of Expatriation	Mean	**32.32**	28.50	30.05	26.78	29.38	32.18	4.203	0.001**
	SD	(9.54)	(9.30)	(7.59)	(9.90)	(8.61)	(8.85)		

Sources: Authors Compilation

Table-1 shows, since p value is less than 0.01, the null hypothesis, there is no relationship between Place of work and the perceptions on the motivating factors and intentions of expatriation except career growth dimension among the sample is rejected at 1% level of significance. Hence, statistically, it is noted that, there is a highly significant relationship between Place of work and the perceptions on the motivating factors and intentions of expatriation among the sample. Based on the mean value, it is noted that the overall motivation of the employees going to expatriation to USA and financial security motivation is observed among the employees working in Singapore among the sample. The null hypothesis is rejected at 5% level of significance with the observed p value of 0.019, which is less than 0.05. Based on the mean value, the employees with career growth is higher in number among the expatriates of USA when compared to others in the sample.

***Null Hypothesis*:** There is no relationship between place of work (country of expatriation) and challenges faced during the expatriation among the sample.

Table-2: ANOVA Results

Challenges of Expatriation		Place of Work						F value	P value
		USA	Canada	Japan	Middle East	Malaysia	Singapore		
Family Challenges	Mean	14.38	14.93	15.71	**16.53**	15.83	14.37	3.436	0.005**
	SD	(3.91)	(3.96)	(2.74)	(5.04)	(3.55)	(3.07)		
Diversity Challenges	Mean	14.68	16.05	13.14	**17.18**	16.63	15.09	4.865	0.000**
	SD	(4.52)	(4.38)	(3.88)	(4.70)	(4.21)	(4.11)		
Societal Challenges	Mean	14.47	14.73	14.10	**16.15**	15.29	13.88	2.428	0.035*
	SD	(4.74)	(4.18)	(3.58)	(4.50)	(4.26)	(3.81)		
Security Challenges	Mean	14.25	15.78	13.71	**16.34**	16.29	14.75	3.745	0.003**
	SD	(4.30)	(3.86)	(3.24)	(3.97)	(3.93)	(4.08)		
Ego Challenge	Mean	17.05	18.48	17.81	**18.76**	18.71	17.67	2.318	0.043*
	SD	(4.46)	(3.23)	(3.87)	(3.56)	(3.22)	(3.75)		
Overall Challenges of Expatriates	Mean	74.83	79.95	74.48	**84.96**	82.75	75.75	4.705	0.000**
	SD	(17.73)	(13.91)	(12.64)	(18.47)	(13.85)	(13.48)		

Sources: Authors Compilation

Table-2 shows, since p value is less than 0.01, the null hypothesis, there is no relationship between place of work (country of expatriation) and family, diversity, security and overall challenges faced during the expatriation among the sample is rejected at 1% level of significance. Hence, there is a highly significant relationship between place of work (country of expatriation) and personal, cultural, safety and overall challenges faced during the expatriation among the sample. Based on the mean value, the expatriates of Middle East encounter higher degree of family, diversity, security and overall challenges. It may be due to religious, socio cultural aspects of Middle East are different from rest of the world. There is no relationship between place of work (country of expatriation) and societal and ego challenges faced during the expatriation among the sample.

Null Hypothesis: There is no relationship between place of work and the perceptions on the expatriate environment and culture prevailing in the country of expatriation among the sample.

Table-3 shows, since p value is less than 0.01, the null hypothesis, there is no relationship between place of work and the perceptions on the expatriate environment and culture prevailing in the country of expatriation among the sample is rejected at 1% level of significance. Hence, statistically, it is inferred that, there is a highly significant relationship between place of work and the perceptions on the expatriate environment and culture prevailing in the country of expatriation among the sample.

Table-3: ANOVA Results

Expatriate Management Environment		Place of Work						F value	P value
		USA	Canada	Japan	Middle East	Malaysia	Singapore		
Knowledge	Mean	17.24	16.33	16.76	14.79	16.42	**17.51**	4.060	0.001**
	SD	(3.89)	(3.98)	(3.42)	(5.53)	(3.83)	(3.25)		
Official	Mean	**19.02**	16.33	18.14	15.51	17.00	18.68	7.792	0.000**

	SD	(3.96)	(4.58)	(2.59)	(5.66)	(3.79)	(3.12)		
Environmental	Mean	17.00	16.08	17.29	14.59	16.21	**17.49**	5.540	0.000**
	SD	(4.08)	(3.35)	(3.42)	(3.85)	(3.64)	(3.79)		
Social	Mean	16.51	15.43	16.95	14.29	15.21	**16.61**	4.391	0.001**
	SD	(4.01)	(3.80)	(3.25)	(3.98)	(3.56)	(3.73)		
Overall Expatriate Management Environment	Mean	69.78	64.15	69.14	59.18	64.83	**70.30**	7.991	0.001**
	SD	(12.85)	(12.71)	(8.68)	(16.55)	(11.12)	(9.97)		

Sources: Authors Compilation

***Null Hypothesis*:** There is no relationship between domain of work and the perceptions on the motivating factors and intentions of expatriation among the sample.

Table 4: ANOVA results

Motivating Factors of Expatriation		**Domain of Work**						
		1	**2**	**3**	**4**	**5**	**F value**	**P value**
Job Advancement	Mean	15.44	15.75	15.54	**16.58**	11.18	8.597	0.000**
	SD	(4.30)	(4.49)	(4.71)	**(5.52)**	(5.08)		
Job Security	Mean	14.52	14.72	14.54	**17.20**	10.84	10.866	0.000**
	SD	(4.43)	(4.85)	(5.20)	**(5.33)**	(5.28)		
Overall Organisational Motivating Factors of Expatriation	Mean	29.96	30.47	30.08	**33.78**	22.03	10.942	0.000**
	SD	(7.84)	(8.43)	(9.24)	**(10.32)**	(9.84)		

Note: 1= Design and Development; 2= Production / Construction; 3= Networking; 4= Consultancy, 5= Marketing
Sources: Authors Compilation

Table-4 shows, since p value is less than 0.01, the null hypothesis, there is no relationship between domain of work and the perceptions on the motivating factors and intentions of expatriation among the sample is rejected at 1% level of significance. Based on the same, it is inferred that, there is a highly significant relationship between domain of work and the perceptions on the motivating factors and intentions of expatriation among the sample.

***Null Hypothesis*:** There is no relationship between domain of work and problems faced during the expatriation among the sample.

Table-5: ANOVA results

Challenges of Expatriation		**Domain of Work**						
		1	**2**	**3**	**4**	**5**	**F value**	**P value**
Family Challenges	Mean	15.35	14.65	15.02	13.94	**18.34**	8.464	0.000**
	SD	(3.49)	(3.38)	(4.25)	(4.11)	**(4.99)**		
Diversity Challenges	Mean	16.10	15.47	14.94	13.92	**18.68**	8.310	0.000**
	SD	(3.90)	(4.08)	(4.23)	(4.96)	**(4.87)**		
Societal Challenges	Mean	15.11	15.02	14.26	13.28	**18.00**	8.376	0.000**
	SD	(3.69)	(4.09)	(3.96)	(4.96)	**(4.53)**		
Security Challenges	Mean	15.09	15.15	15.38	13.73	**18.08**	7.742	0.000**
	SD	(3.47)	(3.64)	(4.11)	(4.71)	**(3.92)**		
Ego Challenge	Mean	17.89	18.32	17.70	16.52	**20.66**	8.030	0.000**
	SD	(3.31)	(3.09)	(3.66)	(5.05)	**(2.64)**		
Overall Challenges of Expatriates	Mean	79.54	78.60	77.30	71.39	**93.76**	13.290	0.000**
	SD	(12.13)	(12.65)	(15.62)	(19.93)	**(18.44)**		

Note: 1= Design and Development; 2= Production / Construction; 3= Networking; 4= Consultancy, 5= Marketing
Sources: Authors Compilation

Table-5 shows, since p value is less than 0.01, the null hypothesis, there is no relationship between domain of work and problems faced during the expatriation among the sample is rejected at 1% level of significance. Hence, statistically, it is noted that, there is a highly significant relationship between domain of work and problems faced during the expatriation among the sample.

***Null Hypothesis*:** There is no relationship between domain of work and the perceptions on the expatriate environment and culture prevailing in the country of expatriation among the sample.

Table-6 shows, since p value is less than 0.01, the null hypothesis, there is no relationship between domain of work and the perceptions on the expatriate environment and culture prevailing in the country of expatriation among the sample is rejected at 1% level of significance. Hence, statistically, it is inferred that, there is a highly significant relationship between domain of work and the perceptions on the expatriate environment and culture prevailing in the country of expatriation among the sample.

Table-6: ANOVA results

Expatriate Management Environment		Domain of Work						
		1	**2**	**3**	**4**	**5**	**F value**	**P value**
Knowledge	Mean	16.70	16.72	16.66	**17.89**	12.18	13.080	0.000**
	SD	(3.31)	(3.71)	(3.93)	**(4.21)**	(6.03)		
Official	Mean	17.46	17.78	17.90	**19.15**	13.61	10.830	0.000**
	SD	(3.62)	(3.86)	(4.00)	**(4.21)**	(6.73)		
Environmental	Mean	16.00	16.42	16.46	**18.16**	13.05	12.523	0.000**
	SD	(3.42)	(3.17)	(3.85)	**(4.26)**	(3.82)		
Social	Mean	15.71	15.73	15.78	**17.25**	12.89	8.513	0.000**
	SD	(3.45)	(3.75)	(3.58)	**(4.24)**	(4.03)		
Overall Expatriate Management Environment	Mean	65.87	66.65	66.80	**72.46**	51.74	17.338	0.000**
	SD	(9.65)	(10.78)	(12.66)	**(14.08)**	(18.39)		

Note: 1= Design and Development; 2 = Production / Construction; 3 = Networking; 4 = Consultancy, 5 = Marketing
Sources: Authors Compilation

Null Hypothesis: There is no relationship between level of fluency of local language and the perceptions on problems faced during the expatriation among the sample.

Table-7: ANOVA results

Challenges of Expatriation		Level of Fluency of Language						
		Nil	**Basic**	**Working**	**Quite Fluent**	**Very Fluent**	**F value**	**P value**
Family Challenges	Mean	**17.98**	16.73	15.31	14.89	13.64	12.842	0.000**
	SD	**(4.66)**	(4.81)	(3.15)	(3.09)	(3.72)		
Diversity Challenges	Mean	**17.64**	17.61	16.71	15.08	14.02	10.016	0.000**
	SD	**(4.90)**	(4.66)	(3.98)	(3.32)	(4.68)		
Societal Challenges	Mean	**17.02**	16.51	14.26	15.20	13.29	9.301	0.000**
	SD	**(4.51)**	(4.59)	(3.82)	(3.19)	(4.66)		
Security Challenges	Mean	**17.07**	17.02	14.51	15.31	13.75	9.436	0.000**
	SD	**(4.19)**	(4.01)	(3.71)	(3.41)	(4.21)		
Ego Challenge	Mean	**19.89**	18.53	17.80	17.97	16.94	5.282	0.000**
	SD	**(3.41)**	(3.41)	(3.70)	(2.70)	(4.72)		
Overall Challenges of Expatriates	Mean	**89.60**	86.41	78.60	78.44	71.64	14.641	0.000**
	SD	**(19.18)**	(18.13)	(13.29)	(8.44)	(17.38)		

Sources: Authors Compilation

Table-7 shows, since p value is less than 0.01, the null hypothesis, there is no relationship between level of fluency of local language and the perceptions on problems faced during the expatriation among the sample is rejected at 1% level of significance. Based on the same, it is inferred that, there is a highly significant relationship between level of fluency of local language and the perceptions on problems faced during the expatriation among the sample.

FINDINGS OF STUDY

There is a highly significant relationship between place of work and the perceptions on motivating factors and intentions of expatriation among the sample. Based on mean value, it is noted that the overall motivation of the employees going to expatriation to USA and financial security motivation is observed among the employees working in Singapore among the sample. Since p value is less than 0.01, the null hypothesis, There is no relationship between place of work (country of expatriation) and Family, Diversity, Security and overall challenges faced during the expatriation among the sample is rejected at 1% level of significance. There is a highly significant relationship between place of work and perceptions on expatriate environment and culture prevailing in the country of expatriation among the sample. Based on mean value, it is noted that knowledge awareness, environmental, social and overall expatriate environment of Singapore sounds good when compared to other countries in the globe. Since p value is less than 0.01, the null hypothesis, There is no relationship between domain of work and the perceptions on motivating factors and intentions of expatriation among the sample is rejected at 1% level of significance. There is a highly significant relationship between domain of work and challenges faced during the expatriation among the sample. Based on mean value, it is noted that, expatriates in the field of marketing are facing higher degree of challenges when compared to others in the sample. There is a highly significant relationship between level of fluency of local language and the perceptions on problems faced during the expatriation among the sample. There is a highly significant relationship between religion and perceptions on motivating factors and intentions of expatriation among the sample. Since p value is less than 0.01, the null hypothesis; there is no relationship between religion and challenges faced during the expatriation among the sample is rejected at 1% level of significance.

SUGGESTIONS

It is advisable to have the projects at favourable climate states when compared to risk oriented countries. When the specific projects are taken up at risk zones, necessary risk mitigating techniques, risk, and disaster control mechanism need to incorporate in the site management infrastructure. Hence, risk management indirectly helps to improve the performance and coping stress at work. The perceptions of people towards expatriation and myths associated with the expatriation influence the stress management capacity and performance levels of employees largely. Hence, pre-departure training on expatriating communication, cross culture, and basic information on location and other related issues can help in facing the challenges. Familiarity of local language is an advantage to the expatriates to cope with the work culture and to interact with local communities to exchange the ideas and to clarify the doubts at work and personal related issues. In some cases, it is advisable to have basic facilities like medical, banking and safety help portals at work place. This can ease the employees stress largely.

CONCLUSION

The results indicate that the expatriate environment prevailing in the countries of expatriation is mixed in nature. The basis issues of cross cultural, in the form of personal, self ego, cultural, social, safety and environmental indicates the need for improvement of the level of awareness of environment in the dimensions of social, cultural, environmental, and behavioural aspects of expatriate country; which is possible only through training on offshore culture and frequent short trips to understand the working conditions, language, culture and behaviour of employees at work. A committed co-operation along with positive attitude towards the problem from all stakeholders is a key of improving the expatriation management environment in multi stakeholder environment.

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OFFICE SUITE CLOUD COLLABORATION

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ABSTRACT

This paper conceptualizes the web-based applications such as Collaborating on Word Processing, Spreadsheet and Presentation. This paper also compares several collaborative office suite tools available in cloud.

KEYWORDS

Cloud, Cloud Computing, Collaboration, Colleges & Schools, Small-to-Medium Companies, Free Cloud Solutions etc.

BEYOND DESKTOP

Cloud Computing portends a major change in how we store information and run applications. Instead of running programs and data on an individual desktop computer, everything is hosted in the "Cloud" – a nebulous assemblage of computers and servers accessed via the Internet. Cloud computing lets you access all the applications and documents from anywhere in the world, freeing you from the confines of the desktop and making it easier for group members in different locations to collaborate.

UNDERSTANDING CLOUD COMPUTING

The emergence of cloud computing is the computing equivalent of the electricity revolution of a century ago. Before the advent of electrical utilities, every farm and business produced its own electricity from freestanding generators. After the electrical grid was created, farms and businesses shut down their generators and bought electricity from the utilities, at a much lower price (and with much greater reliability) than they could produce on their own.

Look for the same type of revolution to occur as cloud computing takes hold. The desktop-centric notion of computing that we hold today is bound to fall by the wayside as we come to expect the universal access, 24/7 reliability, and ubiquitous collaboration promised by cloud computing.

COLLABORATING ON WORD PROCESSING

Now-a-days every user uses a word processing program. It plays a prominent role. However, every mobile and smart phone user wants to perform word processing operations at their fingertips. This can be achieved with the help of cloud services and its web based applications. We have many online web-based word processors that are available for maximum of the devices. All we need is to have an internet access. Every document you create is housed on the web, so you do not have to worry about taking your work with you. It is cloud computing at its most useful, and its here today. In short, Web-based word processing applications are accessed on cloud but on our solid-state drives/disks. These applications encapsulate the essential features of traditional word processors and provide them in web-based word processors.

Exploring Web-Based Word Processors

There are various web-based word processing applications namely:

- Google Docs
- Adobe Buzzword
- ajaxWrite
- Docly
- Glide Write
- KBdocs
- Peepel WebWriter
- ThinkFree Write
- WriteBoard
- Zoho Writer

Figure-1: Collaboration of Word Processors

Sources: Authors Compilation

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There are some features that can be compared for the above web-based word processing applications for better understanding of cloud services classified as platform developed, Unique Features, Subscription plans, etc. Refer Table1 for Collaboration of Word Processing.

COLLABORATING ON SPREADSHEETS

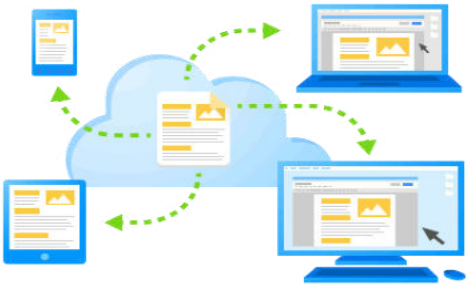
Spreadsheets, after Word processor plays the influential role on business users and home users to plan their budget perform "What if" analysis without facing any problem with the numbers. Some of the users who love mobility in their lives and professions prefer to have a web-based spreadsheet along with them to audit their expenses, outlay, etc, which deals with the numbers. Therefore, alike word processors, spreadsheets are available on cloud services. Web-based spreadsheets shares all the advantages of web-based word processors like portability, collaboration etc along with traditional spreadsheets program features.

Exploring Web-Based Spreadsheets

If you are interested in moving your number crunching and financial analysis into the cloud, these web-based applications are worth checking out:

- Google Spreadsheets
- EditGrid
- eXpresso
- Glide Crunch
- Num Sum
- Peepel WebSheet
- Sheetster
- ThinkFree Calc
- Zoho Sheet

Figure-2: Collaboration of Spreadsheets



Sources: Authors Compilation

There are some features for the above-mentioned web-based spreadsheet applications, collaborated to cloud service. By comparing the features like their platform developed unique features, plans, browser compatibility, etc. for better understanding. Refer Table 2 for collaborations of web-based spreadsheets.

COLLABORATING ON WEB-BASED PRESENTATION

Presentation, after spreadsheets and word processors, the key application for business users and home users. Presentations, last application from traditional office suit which has been extended on to cloud. Although traditional application has ruled the world for many years, a web-based presentation offers same features comparatively.

A user who works in a collaborative environment can perform manipulations and share the presentation to all who are in-group. It has become essential features. The most essential feature of web-based presentation is that there is no need to worry about the connectivity, carrying, etc. however it is present in the cloud one can access the presentations, which are available on cloud. One should be aware of the transitions, slide effects, background color etc, are subjected to change in the web-based application.

Exploring Web-Based Presentation

Unlike some other application categories, there is no clear-cut leader in the web-based presentation market. Some users like Google Presentations, some like Zoho Show, some have other favorites. Check the features of following applications and choose the one that offers the right features for your needs.

- BrinkPad
- Empressr
- Google Presentations
- Preezo
- Presentation Engine
- PreZentit
- Slide Rocket
- ThinkFree Show
- Thumbstacks
- Zoho Show
- Slide Burner (Presentation Sharing Site)
- Slide Share (Presentation Sharing Site)

By comparing the features like their platform developed unique features, plans, browser compatibility, etc. for better understanding. Refer Table3 for collaborations of web-based presentations.

Table-1: Collaboration of Word Processing

	Company Name	URL	Platform	Browser Support	Unique Features	Plans	Price	Mobile Device Support	Graph
Google docs	Google	www.docs.google.com	Java	IE, MF, GC, Safari	Sharing multiuser access, Online editing	Free	Free up to 15GB	Android, iOS	Supports .xlx, .xlsx, .svg
Buzzword	Adobe	www.acrobat.com	HTML	IE, GC	Flash player, Shockwave player	1 month	PCS	Supports for mobiles	Yes
Ajax Write	Ajax write	www.ajaxwrite.com	NA	Firefox	Simple, RTF, PDF docs	Free	Free	Doesn't support	NA
Docly	Docly	www.docly.com	Linux	All Browsers	NA	NA	NA	NA	Maybe
Glide	Glide	www.glideconnect.com	NA	All Browsers	Quick & easy sharing	NA	NA	Windows8, iOS, Android	NA
Kbdocs	Kbdocs	www.kbdocs.com	Java	IE, GC, Firefox	Provides Templates, Tutorials	Domain for sale	Domain for sale	Domain for sale	No
Peepel	Peepel	peepel.com	Peepel platform	All browsers	Spreadsheets, Word Processors, Interactive maps	NA	NA	Windows CE	NA
Thinkfree	Hancom	www.thinkfree.com	Java, Ajax	All browsers	Fast Performance, High Fidelity with Word, Excel & PowerPoint	Free in Australia	Vary for size	Android, Virgin, Cellular south mobiles	NA
Writeboard	Basecamp and Classic	www.basecamp.com	NA	All browsers	Stylish web-based documents, File sharing	1 month	$49pm	iOS, Android, Blackberry	Yes
Zoho	Zoho Office Suite	www.zoho.com	Java, PHP	All browsers	Writer, sheet, meeting, planner, creator, show products	Cost service	Free	No	Yes
Webex	Cisco	www.webex.com	PHP, Java	All browsers	High efficiency reduce costs, easy to use	Cost service	Depends on members	Supports for mobiles	NA

Sources: Authors Compilation
Note: NA- Not Available, IE- Internet Explorer, MF- Mozilla Firefox, GC- Google Chrome, PCS- Proprietary Cost Service

Table-2: Collaborations of Web-based Spreadsheets

	Company Name	URL	Platform	Browser Support	Unique Features	Plans	Price	Device Support	Charts	Graphs
Google Spreadsheets	Google	docs.google.com/spreadsheet	Java/JS	IE 9+, GC, MF, Safari	Nil	Free	$4.99	Google Apps	No	No
Edit Grid	Editgrid	www.editgrid.com	AJAX	Any	RTU, RDU	Free	Free	Nil	Yes	No
Expresso	Expresso Corp	www.expresso.com	AJAX	Any	Nil	PCS	Yes	Nil	No	No
Glide Crunch	Glide Crunch	http://www.glideconnect.com/	Java	Nil	Mobile App	Free	Free	IOS, Android	No	No
Num Sum	Trimpath	http://numsum.com/	AJAX	Any	Nil	Free	Free	Nil	Yes	No
Sheetster	Extentech	http://sourceforge.net/projects/sheetster/	JAVA, JSP, JS	Any	RSS	PCS	Yes	Any	Yes	No
Think free calc	Hancom	office.thinkfree.com/en/calc.html	JAVA, AJAX	Any	Sharing, Collaborating	PCS	Yes	Windows & Android	Yes	No
Zoho	ZOHO Corp	www.zoho.com/docs	PHP, JAVA	Any	RSS, ATOM	PCS	Yes	No	Yes	No
Molw	Microsoft	workspace.office.live.com	C++(Web Based extension of MS Office)	IE 6+, MF 6+,	Mobile Support	PCS	PCS	Windows & Android	No	No

Sources: Authors Compilation
Note: NA- Not Available, IE- Internet Explorer, MF- Mozilla Firefox, GC- Google Chrome, PCS- Proprietary Cost Service

Table-3: Collaborations of Web-based Presentations

	Company Name	URL	Platform	Browser Support	Unique features	Plan	Price	Mobile Device Support	Charts and Graphs
Brinkpad	Brinkpad	www.brinkpad.com	Java, Cloud & Mobile platforms	IE, MF, GC	Special effects	iDrive online backup	Free	iOS, Windows8	It uses icons without clear labels
Empresser	Empresser	www.empresser.com	Java & Multi Platforms	Original Web Standards browser	Graphic design, video editing	Option plan	Free	All	Can add color, text, shapes,
Google Presentation	Googleplex	www.docs.google.com	Cloud & Google Apps platform	IE, MF, GC	Animation new slide transitions	Create mockups directly from drive	Free	Wi-Fi connect	Can use the web clipboard
Preezo	Prezzo Plc	www.prezzo.com	Multiple online platforms	Html5, css3, svg,	Trip advisor, features	Business Plans	Free	All	Point Across visually
Presentation Engine	Presentation engine	www.presentationengine.com	Google apps engine platform	GC, MF, IE	Slide show tool features	Hosted links via email	Free	All	Corporate Signature
PreZentit	Prezentit	www.prezentit.com	Independent platform	IE, MF, Camino	Easy to use clipart shapes	Yes	Free	iOS, Android	Attractive and easy-to-use
Slide Rocket	Slide rocket	www.sliderocket.com	Clear slide & Official Presentation Platform	IE, MF, GC	Interactive Robust grouping	Marketing plan	Free	iOS, Android	One side chart or graph
Think Free show	Think free office Show 4	www.thinkfree.com	Java enabled Mac PC, & Linux platform	Java, Ajax	Robust mail-merge features	Slide Smartphone plans	Free	iOS, Android	Direct to MS Office
Thumb Stacks	Thumb Stacks	www.thumbstacks.com	Multi & Non-traditional Storage platform	GC, Safari, Mobile Safari	Toolbar has more feature	Strategic, managing activities plan	Free	iOS, Android	Creates compact, interactive flash diagrams
Zoho Show	Zoho Show	www.zoho.com/docs	Sozi, Google platform	IE, MF, GC	Clipart and shapes % special 3d features	Discussions, Curriculam Plan	Free	iOS, Windows8, Android	Quickly analyze data in a visual format

Sources: Authors Compilation
Note: IE - Internet Explorer, MF - Mozilla Firefox, GC - Google Chrome

CONCLUSIONS

These suites of applications are designed to compete with Microsoft Office and its included apps – Word, Excel and PowerPoint – but with all the benefits of web-hosted apps and docs. Today, the most popular web-based office suites include the following:

- Glide Business (www.glidedigital.com),
- Google Docs (docs.google.com),
- Peepel Online Office (www.peepel.com),
- ThinkFree My Office (www.thinkfree.com),
- WebEx Web Office (www.weboffice.com),
- Zoho Office (office.zoho.com).

Of these suites, Google Docs has the largest installed base today; many companies, organizations, and educational institutions have already switched from Microsoft Office to Google's free web-based applications. Web-based Word processing, Spreadsheets & Presentations can be used by Beginning users, Casual users, anyone who wants access to their documents from multiple locations, anyone who needs to share their documents with others, anyone who needs to edit their documents in a collaborative environment.

As we all know that every technology have Pro's and Con's so a web-based work processor isn't for everyone like Power users who want to use advanced features most of the time, Anyone who wants to create sophisticated fancy printouts, Anyone working on sensitive documents, Anyone who needs to work when not connected to the Internet.

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COMPARATIVE STUDY OF VARIOUS LINEAR, NON-LINEAR AND GUIDED FILTERS

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ABSTRACT

Most applications in computer vision, computer graphics and image processing involve the concept of image filtering to reduce noise and/or to extract useful image structures. This paper demonstrate the comparative study among various guided, linear, and non-linear filters for image enhancement using Mean Square Error (MSE) and Peak signal to noise ratio (PSNR) This paper also provide an overview of underlying concept of image processing concepts and algorithms.

KEYWORDS

PSNR, MSE, LTI, HDR, Kernel, Mean etc.

INTRODUCTION

Image Processing has been developed in response to solve three major problems concerned with pictures. First, one is Picture digitization and coding to facilitate transmission, printing and storage of pictures. Next one is Picture enhancement and restoration in order for example, to interpret more easily pictures of the surface of other planets taken by various probes. Last one is Picture segmentation and description as an early stage in machine vision.

The field of Image Processing or Filtering continues, as it has since the early 1970s, on a path of dynamic growth in terms of popular and scientific interest and number of commercial applications. In 1994, Yiu-Fai Wong told Image enhancement is useful when the details in an image are lost due to various reasons. It is common to subtract a mask from a given image to enhance the details. The trick is how to obtain a good mask. They described how an edge-preserving filter could be used to generate a mask, which is smooth over areas with fine details, yet preserving most of the edges [1].

The classic bilateral filter by Tomasi and Manduchi (1998) demonstrated a weighted Gaussian filter that makes use of an intensity component in addition to the spatial component to reweight the Gaussian filter. The joint bilateral filter extends this idea by computing the filter weights based on additional input images and not on the color image itself. Therefore, it directly correlates to the previously mentioned global illumination filtering methods, where this buffer consists usually of combinations of the normal depth and/or noisy color image. Even though various methods for accelerating the original bilateral filter exist, it does not seem to be feasible to directly speedup the joint bilateral filtering [2].

In 1999 Bakker, Van Vliet, Verbeek They describes a new strategy for combining orientation adaptive filtering and edge preserving filtering. The filter adapts to the local orientation and avoids filtering across borders. The local orientation for steering the filter will be estimated in a fixed sized window, which never contains two orientation fields. This can be achieved using generalized Kuwahara filtering. This filter selects from a set of fixed sized windows that contain the current pixel, the orientation of the window with the highest anisotropy. They compare out filter strategy with a multi-scale approach [3].

Michael Elad (2002) proposed such a bridge, and showed that the bilateral filter also emerges from the Bayesian approach, as a single iteration of some well-known iterative algorithm. Based on this observation, he also showed how the bilateral filter could be improved and extended to treat more general reconstruction problems [6].

Xing-Fang Huang; Jiang-She Zhang (2009) proposed a novel local adaptive noise reduction operator based on a location shifting procedure. The proposed method aims at removing noise from images while preserving features. Performance of the method is illustrated by simulation and real images, which show an encouraging improvement compared with other methods. The other advantages of the proposed method are its non- iterative feature, explicit formulation, and, consequently, its numerical simplicity [8].

Dammertz (2010) proposed to approximate the cross bilateral filter by an edge-avoiding À-Trous wavelet transform. While being very fast, the approximation of the cross bilateral filter can result in visually disturbing ringing artifacts. It happens all approaches based on the idea of the cross bilateral filter may suffer from small outliers for which not enough samples are available for sufficient filtering results [9].

D. Prasanthi propose a novel explicit image filter which is derived from a local linear model, this filter compute the filtering output by considering the content of guidance image, which can be the input image or another different image. This guided filter

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can be used as an edge preserving smoothening operator like the popular bilateral filter but it has better behavior near edges. This guided filter can transfer the structures of the guidance image to the filtering output, enabling new filtering applications like de-hazing and guided feathering. In addition, here experiment shows that the guided filter is effective and efficient in a great variety of computer vision, computer graphics applications, including edge aware smoothing, detail enhancement, HDR compression, image matting, de-hazing, and join up sampling. It is a work which accelerating the bilateral filter [11].

Pablo Bauszat, Martin Eisemann, Marcus Magnor present a novel path tracing pipeline based on edge aware filtering method for the indirect illumination which produces visually more pleasing results without noticeable outliers. There idea is not to only filter the noisy path traced images but also to use it as a guidance to filter a second image composed from characteristic scene attributes that do not contain noise by default. They show that our approach better approximates the Monte Carlo integral compared to previous methods [13].

Jiahao Pang, Oscar C. Au and Zheng Guo propose a scheme, which de-haze single image, and it is based on haze removal on dark channel. The main benefit of using this filter to refine the transmission lies in its low computational cost; it also generates comparable dehazed result [12].

Zhi-Feng Xie, Rynson W.H. Lau, Yan Gui propose a new sharpness characteristic effectively with affinity-based gradient transformation, and gradient-domain image reconstruction. They also propose and evaluation method based on sharpness distribution for analyzing all sharpness enhancement approaches in respect of sharpness characteristics. They develop a new pipeline with three committed steps: Sharpness saliency representation, affinity-based gradient transformation and gradient domain image reconstruction [14].

Yuxiang Yang, Zengfu Weng proposed a novel method for solving range image super resolution problem. Given a low resolution as an input, it recovers a high-resolution range image using a high-resolution camera image of the same scene. It solves range image super resolution problem by combining the advantages of guided image filter and reconstruction constrain. Here guided image filter will be applied to integrate the high-resolution image into the range data and generate an initial high-resolution range image. In addition, experiment demonstrates that our approach can get excellent high-resolution range image in terms of spatial resolution and depth precision [15].

COMPARATIVE STUDY AND WORK

Bilateral Filtering

Filtering is perhaps the most fundamental operation of image processing and computer vision. In the broadest sense of the term "filtering", the value of the filtered image at a given location is a function of the values of the input image in a small neighborhood of the same location. For example, Gaussian low-pass filtering computes a weighted average of pixel values in the neighborhood, in which the weights decrease with distance from the neighborhood center. Although formal and quantitative explanations of this weight fall-off can be given, the intuition is that images typically vary slowly over space, so near pixels are likely to have similar values, and it is therefore appropriate to average them together. The noise values that corrupt these nearby pixels are mutually less correlated than the signal values, so noise is averaged away while signal is preserved.

The Idea of Bilateral Filtering

The basic idea underlying bilateral filtering is to do in the range of an image what traditional filters do in its domain. Two pixels can be close to one another, that is, occupy nearby spatial location, or they can be similar to one another, that is, have nearby values, possibly in a perceptually meaningful fashion. Consider a shift-invariant low-pass domain filter applied to an image:

$$\mathbf{h}(\mathbf{x}) = k_d^{-1} \int_{\infty}^{\infty} \int_{\infty}^{\infty} \mathbf{f}(\xi) c(\xi - \mathbf{x}) d\xi$$

The bold font for f and h emphasizes the fact that both input and output images may be multi-band. In order to preserve the DC component, it must be:

$$k_d = \int_{\infty}^{\infty} \int_{\infty}^{\infty} c(\xi) d\xi$$

Range filtering is similarly defined:

$$\mathbf{h}(\mathbf{x}) = k_r^{-1}(\mathbf{x}) \int_{\infty}^{\infty} \int_{\infty}^{\infty} \mathbf{f}(\xi) s(\mathbf{f}(\xi) - \mathbf{f}(\mathbf{x})) d\xi$$

In this case, the kernel measures the photometric similarity between pixels. The normalization constant in this case is:

$$k_r(\mathbf{x}) = \int_{\infty}^{\infty}\int_{\infty}^{\infty} s\big(\mathbf{f}(\xi) - \mathbf{f}(\mathbf{x})\big)d\xi$$

The spatial distribution of image intensities plays no role in range filtering taken by it. Combining intensities from the entire image, however, makes little sense, since the distribution of image values far away from x ought not to affect the final value at x. In addition, one can show that range filtering without domain filtering merely changes the color map of an image, and is therefore of little use. The appropriate solution is to combine domain and range filtering, thereby enforcing both geometric and photometric locality. Combined filtering can be described as follows:

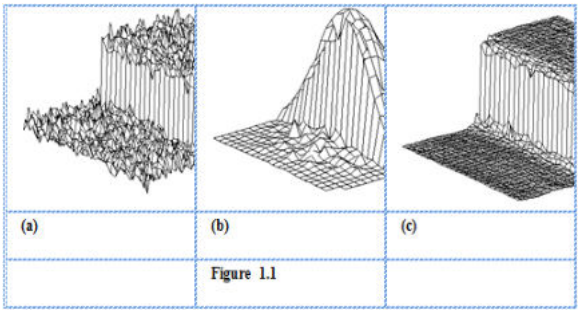
$$\mathbf{h}(\mathbf{x}) = k^{-1}\int_{\infty}^{\infty}\int_{\infty}^{\infty} \mathbf{f}(\xi)c\big(\xi - \mathbf{x}\big)s\big(\mathbf{f}(\xi) - \mathbf{f}(\mathbf{x})\big)d\xi$$

With the normalization:

$$k(\mathbf{x}) = \int_{\infty}^{\infty}\int_{\infty}^{\infty} c\big(\xi - \mathbf{x}\big)s\big(\mathbf{f}(\xi) - \mathbf{f}(\mathbf{x})\big)d\xi$$

Combined domain and range filtering will be denoted as bilateral filtering. It replaces the pixel value at x with an average of similar and nearby pixel values. In smooth regions, pixel values in a small neighborhood are similar to each other, and the bilateral filter acts essentially as a standard domain filter, averaging away the small, weakly correlated differences between pixel values caused by noise. Consider now a sharp boundary between a dark and a bright region, as in figure 1.

Figure-1



Sources: Authors Compilation

When the bilateral filter is centered, say, on a pixel on the bright side of the boundary, the similarity function s assumes values close to one for pixels on the same side, and values close to zero for pixels on the dark side. The similarity function is shown in figure 1.1(b) for a 23x23 filter support centered two pixels to the right of the step in figure 1.1(a). The normalization term k(x) ensures that the weights for all the pixels add up to one. As a result, the filter replaces the bright pixel at the center by an average of the bright pixels in its vicinity, and essentially ignores the dark pixels. Conversely, when the filter is centered on a dark pixel, the bright pixels are ignored instead. Thus, as shown in figure 1.1(c), good filtering behavior is achieved at the boundaries, thanks to the domain component of the filter, and crisp edges are preserved at the same time, thanks to the range component.

The Gaussian Case

A simple and important case of bilateral filtering is shift-invariant Gaussian filtering, in which both the closeness function c and the similarity function s are Gaussian functions of the Euclidean distance between their arguments. More specifically, c is radically symmetric:

$$c\big(\xi - \mathbf{x}\big) = e^{-\frac{1}{2}\left(\frac{d(\xi - \mathbf{x})}{\sigma_d}\right)^2}$$

Where:

$d\big(\xi - \mathbf{x}\big) = \|\xi - \mathbf{x}\|$ is the Euclidean distance. The similarity function s is perfectly analogous to c:

$$s\big(\xi - \mathbf{x}\big) = e^{-\frac{1}{2}\left(\frac{\delta(\mathbf{f}(\xi) - \mathbf{f}(\mathbf{x}))}{\sigma_r}\right)^2}$$

Where

$\delta(\mathbf{f}(\xi) - \mathbf{f}(\mathbf{x})) = |\mathbf{f}(\xi) - \mathbf{f}(\mathbf{x})|$ is a suitable measure of distance in intensity space? In the scalar case, this may be simply the absolute difference of the pixel difference or, since noise increases with image intensity.

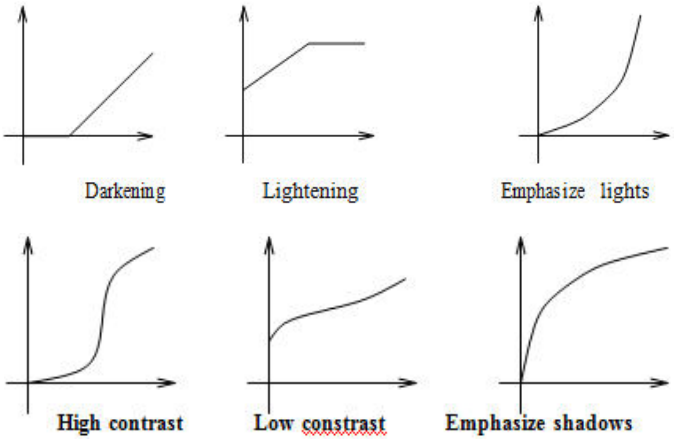
GREY SALE MANIPULATION

The simplest form of operation is when the operator T acts only on a 1×1 pixel neighborhood in the input image, that is $\hat{F}(x, y)$ depends on the value of F only at (x, y).

The simplest case is thresh holding where the intensity profile is replaced by a step function, active at a chosen threshold value. In this case, any pixel with a grey level below the threshold in the input image is mapped to zero in the output image. Other pixels are mapped to 255.

Other grey scale transformations are outlined in Figure 2 below:

Figure-2: Tone Scale Images



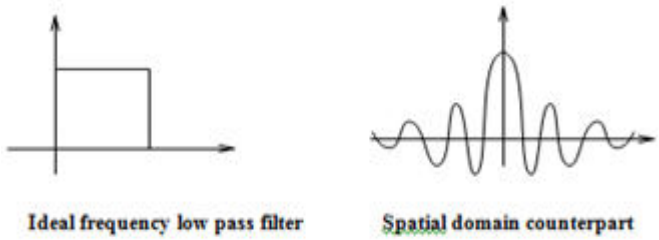
Sources: Authors Compilation

FREQUENCY DOMAIN METHODS

Image enhancement in the frequency domain is straightforward. We simply compute the Fourier transform of the image to be enhanced, multiply the result by a filter (rather than convolve in the spatial domain), and take the inverse transform to produce the enhanced image. The idea of blurring an image by reducing its high frequency components or sharpening an image by increasing the magnitude of its high frequency components is intuitively easy to understand. However, computationally, it is often more efficient to implement these operations as convolutions by small spatial filters in the spatial domain. Understanding frequency domain concepts is important, and leads to enhancement techniques that might not have been thought of by restricting attention to the spatial domain. Low pass filtering involves the elimination of the high frequency components in the image. It results in blurring of the image (and thus a reduction in sharp transitions associated with noise). An ideal low pass filter (see Figure 3) would retain all the low frequency components, and eliminate all the high frequency components.

Smoother transitions in the frequency domain filter, such as the Butterworth filter, achieve better results.

Figure-3: Transfer Function for an Ideal Low Pass Filter



Sources: Authors Compilation

GUIDED FILTER

It is derived from a local linear model; the guided filter generates the filtering output by considering the content of a guidance image, which can be the input image itself or another different image. The guided filter can perform as an edge-preserving smoothing operator like the popular bilateral filter, but has better behavior near the edges. It also has a theoretical connection with the matting Laplacian matrix, so is a more generic concept than smoothing operator and can better utilize the structures in the guidance image. Moreover, the guided filter has a fast and non-approximate linear-time algorithm, whose computational complexity is independent of the filtering kernel size. We demonstrate that the guided filter is both effective and efficient in a great variety of computer vision and computer graphics applications including detail smoothing / enhancement.

Simple explicit linear translation-invariant (LTI) filter like Gaussian filter, Laplacian filter, and Sobel filter are widely used in image blurring/sharpening, edge detection, and feature extraction. LTI filtering also includes the process of solving a Poisson Equation, such as in high dynamic range (HDR) compression, image stitching, and image matting, where the filtering kernel is implicitly defined by the inverse of a homogenous Laplacian matrix.

The kernels of LTI filters are spatially invariant and independent-of any image content. However, in many cases, we may want to incorporate additional information from a given guidance image during the filtering process. For example, in colorization the output chrominance channels should have consistent edges with the given luminance channel; in image matting the output alpha matte should capture the thin structures like hair in the image. One approach to achieve this purpose is to optimize a quadratic function that directly enforces some constraints on the unknown output by considering the guidance image. The solution is then obtained by solving a large sparse matrix encoded with the information of the guidance image. This inhomogeneous matrix implicitly defines a translation-variant filtering kernel. This approach is widely used in many applications, like colorization, image matting, multi-scale decomposition, and haze removal. While this optimization-based approach often yields the state-of-the-art quality, it comes with the price of long computational time.

The other approach is to explicitly build the filter kernels using the guidance image. The bilateral filter is perhaps the most popular one of such filters. Its output at a pixel is a weighted average of the nearby pixels, where the weights depend on the intensity / color similarities in the guidance image. The guidance image can be the filter input itself or another image. The bilateral filter can smooth small fluctuation and preserve edges. While this filter is effective in many situations, it may have unwanted gradient reversal artifacts near edges. Its fast implementation is also a challenging problem. Recent techniques rely on quantization methods to accelerate but may sacrifice the accuracy.

The guided filter output is locally a linear transform of the guidance image.This filter has the edge-preserving smoothing property like the bilateral filter, but does not suffer from the gradient reversal artifacts. It is also related to the matting Laplacian matrix, so is a more generic concept and is applicable in other applications beyond the scope of "smoothing".

Moreover, the guided filter has an O (N) time (in the number of pixels N) exact algorithm for both gray-scale and colour images. Experiments show that the guided filter performs very well in terms of both quality and efficiency in a great variety of applications, such as noise reduction, detail smoothing/enhancement, HDR compression, image matting/feathering, haze removal, and joint up sampling.

OPTIMIZATION-BASED IMAGE FILTERING

A series of approaches optimize a quadratic cost function and solve a linear system, which is equivalent to implicitly filtering an image by an inverse matrix. In image segmentation and colorization, the affinities of this matrix are Gaussian functions of the color similarities. In image matting, a matting Laplacian matrix is designed to enforce the alpha matte as a local linear transform of the image colours. This matrix is also applicable in haze removal.

The weighted least squares filter in adjusts the matrix affinities according to the image gradients and produces a halo-free decomposition of the input image. Although these optimization-based approaches often generate high quality results, solving the corresponding linear system is time-consuming.

GUIDED FILTER KERNEL

General linear translation- variant filtering process, which involves a guidance image I, an input image p, and output image q. Both I and p are given beforehand according to the application, and they can be identical. The filtering output at a pixel I is expressed as a weighted average:

$$q_i = \sum_j W_{ij}(I)\, p_j$$

Where i and j are pixel indexes. The filter kernel W_{ij} is a function of the guidance image I and independent of p. This filter is linear with respect to p.

A concrete example of such a filter is the joint bilateral filter.

The bilateral filtering kernel W^{bf} is given by:

$$W_{ij}^{\mathrm{bf}}(I) = \frac{1}{K_i}\exp(-\frac{|\mathrm{x}_i - \mathrm{x}_j|^2}{\sigma_s^2})\exp(-\frac{|I_i - I_j|^2}{\sigma_r^2})$$

Where the parameters σ_s σ_r adjust the spatial similarity and the range similarity respectively. The joint bilateral filter degrades to the original bilateral filter when I and p are identical.

Now we define the guided filter and its kernel. The key assumption of the guided filter is a local linear model between the guidance I and the filter output q. We assume that q is a linear transform of I in a window w_k centered at the pixel k:

$$q_i = a_k I_i + b_k, \forall i \in \omega_k$$

Where (a_k , b_k) are some linear coefficient assumed to be constant in w_k . We use a square window of a radius r. This local linear model ensures that q has an edge only if I has an edge, because $\nabla q = a\nabla I$. This model has been proven useful in image matting], image super-resolution, and haze removal.

To determine the linear coefficient, we seek a solution to that minimizes the difference between q and the filter input p. specifically, we minimize the following cost function in the window:

$$E(a_k, b_k) = \sum_{i\in\omega_k}((a_k I_i + b_k - p_i)^2 + \epsilon a_k^2)$$

Here E is a regularization parameter preventing a_k from being too large. The solution to this can be given by linear regression.

$$a_k = \frac{\frac{1}{|\omega|}\sum_{i\in\omega_k} I_i p_i - \mu_k \bar{p}_k}{\sigma_k^2 + \epsilon}$$
$$b_k = \bar{p}_k - a_k \mu_k.$$

Here μ_k and σ_k^2 are the mean and variance of I in w_k, |w| is the number of pixels in w_k.

We can apply the linear model to all local windows in the entire image. However, a pixel i is involved in all the windows w_k that contain i, so the value of q_i in is not the same when it is computed in different windows. A simple strategy is to average all the possible values of q_i. So after computing (a_k, b_k) for all patches w_k in the image, we compute the filter output by:

$$q_i = \frac{1}{|\omega|}\sum_{k:i\in\omega_k}(a_k I_i + b_k)$$
$$= \bar{a}_i I_i + \bar{b}_i$$

where $\bar{a}_i = \frac{1}{|\omega|}\sum_{k\in\omega_i} a_k$ and $\bar{b}_i = \frac{1}{|\omega|}\sum_{k\in\omega_i} b_k$.

With this modification, ∇q is no longer scaling of ∇I, because the linear coefficient ($\bar{a}_i$, $\bar{b}_i$) vary spatially. However, since ($\bar{a}_i$,$\bar{b}_i$) are the output of an average filter, their gradients should be much smaller than that of I near strong edges.

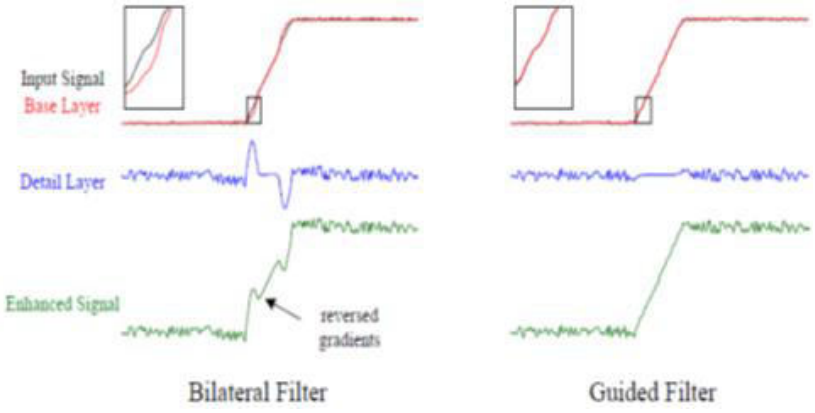
In this situation, we can still have $\nabla q \approx \bar{a}\nabla I$, meaning that abrupt intensity changes in I can be mostly maintained in q.

We point out that the relationship among I , p, and q. In fact, ak in can be rewritten as a weighted sum of p: ak =∑j Akj (I)pj , where Aij are the weights only dependent on I . For the same reason, we also have bk =∑j Bkj (I) pj and qi = ∑j Wij (I)pj. It can be prove that the kernel weights can be explicitly expressed by:

$$W_{ij}(I) = \frac{1}{|\omega|^2}\sum_{k:(i,j)\in\omega_k}(1 + \frac{(I_i - \mu_k)(I_j - \mu_k)}{\sigma_k^2 + \epsilon})$$

Further computations shows that $\sum_j W_{ij}(I) = 1$.

Figure-4: 1-D illustration for Detail Enhancement



Sources: Authors Compilation

PERFORMANCE MEASURES

The following measures of performance are used for quantitative estimation of the performance and analysis of the proposed filtering technique.

Mean Square Error (MSE)

It is the cumulative squared error between the original image and the filtered image and is given by the following equation:

I(x, y) = Image before filtering,
I'(x, y) = Image after filtering,
M, N = dimensions of the image,
D = 255 (for unit8 data type) or 1 (for double data type)

Lower the value of the mean square error better.

$$\text{MSE} = \frac{1}{MN}\sum_{Y=1}^{M}\sum_{X=1}^{N}\left[\frac{(I(x,y)-I^{'}(x,y))}{D}\right]$$

Peak signal to Noise Ratio (PSNR)

It is the measure of the peak error in the signal and is expressed mathematically by the following equation:

$$\text{PSNR} = 20 * \log_{10}\frac{D}{sqrt(MSE)}$$

RESULT AND DISCUSSION

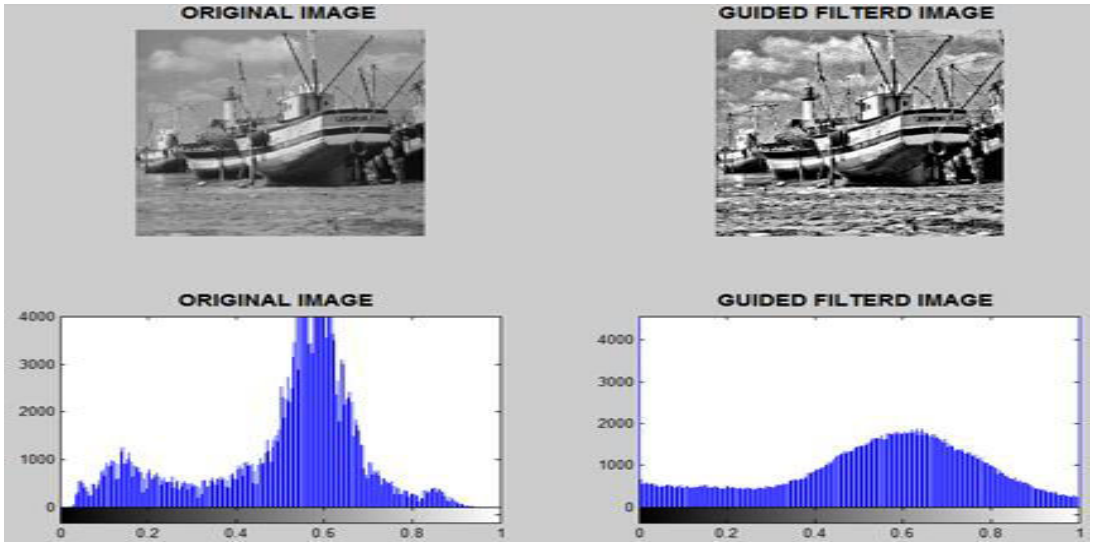
In this paper, we have studied a novel filter, which is widely applicable in computer vision, graphics, and its application (image enhancement). Different from the recent trend towards accelerating the bilateral filter, guided filter is a type of filter that shares the nice property of edge-preserving smoothing but can be computed efficiently and exactly. This filter is more generic and can handle some applications beyond the concept of "smoothing". Since the local linear model can be regarded as a simple case of learning, other advanced models/features might be applied to obtain new filters.

As a locally based operator, the guided filter is not directly applicable for sparse inputs like strokes. It also shares a common limitation of other explicit filter - it may have halos near some edges. In fact, it is ambiguous for a low - level, local operator to determine which edge should be smoothed, and which should be preserved. Unsuitably smoothing an edge will result in halos near it.

However, we believe that the simplicity and efficiency of the guided filter still make it beneficial in many situations. When we compare it with other linear and nonlinear filters for gray scale images we find that the guided filter is both effective and efficient and the MSE and PSNR parameters also shows that guided filter performs well as compared to others.

GUIDED FILTERING OUTPUT FOR BOAT IMAGE

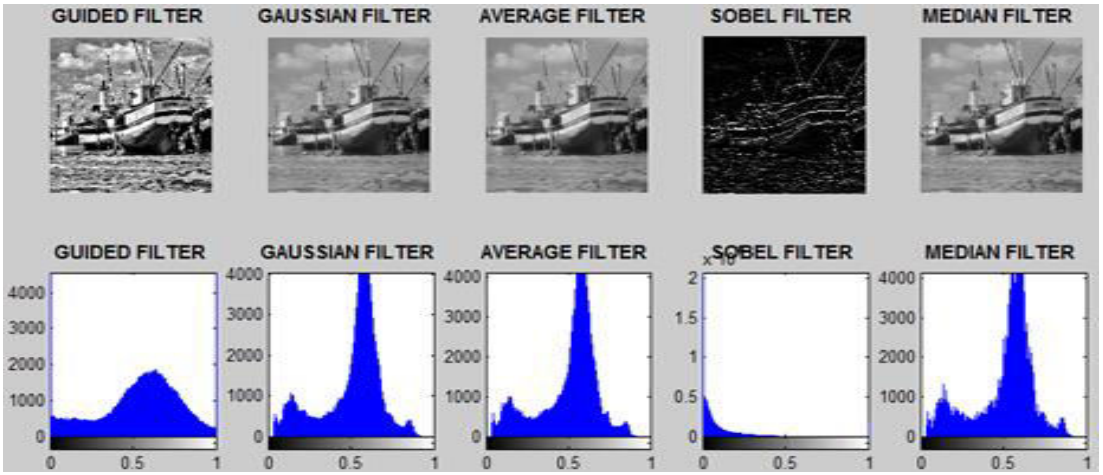
Figure-5: Guided Filtering Output for Boat Image



Sources: Authors Compilation

Figure-6: Comparison of Guided Filter, Linear and Nonlinear Filters on Gray Scale Images

BOAT IMAGE



Sources: Authors Compilation

Comparison of MSE and PSNR for Guided filter, Linear and Nonlinear Filters on Gray Scale Images

Table-1: Comparison of MSE and PSNR for Boat Image

Image Filter	Gaussian Filter	Average Filter	Sobel Filter	Median Filter	Guided Image Filter
MSE	0.0027	0.0208	6.0369	0.0128	0.0015
PSNR	25.70	16.82	-7.80	18.91	28.32

Sources: Authors Compilation

CONCLUSIONS

We studied the image enhancement using various linear, Non-linear and guided filters in this paper; the results show that guided filter is an edge-preserving filter, non-iterative, fast and accurate as compared to earlier developed filters for image enhancement. Other aspect, which needs to be studied, is image feathering, image smoothing, flash / no flash de-noising etc. Further study, other advanced models/features might be applied to guided filter to obtain new filters. Research may be undertaken to devise better enhancement techniques.

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IMPACT OF TECHNOLOGY ON INSURANCE INDUSTRY

P. Raja Babu[11] S. Ravi Kumar[12]

ABSTRACT

Information and communications technologies are a device set of technological tools and resources used to communicate people about to disseminate awareness, create interest and to stimulate enroll intentions of insurance. It has enabled countries to leapfrog traditional modes of service delivery and make manifold improvements in process effectiveness and efficiency. In general, information communication technology and its tools that people use to share, distribute, information gathering and to communicate with insurance providers, or in groups, with media such as print, visual and interconnected computer networks. In this study, I explore the question of how IT could enhance firm performance in the areas of customer's service and organization's profitability in the Indian insurance industry. To draw our sample size of 25, 23 insurance companies were randomly selected from the 25-member insurance umbrella body, the Indian Insurers Association. Our findings show that while most companies have a comprehensive database of their customers, not all make provisions for their customers to make major transactions online because they have not fully integrated their customer relationship management with information technology. I also find out that effective combination of customer relationship management with information technology leads to improved customer service and organization's profitability.

KEYWORDS

Information Technology, Customer Relationship Management, Effectiveness, Firm Performance, Insurance etc.

INTRODUCTION

Information technology is the processing and distribution of data using computer hardware and software, telecommunications, and digital electronics. It is important to acknowledge the fact that for effective management and growth of an organization in any sector, whether banking, insurance, engineering, entertainment etc., there has to be a conscious effort by the management towards making it customer oriented. Customer relationship activities also include learning a customer's individual interest and then tailoring services to meet them. Such programs help companies retain customers not only by providing a useful service but also by making customer feel appreciated.

Today, electronic commerce is breaking the traditional concept and rules of operations, transforming the way enterprises do business and making them confront a new competitive edge. It has been said, therefore, that only organizations that recognize the power of customers and satisfy their needs will move toward sustainability. In many firms, information technology (IT) gives a major transforming advantage in marketing, operations, and other activities of an organization by providing the sales force with a wide array of handheld and laptop computers that enable the firms to collect detailed customer and market data, and by managing the entire order fulfillment process, including demand planning whether banking, insurance, engineering, entertainment, etc, there has to be a conscious effort by the management towards making it customer oriented. Customer relationship activities also include learning a customer's individual interest and then tailoring services to meet them. Such programs help companies retain customers not only by providing a useful service but also by making customer feel appreciated. Information technology is the processing and distribution of data using computer hardware and software, telecommunications, and digital electronics.

OBJECTIVES OF STUDY

- To know how technology affects insurance industry.
- To analyze Insurance organizations in INDIA have been able to integrate IT with CRM.
- To know how IT increase the level of profitability in insurance organizations.
- To analyze efficiency of technology on insurance in INDIA.

E-Business Trends in Insurance

- In a recent information system survey conducted by the National Association of Independents Insurers (NAII), more than 90% of respondents currently operate a website. More significantly, many companies are now looking to use their sites to handle claims, provide quotes, accept application, and provide other customer services.

Among the survey key findings are:

- More than 23% of respondents are currently using their websites to provide quotes, 58% are planning to introduce this feature within the next year.

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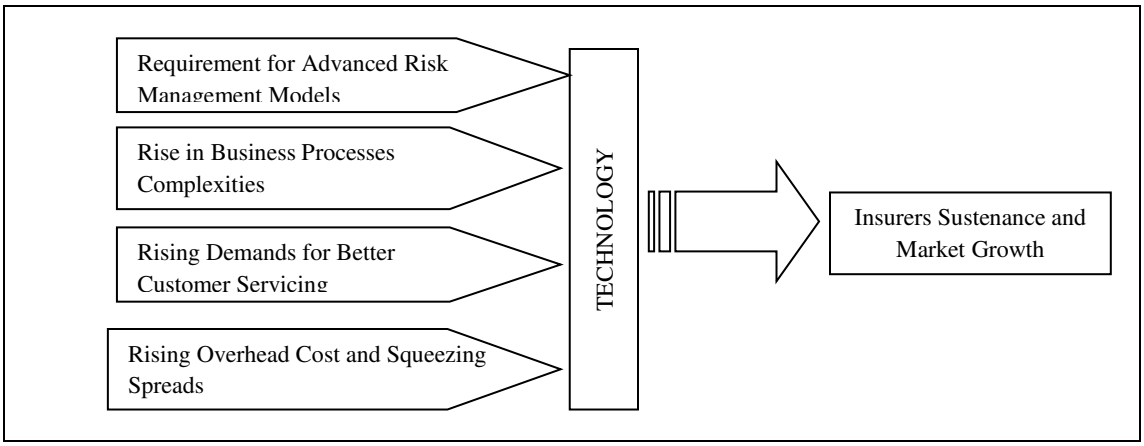
- Almost 20% of those companies surveyed accept online applications; nearly 50% indicated that they would accept electronic applications within the next year.
- Twenty-eight percent of respondents currently provide customer claims access on their websites; 45% of companies are planning to add online claims handling service in the coming year.

Figure-1: Technology Drivers in Insurance Industry



Sources: Authors Compilation

RESEARCH METHODOLOGY

Methodological Background

The data used in this study were collected through a survey among insurance companies in India. Our sample however was selected from A.P state, the commercial centre of the country. Among the 25 members of the India Insurers Association, 23 companies were selected at random from the directory of members contained in the 2013 Insurance Digest published by the Association. 25 copies of the questionnaire were sent. 2 copies of the questionnaire (meant for IT manager, marketing manager and underwriting manager, respectively) accompanied by a covering letter explaining the objectives of this survey were personally handed to each company and this was followed up by telephone calls to motivate them to act. To ensure a high response rate, copies of the questionnaire were sent a second time to those companies who lost the earlier ones. Again, this was followed up by regular visits in order to clarify any difficulty the respondents might have in filling the questionnaire. Eventually, among the 25 copies retrieved, 23 were correctly completed and these were analyzed for this research.

LIMITATIONS

- First, it emphasized the benefits of information technology in service delivery without discussing the cost implications.
- Secondly, the data analyzed for this report were gathered from the insurance operators only and the views of the customers on the subject were not taken into consideration;
- Thirdly, the research does not indicate clearly whether the improvement in customer service is mainly a result of information technology or a result of other factors. These areas need to be explored in the future.

REGISTRATION OF INSURERS

The IRDA opened up the market in August 2000 with the invitation of applications for registration. The foreign companies were allowed ownership of up to 26 per cent. The Authority has the power to frame regulations under section 114 A of the Insurance Act, 1938 and has from 2000 onwards framed various regulations ranging from registration of companies to carry on insurance business for the protection of policyholders' interests.

Every insurer seeking to start insurance business in India has to get a certificate of registration from the IRDA. The pre-conditions for applying for registration should be within the framework of the Insurance Act of 1938, and the regulations stipulated by the IRDA from time to time. When the IRDA invited applications for registering private players, all the prudential aspects were notified within a short span of six months.

The Registration of Indian Insurance Companies Regulations, 2000 required disclosure of the way in which the prospective insurer would plan its rural business and meet its obligations towards rural, unorganized and backward sectors right at the time of requisition of application for registration.

The following are the registration requirements that an applicant is required to fulfill:

- The applicant should be a company registered under the provisions of the Indian Companies Act, 1956.
- The total equity participation of a foreign collaborator in the applicant company cannot exceed twenty-six per cent of the paid-up capital.
- The applicant can carry on any one of the business i.e. life insurance, general insurance or reinsurance. Separate companies are needed if the registration is for more than one type of insurance business.
- The name of the applicant includes the words either 'Insurance Company' or 'Assurance Company'.
- The applicant must have a minimum paid-up equity capital of Rs.100 crores for doing life insurance business.
- An insurer who has been granted a certificate of registration should renew the registration before 31st December of every year.

Table 1 gives information on the cumulative number of registered insurers in India during 2000-01 to 2011-12. As on 31st August, 2012, 23 insurance players are working in the Indian life insurance market. Of which, one is in the public sector i.e. The LIC of India and the other 22 are in the private sector. During 2000-01, seven private players were registered by the Regulator. However, some players did not start their business immediately because of some teething problems. From that year onwards, the strength of private players has gradually increased to 22 until 2012.

Table-1: Number of Registered Insurers in India during 2000-01 to 2011-12

(Cumulative)

Year	Public Sector	Private Sector	Total
2000-01	01	7	8
2001-02	01	11	12
2002-03	01	12	13
2003-04	01	13	14
2004-05	01	13	14
2005-06	01	14	15
2006-07	01	15	16
2007-08	01	17	18
2008-09	01	21	22
2009-10	01	22	23
2010-11	01	22	23
2011-12	01	22	23

Sources: Compiled from Annual Reports of IRDA

The Registration of Indian Insurance Companies Regulations, 2000 required disclosure of the way in which the prospective insurer would plan its rural business and meet its obligations towards rural, unorganized and backward sectors right at the time of requisition of application for registration.

Table-2: Details of the Life Insurance Players in India

Serial Number	Name of the Player	Regd. Number	Year of Operation
1	HDFC Standard Life Insurance Co. Ltd.	101	2000-01
2	Max New York Life Insurance Co. Ltd.	104	2000-01
3	ICICI Prudential Life Insurance Co. Ltd.	105	2000-01
4	Om Kotak Life Insurance Co. Ltd.	107	2001-02
5	Birla Sun Life Insurance Co. Ltd.	109	2000-01
6	Tata AIG Life Insurance Co. Ltd.	110	2000-01
7	SBI Life Insurance Co. Ltd.	111	2001-02
8	ING Vysya Life Insurance Co. Ltd.	114	2001-02
9	Allian Bajaj Life Insurance Co. Ltd.	116	2001-02
10	Metlife India Insurance Co. Ltd.	117	2001-02
11	Reliance Life Insurance Co. Ltd. (Earlier AMP Sanmar Life Insurance Company from 3.1.02 to 29.9.05)	121	2001-02
12	Aviva Life Insurance Company Limited	122	2002-03
13	Sahara Life Insurance Co. Ltd.	127	2004-05
14	Shriram Life Insurance Co. Ltd.	128	2005-06
15	Bharti AXA Life Insurance Co. Ltd.	130	2006-07
16	Future Generali India Life Insurance Company Ltd.	133	2007-08
17	IDBI Fortis Life Insurance Company Ltd.	135	2007-08
18	Canara HSBC OBC Life Insurance Company Ltd.	136	2008-09
19	Aegon Religare Life Insurance Company Ltd.	138	2008-09

20	DLF Pramerica Life Insurance Co. Ltd.	140	2008-09
21	Life Insurance Corporation of India	512	1955-56
22	Star Union Dai-ichi Life Insurance Company Ltd.	142	2008-09
23	India First Life Insurance Company Ltd.	143	2009-10

Sources: Compiled From the Annual Reports of IRDA

The particulars relating to the partnership of the domestic insurance players with foreign partners are given in Table3. It is clear from the Table that only the Reliance Life Insurance Company Limited, Sahara Life Insurance Company Limited and the Life Insurance Corporation of India are solely the companies with only domestic capital and have no partnership with foreign companies. However, the other insurance companies working in our country have equity participation of the foreign insurance majors.

Table-3: Life Insurance Players and their Foreign Partners

Sl. No.	Name of the Player	Foreign Partner
1	HDFC Standard Life Insurance Co. Ltd.	Standard Life Assurance, UK
2	Max New York Life Insurance Co. Ltd.	New York Life, USA
3	ICICI Prudential Life Insurance Co. Ltd.	Prudential, UK
4	Om Kotak Life Insurance Co. Ltd.	Old Mutual, South Africa
5	Birla Sun Life Insurance Co. Ltd.	Sun Life, Canada
6	Tata AIG Life Insurance Co. Ltd.	American International Assurance Co., USA
7	SBI Life Insurance Co. Ltd.	BNP Paribas Assurance SA, France
8	ING Vysya Life Insurance Co. Ltd.	ING Insurance International B.V., Netherlands
9	Allianz Bajaj Life Insurance Co. Ltd.	Allianz, Germany
10	Metlife India Insurance Co. Ltd.	Metlife International Holdings Ltd., USA
11	Reliance Life Insurance Co. Ltd. (Earlier AMP Sanmar Life Insurance Company from 3.1.02 to 29.9.05)	---
12	Aviva Life Insurance Company Limited	Aviva International Holdings Ltd., UK
13	Sahara Life Insurance Co. Ltd.	---
14	Shriram Life Insurance Co. Ltd.	Sanlan, South Africa
15	Bharti AXA Life Insurance Co. Ltd.	AXA Holdings, France
16	Future Generali India Life Insurance Company Ltd.	Pantaloon Retain Ltd., Sain Marketing Network Pvt. Ltd. (SMNPL), Generali, Italy
17	IDBI Fortis Life Insurance Company Ltd.	Fortis, Netherlands
18	Canara HSBC OBC Life Insurance Company Ltd.	HSBC, UK
19	Aegon Religare Life Insurance Company Ltd.	Religare, Netherlands
20	DLF Pramerica Life Insurance Co. Ltd.	Prudential of America, USA
21	Life Insurance Corporation of India	---
22	Star Union Dai-ichi Life Insurance Company Ltd.	Dai-ichi Life Insurance, Japan
23	India First Life Insurance Company Ltd.	Legal and General (UK's Risk, Wealth and Investment Co.)

Sources: Compiled from the Annual Reports of IRDA

REVIEW OF LITERATURE

The concept of customer relationship management (CRM) was derived from the term 'contact management in the 1980s and it essentially relates to collecting all the information when customers come in contact with companies (Knox et al., 2003). It may be described as a process companies utilize to understand and react to customers' evolving desires, utilizing detailed customer behavior and transaction information, to drive customer acquisition, loyalty, satisfaction and profitability. It has been defined as an enterprise approach to developing full knowledge about customer behavior and preferences and to developing programs and strategies that encourage customers to continually enhance their business relationship with the company (Parvatiyar and Sheth, 2002). Information technology on the other hand is the processing and distribution of data using computer hardware and software, telecommunications and digital electronics. CRM is not only a technology application for marketing purposes, it is a cross-functional, customer driven, technology integrated into business process and a management strategy that maximizes relationships, which encompasses the entire organization (Goldenberg, 2000).

The origins of CRM are found in relationship marketing theory, which is aimed at improving long-term profitability by shifting from transaction-based marketing, with its emphasis on winning new customers, to customer retention through effective management of customer relationships (Christopher et al., 1991). Reichheld and Teal (1996) found out those customers who have been around long enough to get familiar with the company's procedures, will create more valuable business relationships, will acquire more products and will be less price sensitive on individual offers.

INFORMATION TECHNOLOGY AND CUSTOMER SERVICE

Embedding more technology in the product and services has a profound impact on the standard of competition (Karimi et al., 2001). More and more service firms like insurance and banks are providing IT based service options to their customers. These services are expected to bring benefits such as improved product and service quality, improved customer satisfaction, higher productivity and improved financial performance. Jeffers (2003) discovers that a potential contribution of IT to firm performance is its complementarities with other resources in leveraging customer service performance, which can be a major factor in determining the viability and competitive edge of the firm. There are 3 types of CRM technologies which includes operational, analytical and collaborative (Miriam et al., 2003). Operational CRM is the customer facing applications of CRM such as SFA (sales force automation), EMA (enterprise marketing automation) and front office suites. The analytical segment includes data marts or data warehouses that are used by applications that apply algorithms to dissect the data and present it in a form that is useful to the user. The collaborative CRM reaches across customer touch points, all the different communication means that a customer might interact with, such as e-mail, phone call, fax, website pages etc. When technology is embedded in CRM, it may play a supporting role, a direct role, a coordination role and a role in restoring customer confidence especially when it is combined with training and other organizational changes (Evangelia, 2006; Sweat and Hibbard, 1999). However, when technology is mismanaged, it can deter rather than enhance customer service (Asbrand, 1997). Even when used as intended, IT is not always customer-friendly. For example, some CRM applications are meant to help businesses track interactions with customers, which do not necessarily translate into better service (Sweat and Hibbard, 1999). The services literature suggests that personal interaction plays a key role in creating satisfied customers (Parasuraman et al., 1985).

CUSTOMER RELATIONSHIP MANAGEMENT AND IT IN THE INSURANCE INDUSTRY

E-commerce and the internet are increasingly becoming one of the most important drivers of strategic change for business and national governments. A body of research specifically focused on the use of IT in the insurance industry shows that the adoption is positively related to increases in productivity (Harris and Katz, 1991). Yet, the insurance industry has been lagging behind other financial services to embrace this new change within its activities (Arora, 2003).

Most insurance organizations recognize that web services and electronic collaborations are the key buzzwords of today's organizations, but the bulk of the job in many firms is still done via manual paper-based processing. For example, customer orders are still received via old methods, and the process for handling these documents is time consuming, wrong and unnecessary (Ahmadi and Salami, 2010). The result is that customers maintain relationships with several companies and finish contact quickly if they are not satisfied with quality of service. Efficient insurance markets are essential basis for the transition countries to achieve integration into global economy and sustainable strong economic growth. Insurance market is a vitally important economic institution where mutual beneficial exchange between consumers and insurance companies is carried out. The information intensive nature of the insurance sector affects all the activities of the value chain (from risk evaluation to claim management), which are based on the ability to process information efficiently. For this reason, investments in IT, which represent almost all investments in technical capital, affect productivity more than in other sectors (Matassa et al., 2003).

Furthermore, contacts between the insurance company and its customers are rare because the contracts are by nature long-term and promissory. So far, insurance companies only offer value-added services to support their customers in the decisive moment, that is, after a loss. Therefore, customers have a second thought, whether the buying decision was right while 'nothing happens' (Bodendorf and Schobert, 2007). These added services are a promising approach to keep customer relationship alive in the insurance business by vital interaction. Where these technologies were put in place, they have actually proved to be a promising approach to intensify the customer relationship in the insurance business.

However, despite the growing importance of the IT function, only a few major insurance companies have gained a complete understanding of their competitive IT positions. For most institutions, the performance level and cost of IT remain well hidden. Therefore, many levers that could help sharpen IT efficiency and effectiveness are not being put to good use (The Boston Consulting Group, 2005). Over a decade ago, it was emphasized that benefits of information technology to the insurance industry in India would include faster and accurate ways of getting things done, relieving workers of the burden of performing minor repetitive tasks and elimination of unnecessary use of resources like paper (Data Board Limited, 1998). Research has linked IT investment with profitability. Lichtenberg (1995), for example, observes a clear, positive relationship between the level of IT investment and multifactor productivity, despite a great deal of individual variation in firms' success with information technology.

Information technology also leads to decreasing costs. For example, according to a large United States insurance company, 70% of its incoming calls are from insurance agents wanting information about its customers. This is a non-revenue generating activity. CRM helps financial services institutions reduce these non-revenue generating activities by enabling agents to access customer information over the web via a browser. Furthermore, cost centers can be turned into revenue centers. It has been said that the primary resource an organization has is its human resource, while the information resource (that is, the corporate database of information and the processing systems) has become the second key resource of effective organization. It is the information resource that enables the speedy identification and assessment of an organization's opportunities, threats and its strengths and weaknesses (Aghanenu, 1998).

RESEARCH HYPOTHESES

The following hypotheses stated in null form will serve as a guide for this research.

- H1: Insurance organizations in India have been able to fully integrate IT with CRM.
- H2: Information technology enhances service delivery in insurance organizations.
- H3: Efficient combination of IT and CRM has increase the level of profitability in insurance organizations.

Data Instrument

As earlier on stated, the primary data gathering instrument used in this research study is the questionnaire (Appendix 1). The questionnaire for this research study was drawn based on the research questions and hypotheses formulated earlier. It consists of 2 parts, A and B. Part A consists of personal data of the respondents. Part B contains general questions relating to the research study.

The questions contained in part B are of two categories: open ended and close-ended questions. The open ended questions required the respondents to provide brief written answers to the questions based on their own opinion, while the closed ended questions were drawn along Likert format: Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly Disagree (SD) and Always true (A), Frequently true (F), Sometimes true (S), Rarely true (R), Never true (N) these require the respondents to choose from the options by ticking the appropriate boxes provided. In all, section A consists of four questions, and section B consists of 13 internal questions.

DATA ANALYSIS AND PRESENTATION

We used simple frequency tables and percentage for the presentation of data and the hypotheses formulated would be tested using Kolmogorov-smirnov test. It is appropriate, because it is a non-parametric tool used to test the goodness of fit of an ordinal data. This test looks at the degree of agreement between the distribution of the observed values, some specified theoretical distribution (expected frequencies), and it focuses on the largest value of the deviations among observed and theoretical proportions. The theoretical distribution represents what would be expected under the null hypothesis. It treats individual observation separately and thus, unlike Chi-square ($\chi 2$) test for one sample it needs not lose information through the combining of categories and thus, it is more powerful than $\chi 2$ test (Siegel, 1956).

Analysis of the research questions

Question 1

Could major transactions like the filling of proposal forms and claim forms be done on line by the customers without physical contact with insurance companies?

This question can be answered about 65% of the respondents agreed that customers could perform major transactions on-line without necessarily coming in contact with the company in person, while the rest disagreed. This shows the low level of development of online business activities in the market.

Table-4

Statistics		
Our major transactions can be effected online without physical contact with the customer e.g., transfers, direct debit, etc for customer convenience.		
N	Valid	23
	Missing	0
Mean		1.65
Median		1.00
Mode		1
Std. Deviation		1.027
Sum		38
Percentiles	25	1.00
	50	1.00
	75	2.00

Sources: Authors Compilation

Table-5

Our major transactions can be effected online without physical contact with the customer e.g., transfers, direct debit, etc for customer convenience.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	15	65.2	65.2	65.2
	Agree	3	13.0	13.0	78.3
	Undecided	3	13.0	13.0	91.3
	Disagree	2	8.7	8.7	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Question 2

With the aid of IT, do the insurance firms in INDIA have a comprehensive database of their customers?

This question can be answered. 65% of the respondents agreed that they have a comprehensive database of their customers. This result is an interesting one because customer relationship marketing in practice involves the purchase of hardware and software that will enable a company to capture detailed information about individual customers that can be used for better target marketing.

Table-6

Statistics		
In my organization, we have a comprehensive database of our customers' information.		
N	Valid	23
	Missing	0
Mean		1.61
Median		1.00
Mode		1
Std. Deviation		1.076
Sum		37
Percentiles	25	1.00
	50	1.00
	75	2.00

Sources: Authors Compilation

Table-7

In my organization, we have a comprehensive database of our customers' information.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	15	65.2	65.2	65.2
	Agree	5	21.7	21.7	87.0
	Undecided	1	4.3	4.3	1.3
	Disagree	1	4.3	4.3	5.7
	Strongly disagree	1	4.3	4.3	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Question 3

What are the effects of application of information technology on the profitability of an insurance organization?

About 8% agreed that a combination of IT and CRM has not given an impressive increase in the level of profitability, 52% disagreed, while 39% were undecided. This shows that efficient use of IT in insurance organizations results in increased profitability. That IT on itself does necessarily account for differences in performance level among firms, but its true contribution in that regard may lie in its complementarily effect on other firm-specific resources. In simple terms, IT supported by adequate human and business resources as well as IT managerial capability may help to make profitable resources even more so.

Table-8

Statistics		
Combination of IT and CRM in my organization has not given an impressive increase in customer loyalty and profitability.		
N	Valid	23
	Missing	0
Mean		3.43
Median		4.00
Mode		4
Std. Deviation		.662
Sum		79
Percentiles	25	3.00
	50	4.00
	75	4.00

Sources: Authors Compilation

Table-9

Combination of IT and CRM in my organization has not given an impressive increase in customer loyalty and profitability.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	2	8.7	8.7	8.7
	Undecided	9	39.1	39.1	47.8
	Disagree	12	52.2	52.2	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Test of Hypotheses

The test of hypotheses seeks to further analyze research questions, which relate to the effect of information technology on customer relationship in insurance industry. We have formulated 3 hypotheses that serve to provide a clear direction for the conduct of this research and these were tested, using the Kolmogorov-smirnov test. The Kolmogorov-Smirnov test is appropriate because it is a non-parametric tool used to test the goodness of fit of an ordinal data. The test focuses on the largest value of the deviations among observed and theoretical proportions. The Kolmogorov-Smirnov test is given as:

$D\ N = \max_x |Fo\ (x) - Fo\ (x)|$

Where, F is the number of observations; Fo (x) is the specified (or theoretical) cumulative frequency distribution under Ho for any value of X; Fo (x) is the observed cumulative frequency distribution of a random sample of N observation for any value of X. The procedure is as follows: specify the null hypothesis; specify the level of significance; state the decision rule. The degree of freedom is measured against 95% level of significance. The critical value of D for sample size of N<35 is given as:
$D\ N = \max_x |Fo\ (x) - Fo\ (x)|$

The decision rule is that Ho will be rejected if the calculated D (Dcal) is greater than the tabulated D (Dtab) under the deviation level of 5%.

Hypothesis 1

Table-10: Kolmogorov-Smirnov Frequency Table for Hypothesis 1

Hypothesis	**Rank of View of Respondents**				
	Strongly Agree	**Agree**	**Indifferent**	**Disagree**	**Strongly Disagree**
F Number of respondents according to their views that insurance companies have not been able to fully integrate IT with CRM	16	03	03	02	0
Fo(X) = Theoretical cumulative distribution choices under Ho	0.6000	0.8000	0.2000	1	0
Fo(X) = Cumulative distribution of observed choices under Ho	0.9359	0.9744	0.0384	1	0
$\|Fo\ (x) - F0\ (x)\|$	0.3359	0.1744	0.1616	0	0

Sources: Authors Compilation

Insurance organizations in INDIA have been able to fully integrate IT with CRM. From the Kolmogorov-Smirnov frequency table for Hypothesis 1, the calculated D value is the point of greatest divergence between the cumulative observed and cumulative theoretical distributions, which is 0.3359.The tabulated D from the Kolmogorov-Smirnov test.

$D = \alpha / \sqrt{N} = 1.36/\sqrt{23}=0.2839$

Table at ($\alpha/\sqrt{N} = 1.36/ \sqrt{23}$) is given as: In this case, D*cal* is greater than D*tab* (0.3359 > 0.2839), thus, in accordance with the decision rule, the null hypothesis (Ho), stating that this indicates that insurance organizations in India have not been able to fully integrate IT with CRM is rejected (Table 1). Insurance organizations in India have been able to fully integrate IT with CRM. In developing countries like INDIA, only a few organizations in the economy have adopted the IT and others have really integrated such with their total organization process.

Hypothesis 2

Table-11: Kolmogorov-Smirnov Frequency Table for Hypothesis 2

Hypothesis	**Rank of View of Respondents**				
	Strongly Agree	**Agree**	**Indifferent**	**Disagree**	**Strongly Disagree**
F = Number of respondents according to their views that Information technology does not enhance service delivery in an insurance organization	0	02	02	06	13
Fo(X) = Theoretical cumulative distribution choices under Ho	0	0.2000	0.8000	0.6000	0.4000
Fo(X) = Cumulative distribution of observed choices under Ho	0	0.4359	0.9744	0.9359	0.8974
$\|Fo(x) - F0(x)\|$	0	0.2359	0.1744	0.3359	0.4974

Sources: Authors Compilation

Information technology does not enhance service delivery in insurance organizations. From the Kolmogorov-Smirnov frequency table for the hypothesis, the calculated D value is the point of greatest divergence between the cumulative observed and cumulative theoretical distributions, which is 0.4974.The tabulated D from the Kolmogorov-Smirnov test table at ($\alpha/\sqrt{N} = 1.36/ \sqrt{23}$) is given as: $D = \alpha / \sqrt{N} = 1.36/\sqrt{23}=0.2839$

In this case, D*cal* is greater than D*ta* (0.4974 > 0.2839), thus, in accordance with the decision rule, the null hypothesis (Ho), stating that information technology does not enhance service delivery in insurance organizations is rejected at $\alpha = 0.05$ (Table 2). We can then conclude that information technology does enhance service delivery in insurance organizations in India.

Hypothesis 3

Table-12: Kolmogorov-Smirnov Frequency Table for Hypothesis 3

Hypothesis	**Rank of View of Respondents**				
	Strongly Agree	**Agree**	**Indifferent**	**Disagree**	**Strongly Disagree**
F Number of respondents according to their views that efficient efficient combination of IT and CRM does not increase the level of profitability in insurance organizations	15	03	03	03	02
Fo(X)= Theoretical cumulative distribution choices under Ho	0.2000	0.4000	0.6000	0.8000	1
Fo(X)= Cumulative distribution of observed choices under Ho	0.0384	0.8974	0.9359	0.9744	1
$\|Fo(x) - F0(x)\|$	0.1616	0.3974	0.3359	0.1744	0

Sources: Authors Compilation

Efficient combination of IT and CRM does not increase the level of profitability in insurance organizations. From the Kolmogorov- Smirnov frequency table for the hypothesis, the calculated D value is the point of greatest divergence between the cumulative observed and cumulative theoretical distributions, which is 0.3974. The tabulated D from the Kolmogorov-Smirnov test table at ($\alpha/\sqrt{N} = 1.36/ \sqrt{23}$) is given as: $D = \alpha / \sqrt{N} = 1.36/\sqrt{23}=0.2839$.

In this case, D*cal* is greater than D*tab* (0.3974 > 0.2839), thus, in accordance with the decision rule, the null hypothesis (Ho), stating that effective combination of IT and CRM does not increase the level of profitability in insurance organizations is rejected at $\alpha = 0.05$ (Table 3). We can then conclude that effective combination of IT does result in profitability of insurance organizations. Therefore, we reject the null hypothesis and accept the alternative hypothesis stating that effective and efficient combination of high-level customer relationship and information technology will increase the level of profitability in insurance organizations. That IT contributes to the firm's ability to assess the needs of its customers and then adapt its operations to best match its products or services to those needs, in order to maximize customer's utility and company's profitability.

Table-13: Internal IT Level of Organization

Internally Developed Information System / Software for Company Usage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always True	17	73.9	73.9	73.9
	Frequently True	5	21.7	21.7	95.7
	Sometimes True	1	4.3	4.3	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-14: Buys Third Party Systems / Software and Customized Them

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always True	6	26.1	26.1	26.1
	Frequently True	3	13.0	13.0	39.1
	Sometimes True	4	17.4	17.4	56.5
	Rarely True	10	43.5	43.5	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-15: Outsource Some of Processes / Activities of Company

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always True	18	78.3	78.3	78.3
	Frequently True	5	21.7	21.7	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-16: Follows Standard Procedures &Amp; Practices to Manage and Maintain Our System

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	23	100.0	100.0	100.0

Sources: Authors Compilation

Table-17: Our Technical and Management Expertise is Enough to Satisfy Company IT Requirements

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always True	20	87.0	87.0	87.0
	Frequently True	2	8.7	8.7	95.7
	Rarely True	1	4.3	4.3	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-18: There is a Sufficient Linkage Between IT Department and Business Departments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always True	2	8.7	8.7	8.7
	Frequently True	3	13.0	13.0	21.7
	Some Times True	16	69.6	69.6	91.3
	Rarely True	2	8.7	8.7	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-19: IT Department is often seen as a Completely Separate Entity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	always true	23	100.0	100.0	100.0

Sources: Authors Compilation

Process Planning & Support

Table-20: IT Streamlines Business Processes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Frequently true	5	21.7	21.7	21.7
	Sometimes true	17	73.9	73.9	95.7
	Rarely true	1	4.3	4.3	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-21: IT Strengthens Strategic Planning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	2	8.7	8.7	8.7
	Frequently true	18	78.3	78.3	87.0
	Sometimes true	3	13.0	13.0	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-22: IT Improves Management Decision-Making

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	23	100.0	100.0	100.0

Sources: Authors Compilation

Table-23: IT Improves Internal Communication &Amp; Coordination

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	23	100.0	100.0	100.0

Sources: Authors Compilation

Table-24: IT Enable Our Company Adopt New Organization Structures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	23	100.0	100.0	100.0

Sources: Authors Compilation

Operation Support

Table-25: IT Enhances Operating Flexibility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	17	73.9	73.9	73.9
	Frequently true	6	26.1	26.1	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-26: IT Improves Productivity Of Labour

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	6	26.1	26.1	26.1
	Frequently true	1	4.3	4.3	30.4
	Sometimes true	16	69.6	69.6	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Sales & Marketing

Table-27: IT Enhances Utilization of Equipment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	20	87.0	87.0	87.0
	Frequently true	3	13.0	13.0	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-28: IT Enhances Cooperation Among Co-Workers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	2	8.7	8.7	8.7
	Frequently true	3	13.0	13.0	21.7
	Sometimes true	18	78.3	78.3	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-29: IT Enhances Value of Insurance Products By Embedding IT in Them

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Frequently true	7	30.4	30.4	30.4
	Sometimes true	16	69.6	69.6	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-30: IT Decreases Cost of Design New Products

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Frequently true	1	4.3	4.3	4.3
	Sometimes true	6	26.1	26.1	30.4
	Rarely true	16	69.6	69.6	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-31: IT Enhance Product Quality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sometimes true	5	21.7	21.7	21.7
	Rarely true	18	78.3	78.3	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-32: IT Enables the Identification of Trends in Insurance Market

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	16	69.6	69.6	69.6
	Frequently true	7	30.4	30.4	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-33: IT Improves Accuracy of Sales Forecasts

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	2	8.7	8.7	8.7
	Frequently true	5	21.7	21.7	30.4
	Sometimes true	16	69.6	69.6	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-34: IT Increases Ability To Anticipate Customer Needs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	20	87.0	87.0	87.0
	Frequently true	2	8.7	8.7	95.7
	Sometimes true	1	4.3	4.3	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-35: IT Enables Sales Agent					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Frequently true	3	13.0	13.0	13.0
	Sometimes true	20	87.0	87.0	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

IT Infrastructure & Future Investment

Table-36: Our Insurance Company Uses Modern Hardware &Amp; Software Tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	23	100.0	100.0	100.0

Sources: Authors Compilation

Table-37: We Migrate to New Technologies Although Current Applications and Tools than Our Competitive Insurance Companies					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	4	17.4	17.4	17.4
	Frequently true	17	73.9	73.9	91.3
	Sometimes true	2	8.7	8.7	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-38: We Follow Modern Technologies Used By World Leading Insurance Companies					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	23	100.0	100.0	100.0

Sources: Authors Compilation

Table-39: Our Organization Processes Specialized Hardware Which Are Not Still Available To Other Organization					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	18	78.3	78.3	78.3
	Frequently true	5	21.7	21.7	100.0
	Total	23	100.0	100.0	

Sources: Authors Compilation

Table-40: Our Organization Processes Specialized Software Which Are Not Still Available To Other Organization					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always true	23	100.0	100.0	100.0

Sources: Authors Compilation

This questions can be answered from the responses to Question 5,7,9 & 12 on the above questionnaire as presented in of the respondents agreed that customers could perform major transactions on line without necessarily coming in contact with the company in persons. This shows the high level of development of online business activities in the market.

RECOMMENDATIONS AND SUGGESTION

In view of the findings of this study, the following recommendations are worth noting.

- Firstly, customer relationship management (CRM) with adequate information technology facilities should be properly entrenched in all areas of operation in the insurance industry.
- Secondly, to enhance effective working of CRM, management should adopt a more diligent approach involving the engagement of staff with requisite knowledge of customer relation and with adequate training on the use of IT facilities within the organization to meet customers' needs.
- CRM is the process of engaging customer on a continuing basis at both functional and emotional level and this involves the ease of customers to do major transactions.
- The provision of online insurance services is highly recommended to improve service delivery.

CONCLUSIONS

This research attempts to find out how customer relationship can become more effective with the aid of information technology and to examine the view that CRM when properly carried out using adequate information technology can yield optimal results for organizations. Based on the results of research questions and hypotheses tested for selected insurance companies, it found out that in majority of companies, customers could not perform major transactions on line without necessarily meeting the company in person. This is because not all companies have fully integrated IT with their CRM. In addition, it discover that a good number of insurance companies have a comprehensive database of their customers with the aid of information technology. Consistent with some previous studies, this study supports the view that the use of IT can enhance service delivery. Apart from that, another finding is that effective and efficient combination of high level of CRM and IT will increase the level of customers' patronage and ultimately the organization's profitability.

The importance of combining IT with CRM cannot be overemphasized. This view represents the opinions of major authors cited in the course of this research study. This research reveals that customer relationship can be improved using information system, and this is being adopted and albeit gradually by the insurance companies in India. In summary, the study revealed that CRM and IT, if effectively and appropriately combined in service delivery, would minimize delay in customer service delivery and ultimately result in increased profit.

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SENSOR CLOUD ACCESS WITH MAP REDUCE BASED QUERY PROCESSING

Sreeram Indraneel[13] Dr. Raja Sekhara Rao Kurra[14]

ABSTRACT

Sensor networks are meant for capturing the real world data such as Battlefield surveillance, environmental monitoring etc. With the rapid progress in technology, sensor nodes off the shelf are capable of capturing more reliable information in the form of alphanumeric, images, audio, video etc. Earlier lot of work and focus is made on devising the methods and algorithms for data compression techniques, dealing with bandwidth constraints etc. in the preview of resource constrained wireless sensor networks. However, the more challenging task is getting the proper inferences from this data. The large amount of heterogeneous data collected by the huge no of sensor nodes needs huge data storage such as cloud. In general, lot of redundancy is present in the sensor data. The new challenges are processing huge data for any query generated by the end user and the elimination of the duplicates from sensor data. To address these challenges we have proposed distributed query processing based on MapReduce technique to refine the huge data stored in the cloud and implemented de-duplication at various levels of sensor node hierarchy to reduce redundancy.

KEYWORDS

De-duplication, Map Reduce, Query Processing, Sensor Cloud, Wireless Sensor Networks etc.

INTRODUCTION

Ever increased utilization of internet in daily life and the miniaturization of the processing and communication devices lead to the digitization of all walks of the human life in their day-to-day needs. With this, lot of digital data is being generated, processed, and stored in various locations. However, the unorganized nature of this data needs to be addressed with the seamless integration of this digital data with the real world sensed data. The main challenge is to handle this huge amount of data, which is generated from distributed applications. Because of the heterogeneity of the data feeds from various applications, a third party infrastructure such as cloud is essential to manage this huge data effectively. Lot of insight into the data processing and data dissemination at the cloud is essential. We have proposed to use the Iaas approach and to implement map and reduce programming model to achieve this. Cloud computing is rapidly emerging as a new paradigm for delivering IT services as utility services on subscription basis. The fundamental nature of Cloud computing is providing services or resources on demand. With cloud computing the end user can get the services at very low cost by means of "pay as you go" feature, which provides services by charging hourly resource rental fee. The Elasticity feature of a cloud allows the turbulences in the resource and computing needs of the application. In this paper, we propose a Map Reduce based distributed query processing to achieve the above using sensor cloud and de-duplication of data at various levels of sensor node hierarchy.

SENSOR CLOUD

Sensor cloud is an infrastructure that allows truly pervasive computation using sensors as interface between physical and cyber worlds, the data-compute clusters as the cyber backbone and the internet as the communication medium [5]. It integrates large-scale sensor networks with sensing applications and cloud computing infrastructures. It collects and processes data from various sensor networks, Enables large-scale data sharing and collaborations among users and applications on the cloud. Delivers cloud services through sensor-rich mobile devices. It allows cross-disciplinary applications that span organizational boundaries [4]. Acquisition of data feeds from numerous body area (blood sugar, heat, perspiration, etc.) and wide area (water quality, weather monitoring, etc.) sensor networks in real time. Real-time processing of heterogeneous data sources in order to make critical decisions. Automatic formation of workflows and invocation of services on the cloud one after another to carry out complex tasks. Highly swift data processing using the immense processing power of the cloud to provide quick response to the user. Here the sensor nodes in the sensor networks sense the real world parameters and transmit the information to the sensor network proxy, which acts as the interface between localized sensor network, gate way and the Internet. The data is communicated from the sensor network proxy to the sensor-cloud proxy, an interface between the sensor cloud and the internet. The cloud provides its infrastructure as a service to perform computational tasks and storage of huge data feeded from the heterogeneous applications.

MAP REDUCE

Map Reduce is a framework for processing parallelizable problems across huge datasets using a large number of computers collectively referred to as a cluster. Map Reduce can take advantage of locality of data, processing data on or near the storage assets to decrease transmission of data [1].

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Map: The master node takes the input, divides it into smaller sub-problems, and distributes them to worker nodes. A worker node may do this again in turn, leading to a multi-level tree structure. The worker node processes the smaller problem, and passes the answer back to its master node.

Reduce: The master node then collects the answers to all the sub-problems and combines them in some way to form the output – the answer to the problem it was originally trying to solve.

Another way to look at Map Reduce is as a 5-step parallel and distributed computation:

- **Prepare the Map() input:** The Map Reduce system designates Map processors, assigns the K1 input key value each processor would work on, and provides that processor with all the input data associated with that key value.
- **Run the user-provided Map () code:** Map () is run exactly once for each K1 key value, generating output organized by key values K2.
- **Shuffle the Map output to the Reduce processors** – the Map Reduce system designates Reduce processors, assigns the K2 key value each processor would work on, and provides that processor with all the Map-generated data associated with that key value.
- **Run the user-provided Reduce () code**: Reduce () is run exactly once for each K2 key value produced by the Map step.
- **Produce the final output**: The MapReduce system collects all the Reduce output, and sorts it by K2 to produce the outcome.

QUERY PROCESSING USING MAP REDUCE TECHNIQUE

The main aim of using the sensor cloud is, highly swift data processing using the immense processing power of the cloud to provide quick response to the user. For achieving this, we have implemented the query processing optimization using the most prominent MapReduce technique. Here when the target user generates a query regarding his need to the sensor cloud, it will co-ordinate the collection and processing of the data from heterogeneous feeds using MapReduce. This process in turn is hierarchically repeated starting from root node i.e., sensor cloud through the intermediate nodes such as Gateway node, cluster head until the field sensing member sensor node. The MapReduce function functions as two parts. Firstly, during Map function the master node takes the input, divides it into smaller sub-problems, and distributes them to worker nodes as shown below. A worker node may do this again in turn, leading to a multi-level tree structure. The worker node processes the smaller problem, and passes the answer back to its master node.

Secondly, during Reduce function the master node then collects the answers to all the sub-problems and combines them in some way to form the output – the answer to the problem it was originally trying to solve. Therefore, by using this technique we are able to decrease the transmission over head in various levels of sensor network hierarchy, which in turn decreases the power consumption. Because the majority of the power consumed in sensor nodes is during the transmission and reception process this technique decreases the power consumption by distributed query processing at various levels of the network hierarchy. This in turn increases the overall lifetime of the network. In our approach, we have observed that, lot of duplicate data is generated due to dense deployment of the sensor nodes. Further, we have concentrated on data de-duplication at various levels of sensor node hierarchy in reduce function for optimizing the data transmissions along with the distributed query processing using Map Reduce technique.

Figure-1: Distributed Query Processing using Map Reduce

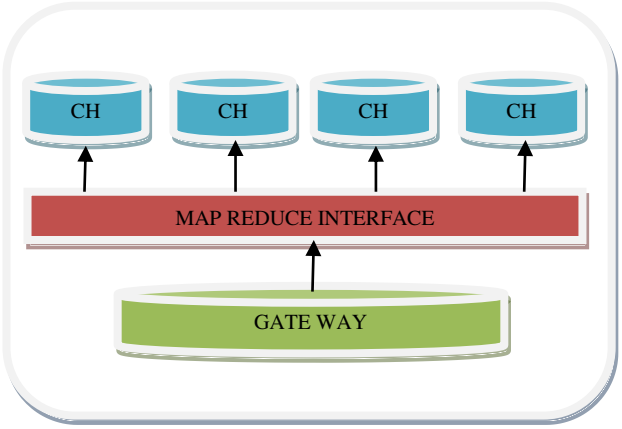
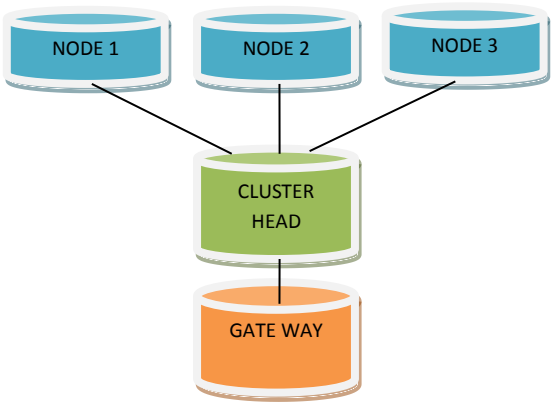


Figure-2: Sensor Node Hierarchy



Sources: Authors Compilation

EXPERIMENTAL RESULTS

We have evaluated our novel approach by considering the sample data set generated by various nodes deployed to sense the humidity and temperature in the field area of dust monitoring system. We have made following observations where lot of duplicate data is eliminated which in turn optimized the transmission and reception of data frames at various levels of network hierarchy.

Figure-3: Before De-Duplication of Dust Ball Data Set

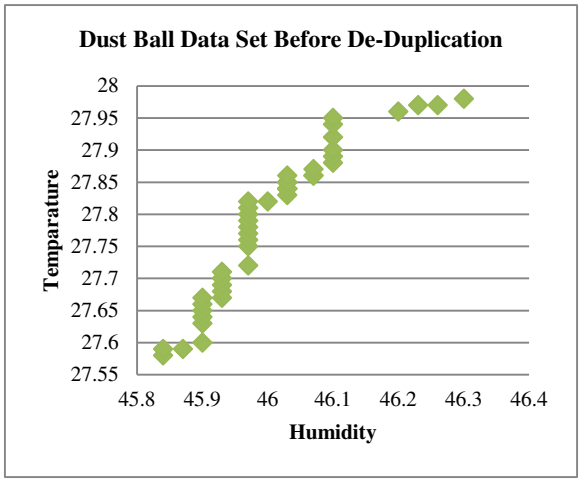
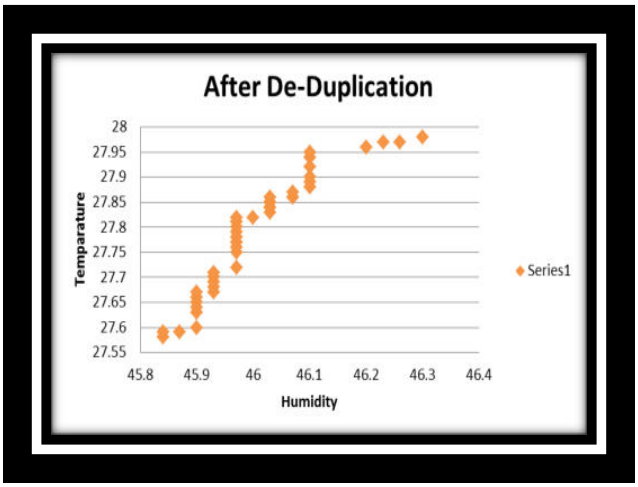


Figure-4: After De-Duplication of Dust Ball set



Sources: Authors Compilation

CONCLUSION AND FUTURE PERCEPTIVE

With advances in technology, the scope of utilization of wireless sensor networks for wide range of applications is increasing. Such applications will generate huge amount of data. To store and handle the processing of this huge data needs some innovative methods. Using cloud with Iaas and implementing, map reduce technique along with deduplication is applied for effective processing of data. We have performed the experiment on the sample observations of a dust monitoring system and observed the results. In future, we wish to improve the quality and optimize the results obtained from our approach.

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A PACE IN TO REACTIVE AND PROACTIVE MODE OF CYBER SECURITY IN DATA MINING CONTEXT

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ABSTRACT

The aim of this article is to describe the different modes of cyber threat and to identify major issues that appear at the different stages. Many traditional crimes are now being aided with computers and networks. Computer crimes are requiring law enforcement departments in general and criminal investigators in particular to cast an increasing amount of their efforts toward successfully identifying, apprehending, and assisting in the successful prosecution of executioner.

Recently the need for new forensic techniques and tools able to investigate anti-forensics methods, and have promoted automation of live investigation. Here we try to examine the gaps that arise between reactive social control systems and proactive technology systems. Data mining can be used to model crime detection problems. Crimes are a social nuisance and cost our society exceedingly in several ways. It can also be applied for counter terrorism for homeland security.

KEYWORDS

Cybercrime, Detection, Forensic, Reactive, Proactive Analysis etc.

INTRODUCTION

Computer crimes have increased in frequency, and their degree of sophistication has advanced. More the presence on the Internet, and the more intrusive an attack is, the more likely it is that any attack will have significant consequences for the financial health of that association. Moreover, volatility and dynamicity of the information flow in such of anti-forensics methods require some type of a proactive investigation method or system. The term *anti-forensics or* Anti-computer forensics refers a general term for a set of techniques used as countermeasures to forensic analysis [2]. Two examples of anti-forensics methods are:

- *Data overwriting* and
- *Data hiding*

From a digital investigation perspective, anti-forensics can do the following [2]:

- Prevent substantiation collection.
- Increase the inquest time.
- Provide ambiguous support that can make vulnerable the whole investigation.
- Prevent exposure of digital offense.

DIGITAL DATA AS EVIDENCE

Features of digital proof
Volatility of digital data
Time-dependent
Criticality based on:
- Privacy
- Significance

Criticality based on eccentricity
Safeguard the data
Retrieve and produce
Data as evidence
Indisputable
Admissibility
- Legal
- Technical

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DIGITAL FORENSIC INVESTIGATION

A digital forensic investigation is an inquiry into the unusual or dubious activities in the Cyber liberty or digital planet. The investigation process is as follows (As per National Institute of Standards and Technology) [1]. Digital Forensic Science covers Computer forensics, Disk forensics, Network forensics, Firewall forensics, Device forensics, Database forensics, Mobile device forensics, Software forensics, live systems forensics etc.

Following are the complete phases of Digital Forensic investigation processes.

Gathering Phase: The first step in the forensic procedure is to identify possible sources of data and acquire forensic data from them. Major sources of data are desktops, storage media, Routers, Cell Phones, Digital Camera etc. A plan is developed to acquire data according to their importance, volatility and amount of effort to collect [2].

Inspection phase*:* Once data has been collected, the next phase is to inspect it, which involves assessing and extracting the relevant pieces of information from the collected data [2].

Scrutiny phase*:* Extracted and relevant data has been scrutinized to draw conclusions. If additional data is sought for detail investigation will call for in depth data collection.

Exposure phase**:** This is the process of preparing and presenting the outcome of the scrutiny phase

FILE SYSTEM FORENSICS

The File system investigation is the identification, collection and analysis of the evidence from the storage media. File systems or file management systems is a part of operating system, which organize and locate sectors for file storage [3, 4].

Basic Steps in Storage Media Investigation

- Replication of forensic image: Nonintrusive acquisition of a replicated image of data extracted from the questioned device.
- For integrity, perform Hash value calculation.
- Conducting a file-fragment recovery procedure to recover files and folders to a new location.
- Examine all files especially deleted files.
- Reviewing typical evidentiary objects such as:
    - Analyze free spaces, slack spaces and bad sectors.
    - Application software file.

Hidden Evidence Analysis in the File System

Suspects can hide their sensitive data in various areas of the file system such as Volume slack; file slack, bad clusters, deleted file spaces [5].

- *Hard Disk:* The maintenance track / Protected Area on disks are used to hide information. The evidence collection tools can copy the above contents.

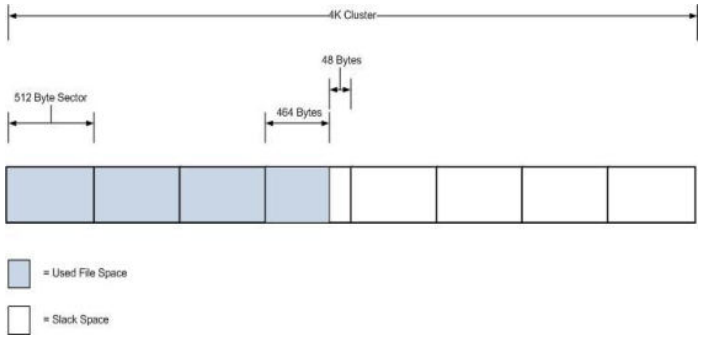
- *File System Tables*: A file allocation table in FAT and Master File Table (MFT) in NTFS are used to keep track of files.MFT entries are manipulated to hide vital and sensitive information [5].

- *File Deletion*: When a file is deleted, the record of the file is removed from the table, thereby making it appear that it does not exist anymore. The clusters used by the deleted file are marked as being free and can now be used to store other data. However, although the record is gone, the data may still reside in the clusters of the hard disk.

- *Partition Tables*: Information about how partitions are set up on a machine is stored in a partition table, which is a part of the Master Boot Record (MBR). When the computer is booted, the partition table allows the computer to understand how the hard disk is organized and then passes this information to the operating system. When a partition is deleted, the entry in the partition table is removed, making the data inaccessible. However, even though the partition entry has been removed, the data still resides on the hard disk.

- *Slack Space*: A file system may not use an entire partition. The space after the end of the volume called *volume slack* that can be used to hide data. The space between Partitions is also vulnerable for hiding data, *file slack* space is another hidden storage.***Figure1*** shows slack spaces in a Disk [3].

Figure-1: Slack Space



Sources: Authors Compilation

- *Free Space*: When a file is moved from one hard disk or partition to another, it is actually a multistep process of copying and deleting the file. First, a new copy of the file is created on the target partition. After the file has been copied, the original file is then deleted. This process also requires some housekeeping in the FAT or MFT tables. A new entry is created in the table on the partition where it has been copied, whereas the record for the deleted file is removed from the table on its partition. When a file get deleted, that space considered as free space, there also criminal can hide sensitive information [6].

- *Faked Bad Clusters*: Clusters marked as bad may be used to hide data. In NFTS, bad clusters are marked in metadata file called $BadClus, which is in MFT entry 8.Originally, $BadClus is a sparse file which file size is set to the size of entire file system. When bad clusters are detected, they will be allocated to this file. The size of data that can be hidden with this technique is unlimited. Suspects can simply allocate more clusters [6].

NETWORK FORENSIC ANALYSIS

Network forensics is capturing, recording and analysis of network events in order to discover the source of cyber attacks. In network, forensics there are two major types of investigation [7, 8] *i.e.* Network Traffic Analysis & Log Files Analysis.

Network Traffic Analysis

Network traffic analysis can be used to reconstruct and analyze network-based attacks, inappropriate network usage. The content of communications carried over networks, such as e-mail, chat etc can also support of an investigation. A Packet Sniffer tool is used for capturing network traffic. The header information encapsulated in the captured packet can be analyzed by the forensic analyst [8, 9]. This is very important when an investigation conducting on active network intrusions or attacks. Some cases evidences are available only in running processes or RAM.

Procedure for Network Live Acquisition

- Create a bootable forensic CD.
- Perform Remote access to the suspected machine.
- Insert bootable CD in suspect's machine directly.
- Record or keep a log of all the actions of forensic investigator.
- If need to take out away the evidence then use USB.
- Next, Take a copy of the physical memory using a forensic tool like ***forensic ^{ctrl}*** ™
- Create an image of the drive.
- For intrusion, first check root kit is installed or not, for that root kit revealers are available.
- Perform hash value of the created image for integrity checking.

Log Files Analysis

During investigation to recognize malicious activities by mining user log files. Access logs can contain vast amount of data regarding each user activities [10].

Analysis steps:

- Input a server log file;
- Identify each sessions;
- Log file parser converts dump file into formatted order;
- Using a Search function finds the required data; or, Data mining algorithms give relations or sequential pat-terns.

DATA MINING FOR DIGITAL FORENSICS

Cyber Crime Data mining is the extraction of Computer crime related data to determine crime patterns. With the growing sizes of databases, law enforcement and intelligence agencies face the challenge of analyzing large volumes of data involved in criminal and terrorist activities. Thus, a suitable scientific method for digital forensics is data mining. Crime data mining is classified as follows [11, 12].

- *Entity extraction* has been used to automatically identify person, login ID, Password, ID no, IP of the system, and personal properties from reports or logs.
- *Clustering techniques* such as "concept space" have been used to automatically associate different objects (such as persons, organizations, hardware systems) in crime records [12].
- *Deviation detection* has been applied in fraud detection, network intrusion detection, and other crime analyses that involve tracing abnormal activities [12].
- *Association* rule has been applied to finding associations and sequential patterns between web transactions are based on the Apriori Algorithm. Mining results shows motive, pattern and counts of similar types of attacks appended during a period.

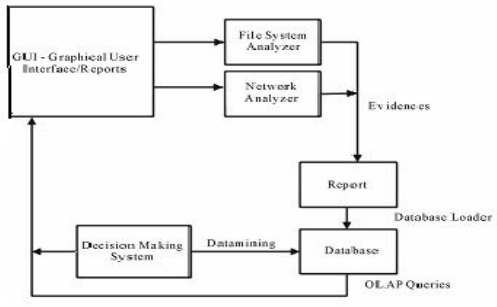
Crime Data Mining Algorithm

- Identify variables/item sets from a case report (our proposed system stores these variables as attributes of tables, file system table, network table).
- Item sets I = {I1, I2, I3 ⋯ Im}.
- Set of actions D = {t1, t2, t3 ⋯ tn}.
- Find frequent item sets by using Apriori algorithm.
  Employs an iterative level to find set of frequent item sets.
  E.g. if an attacker attacked database, login attempt results a data loss/Data tampering and case report show actions like Data deleted, Login attempt, attack type = SQL injection, If these item sets are frequent then we can set a rule " motive of attack is Data theft".
- Make Association Rules
  i.e. It is a rule in the form X → Y showing an association between X and Y that,
  if X occurs then Y will occur.
  If the attacker accessed operating system files then we can say motive of attack is system Crash.
  If attacker attacked Database login and password steel then we can say criminal motive for data theft / data change.
  This maximum frequent item sets also shows attack patterns.
  Finding other signs of evidence Correlation, contingences (Consider these values while making rule sets).
- Set SQL queries

Proposed Digital Forensic Tool

Our proposed model is the combination of digital forensics and data mining. Our proposed system helps to increase the security of the organization. When an incident reported, it investigates and report is saved in the database. Using crime data mining tool the nature of the attack is identified and alert administrator about similar attacks in future. Proactive measures can be initiated to prevent future cyber attacks. ***Figure2*** shows the Block diagram of our proposed tool.

Figure-2: Block Diagram of the Proposed System



Sources: Authors Compilation

- *Graphical User Interface*: It is used by the forensic investigator to enter case details and apply tools (File system, Network) to collect evidences. Investigators can input their queries in the system. This also displays the result of the query in the form of Bar chart or report.

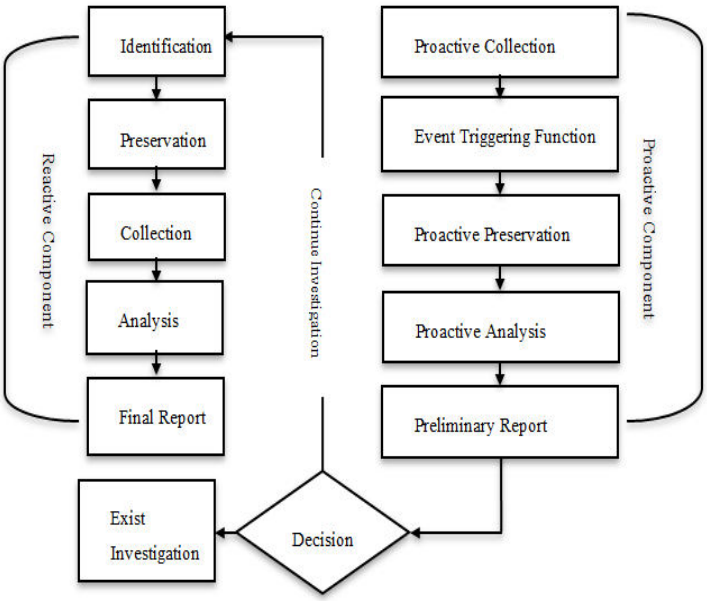
- *File System Analyzer*: This tool Collects evidence from the file system, it recovers all files, searches data in the free space, slack spaces and deleted spaces.
- *Network Analyzer*: This tool collects data from the network traffics and server log files.
- *Database*: Database loader collects evidences from the above tools and loader loads into the database as attributes of the tables.
- *OLTP (Online Transaction Processing):* Set relations between the tables of the detected crime attributes. This applies data mining and extracts of required data.
- *OLAP (Online Analytical processing)* apply analytical queries and retrieves the output/decisions. Database server helps to store and retrieve crime attributes and results.
- *Decision Making System*: This module applies data mining algorithm and SQL queries into the database and generates reports.
- *Log file analyzer module* parses the web server logs,

Apply an Association mining (Apriori Algorithm) finding relation between these item sets of Crime Data and generate a prediction. *Graphical visualization module* generates the required results in the form of Bar Charts or Graphs.

THE INTERDISCIPLINARY NATURE OF CYBER DEFENCE

The cybercrime process is initiated when the detection function identifies a situation or event as abnormal referring to the assumed security level and the security policy. This detection function can be executed in *Reactive mode* as control function of a system or *Proactive mode* by law enforcement actions such as internet flow or social networks supervision to look for suspicious contents. In the first case, the abnormal event (or state) is detected by processing control variables; in the second case, the nature of application contents carried though networks may alert about an illegal activities.

Figure-3: Functional Process for Proactive and Reactive Digital Forensics Investigation System



Sources: Authors Compilation

Description of the two components in the proposed process is as follows:

1) Proactive Digital Forensics Component: is the ability to proactively collect, trigger an event, and preserve and analyze evidence to identify an incident as it occurs. In addition, an automated preliminary report is generated for a later investigation by the reactive component. The evidence that will be gathered in this component is the proactive evidence that relates to a specific event or incident as it occurs [4]. As opposed to the reactive component, the collection phase in this component comes before preservation since no incident has been identified yet.

Phases under the proactive component are defined as follows:

- *Proactive Collection*: automated live collection of a predefined data in the order of volatility and priority, and related to a specific requirement of an organization.
- *Event Triggering Function*: suspicious event that can be triggered from the collected data.
- *Proactive Preservation*: automated preservation of the evidence related to the suspicious event, via hashing.
- *Proactive Analysis*: automated live analysis of the evidence, which might use forensics techniques such as data mining to support and construct the initial hypothesis of the incident.
- *Preliminary Report*: automated report for the proactive component. This proactive component differs from common Intrusion Detection Systems (IDS) by ensuring the integrity of evidence and preserving it in a forensically sound manner.

In addition, the analysis of the evidence will be done in such a way as to enable prosecution of the suspect and admission to court of law.

2) Reactive Digital Forensics Component: is the traditional (or post-mortem) approach of investigating a digital crime after an incident has occurred [7]. This involves identifying, preserving, collecting, analyzing, and generating the final report. Two types of evidence are gathered under this component: *active* and *reactive*. Active evidence refers to collecting all live (dynamic) evidence that exists after an incident. An example of such evidence is processes running in memory. The other type, reactive evidence, refers to collecting all the static evidence remaining, such as an image of a hard drive.

Phases under the reactive component are defined as follows [7].

It is worth mentioning that the examination and analysis phases [7] are combined in the proposed process under a single phase called analysis. In order to see how the two components work together, let us take the scenario that electronic health records with an important risk will be proactively collected all the time for any read access of such records. This live collection is automated and is conducted without the involvement of the investigator. When a suspicious event is triggered during collection, consequently all evidence related to that event will be preserved. Thereafter, a forensic image will be made from the preserved evidence. Next, a preliminary analysis will be conducted.

CONCLUSIONS

This paper explains the hidden evidence acquisition from file system. Second section explains investigation on the Network. There are two types of investigation in network, live data acquisition (Packet capturing and analysis) and log file analysis. Third section explains crime data mining. Next we had a comparative study on reactive and proactive mode of cyber security .On this basis we propose a new system with Digital forensic tool for decision making in the computer security domain .For future work; the proposed process will be used to develop and implement the proactive and reactive systems using domain specific modeling language and automated code generation. This new method will help in creating the skeleton of the new digital investigation tools and techniques. Two major issues will be addressed in the implementation of the new process:

- The ability to predict an event (an attack) proactively, and
- Optimizing the proactive component by providing a feedback loop whenever the proactive or the reactive component is originated.

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INFORMATION TECHNOLOGY AND CHALLENGES OF ECONOMIC DEVELOPMENT IN INDIA

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ABSTRACT

This paper reviews India's development challenges in an increasingly information and knowledge-based global economy. It summaries the roles of knowledge and information technology in addressing these challenges and discusses the strategies and policies that India could adopt to accelerate the process of integrating the region into the developing global information system. The paper is organized in five sections. Following this introduction, the next section examines the major developmental challenges facing India and what role information technology could play in overcoming them. Section III outlines the policies that would need to be adopted by India to improve their information accessibility and examines the initiatives taken by India in this purview. The conclusion of the paper is provided in the last section.

KEYWORDS

Information Technology, Economic Development, Challenges etc.

INTRODUCTION

The recent progresses in information technology are becoming significant to the process of socio-economic development. Information technology offers new ways of exchanging information, and steering business, changes the nature of the financial and other service sectors and provides efficient means of using the human and institutional capabilities of countries in both the public and private sectors. The world is rapidly moving towards knowledge-based economic structures and information societies, which comprise networks of individuals, firms and countries that are linked electronically and in interdependent relationships. The paper examines the contribution of IT in economic development of India.

In an increasingly globalized economy, information technology is one of the key determinants of [20]competitiveness and growth of firms and countries. Firms are becoming more competitive because of their knowledge, rather than based on natural endowments or low labor costs. It is becoming increasingly ostensible that the role of traditional sources of comparative advantage (a large labor force and abundant natural resources) in determining international competitiveness is diminishing. The competitive and comparative advantages of countries are gradually being determined by access to information technology and knowledge. The comparative advantage that now amounts is man-made, engineered by knowledge through the application of information.

Since fabricated comparative advantage can only be acquired by knowledge and brainpower, the newly emerging knowledge-based economic structures have far-reaching implications with regard to labor markets and the roles of technical education, human capital formation and research and development in the process of economic growth. The evolution of the knowledge-based economy is expected to result in increasing the demand for skilled labor and reducing the employment prospects of unskilled labor. In addition, within economies, enterprises would succeed only to the extent that their employees can access and use information and knowledge effectively.

Information technology does not only determine the market share and profitability of individual companies in tomorrow's global economy, but it has a huge impact on future generations of workers and on a country's economic prospects. What are the consequences of information technology for the relative fortunes of nations? Countries that invest in and adopt information technology quickly will move ahead and those that fail to rapidly adopt information technology will be left behind.

DEVELOPMENT CHALLENGES AND INFORMATION TECHNOLOGY

India's overarching objective remains necessarily one of accelerating economic growth and reducing widespread poverty. To effectively reduce poverty, the pattern of economic growth would need to be broad-based to bring about social development and improvements in the welfare of Indian peoples. To this end, priority should be deliberated to investing in physical as well as human capital, especially with respect to access to education, health and nutrition. It is also important to promote private-sector led growth and international trade. Furthermore, efforts would be needed to attend to crosscutting issues such as environmental management. Briefly, India's seek for sustainable development should be based on the pursuit of the intertwined goals of accelerating the pace of economic growth, while also spreading the benefits widely among the population to make significant developments in poverty reduction.

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To achieve this fundamental objective, India faces a complex mix of development challenges that need to be tackled. Although vast and multifaceted, some of these include:

- Integrating India into the global trade and finance;
- Effective macroeconomic and public sector management;
- Stimulating private enterprise development;
- Accomplishing agricultural development and food security;
- Ensuring Environmental Protection; and
- Promoting Human capital development.

INTEGRATING INDIA INTO THE GLOBAL TRADE AND FINANCE

The world economy is becoming increasingly globalized and the significance of international and regional trade to the process of economic growth and poverty reduction cannot be overstated. Trade performance sets the limit to which investments and growth can be expanded without encountering balance of payments and debt repayment problems. Therefore, in any open economy trade is one of the main driving forces of the process of economic growth. India, which is striving for sustainable economic growth and improved living standards, cannot afford to ignore the significant deterioration in its international market share. In addition to holding great potential for enhancing the productivity and supply of exports, the application of information technology to the demand side can help India improve their trade performance and retrieve the losses in their international market share. This is particularly true because the poor export performance of India is largely ascribed to non-price factors on the demand side.

Information technology offers effective methods to perform these trade promotion functions and address India's lack of international competitiveness. For instance, using the Internet, it is possible to access on-line information on markets, market regulations, prices, potential buyers and many import-export data. The use of computer technology for data processing would speed up delivery time by improving the internal and external networks, export-servicing facilities, customs operations, and reduce transaction costs. The application of information technology will also make it possible for export producers to intermediaries and conduct their transactions directly with exporters or export markets, increasing, thereby, their profitability and incentives to produce.

The promotion of inter-Indian trade will also require efficient financial and payment systems to settle inter-regional transactions. In India, this means harnessing information technology to improve the banking infrastructure; strengthen prudential regulations and the legal framework; build sound and efficient payment systems; and deepening capital markets. The project would develop an automated payments system within the banking and finance system; improve delivery of key public services with priority to those services which directly interface with the private sector, such as company and land registration; and modernize the legal framework, particularly in the areas of intellectual property, rules of evidence, data access and confidentiality. The development of national and regional capital markets will be facilitated by widespread adoption of information technology.

MACROECONOMIC AND PUBLIC SECTOR MANAGEMENT

Since the mid-1990s, India has made remarkable progress in the area of macroeconomic management. This progress was marked by restrictive fiscal policies which reduced overall budget deficits from 4.7 per cent of GDP in 1996 to a historic low of 0.1 per cent of GDP in 2000.

Although the recent improvements in macroeconomic management and economic growth are welcome, but the origin of economic crisis is directly attributable to the cavalier macro management of the economy, which led to large and persistent macroeconomic imbalances. While the decline in fiscal imbalances has contributed to non-inflationary economic growth, there is increased concern over the adverse impact of public expenditure reductions on the social sector. There is also some evidence that there are inefficiencies in resource mobilization and in the use of available resources. Progress in stabilizing the macroeconomic environment, strengthening the efficiency, accountability, and transparency of government can benefit a great deal from the introduction of information technology applications. Information systems, which can help governments design, implement, and assess policy reforms are now powerful instruments of public policy. Such information systems could increase the speed, volume, quality, transparency, and accountability of government transactions, yielding large productivity increases in government services.

In fiscal monitoring, governments can use information systems to design and follow-up the process of tax collection and authorize its revenue collections against its expenditure. In budgetary planning, information technology provides simulation techniques to simultaneously maximize revenue and minimize the tax burden on selected income groups and economic actors. In public procurement, the adoption of information technology can help simplify purchasing procedures through electronic advertising, qualification, tendering, selection and payment. In debt management, information systems can be used to co-ordinate the processes of borrowing and debt repayment transactions with the various bilateral and multilateral creditors in order to improve the efficiency and transparency in the use of foreign capital and avoid the problems of corruption and excessive debt burdens. Such applications are also laborsaving and can help governments to keep a small, efficient and well-paid civil service.

PRIVATE ENTERPRISE AND INDUSTRIAL DEVELOPMENT

Industrial performance has been poor in most of India and has suffered deindustrialization. One of the most important challenges to India's industrial development is the upgrading of the technological capabilities of local industries, particularly Small and Micro Enterprises (SMEs) which form the bulk of private sector industry and provide employment for a large number of people. SMEs make a potentially important contribution to economic and social development in India. Compared to larger firms, they tend to use less capital per worker and have the capacity to use capital productively. Small- and medium scale enterprises employ workers with limited formal training, and use local raw materials that would otherwise be neglected. They also organize the small savings of proprietors, which tend to exist outside the formal banking system. Studies have shown that owners of SMEs have a surprisingly high propensity to save and invest, even at quite low-income levels. In addition, SMEs have important linkages with large firms through subcontracting arrangements.

A number of factors make it vital for Indian SMEs to harness information technology for establishing networks and alliances. For instance, existing and new markets are opening up as countries liberalize their trade in goods and services under the supports of the World Trade Organization (WTO), and other forms of regional trading blocs and business becomes globalized. While offering better exporting opportunities, these developments have changed the requirements and rules of competition. In order to access these markets or compete effectively even in their own markets, it is imperative that Indian SMEs adopt a global outlook and form strategic partnerships, both domestically and in foreign markets. In addition, successful firms are going to be ones that respond to changing customer requirements.

Furthermore, building alliances and networks can benefit SMEs is in the area of technical change. Rapid technological changes in the form of new products, along with new production processes and management systems threaten to overcome most Indian SMEs. Developments in transport, agriculture, manufacturing and finance are likely to erode further the competitiveness of Indian SMEs-even in areas where India traditionally held a comparative advantage. If Indian firms are to respond effectively to changing customer needs and take advantage of changing production incentives, it will be imperative that they improve their technological capabilities. To this end, Indian SMEs will have to source information technology, which provides them with access to state-of-the art technology.

AGRICULTURE DEVELOPMENT AND FOOD SECURITY

Indian economies continue to be heavily dependent on agricultural production and the export of natural resources. The extensive adoption of information technology holds considerable promise for India in their quest to improve their agricultural production and marketing practices. It provides opportunities for the development of information systems to monitor water and land resources, food transportation and storage and crop-diseases control. Video and radio-conferences between buyers and sellers, growers and extension officers, can also play important roles in stimulating internal and external trade and improving agricultural practices and productivity. Investing information technology opens up avenues to access and disseminate such information more quickly and extensively. With information technology, access to worldwide knowledge about new techniques for improving agricultural production would be considerably improved. Such knowledge includes advances in genetic engineering, which offer great opportunities for India to use seeds and plants that are adaptable to water availability and soil conditions.

ENVIRONMENTAL MANAGEMENT

India continues to experience serious drought, floods, and other natural disasters-with adverse effects on both humans and the environment. India's capacity to protect itself from such disasters, or to minimize the impact of both environment and human is limited by several factors, including the lack of resources, inadequate early warning systems, and the generally poor state of information on natural resources. The effects of the natural disasters on the environment are compounded by man-made factors.

Environmental management in India requires timely and accurate data on socio-economic and demographic trends, weather patterns and natural disasters, and the availability and use of both renewable and non-renewable resources. It is also dependent on the analysis of this information and the ability to share the information among policy makers across the region. Developments in geographic information systems have led to the introduction of improved assessment and monitoring techniques of natural-resource endowments. Information on natural resources could be linked to data on socio-economic and demographic dynamics to achieve better management and overall resource planning. Satellite images about vegetation patterns, moisture levels and weather could now be combined with ground-based information to provide early warnings on insect infestations, droughts and other natural disasters. Information technology holds great potential for developing access to areas threatened by disasters and environmental degradation. It can be used to monitor disaster prone areas and for coordinating efforts in the case of disasters.

HUMAN CAPITAL DEVELOPMENT

Human capital development is seen both as an essential means for sustained economic growth and poverty reduction and as an important end in itself. Human capital matters because the poor's most significant asset is their labor, and the most effective way to improve their welfare is to increase their employment opportunities and the productivity of their labor through investment in education, and health.

India achieved marked improvements in health development in the post-independence period. Despite, this improvement, India is presently encountering serious health hazards, reflecting a combination of poor nutrition, environmental conditions and inadequate health services. The main causes of illness are malaria, diarrheal diseases, respiratory infections, childhood diseases, parasitic diseases, sexually transmitted diseases, leprosy and injuries.

Information technology can help control and sometimes eradicate some of the health problems plaguing the country. It could enhance health administration and management through the provision of medical information systems, and could link health centers, delivery systems and medical transport to patients. Other applications of information technology include statistical analysis of health and family planning indicators, epidemiology, demographics, medical research, health manpower planning and management and training.

Access to the Internet and packages like WebPro, for instance, offer Indian physicians and hospitals opportunities to provide world-class services. With moderate investments in hardware and software, hospitals can create on-call teleradiology systems or consulting on remote cases over the Internet. The WebPro package to view ultrasound images can be transmitted quickly over ordinary phone lines, on commercially available PCs.

With the WebPro package, a physician in India working on a computer with a Web browser can pull an entire ultrasound examination-images and patient data-from an Acuson AEGIS(R) digital image and information network or from an Acuson ultrasound system. With the WebPro package, hospitals and clinics can use Internet technology for linking radiologists with their patients-speeding turnaround, controlling costs, improving hospital productivity, and increasing patient access to first-class care. There are also several other applications of information technology in the field of health which proved to be very useful.

The educational system in India suffers from various inadequacies including regional, intra-country and gender disparities; inability to meet the educational needs of deprived groups such as nomads, street children and the disabled; losses and leakages with more than a fifth of Indian children who enroll in primary school either repeating several classes or dropping out of school all together; low teacher-student ratios; limited availability of instructional material; and, poor quality of education. Higher education also faces serious problems with regard to quality, relevance and finance. There are few libraries, most of them lacking access to international journals and generally deprived of educational materials, while research facilities remain limited.

Most of these educational problems are related to inadequate funding and inefficient use of available resources. Information technology offers a wide range of low-cost solutions. One of the most important applications of information technology in this area is distance education in India (defined to include print, broadcasting, and limited face-to-face education) which could be broadly used to pursue entirely conventional educational ends. The main advantages of distance education are economy, flexibility, and suitability for widely dispersed student bodies. In addition, information technology has the potential to connect Indian educational institutions continent-wide, and link them with international universities, hence, facilitating research and the exchange of ideas. Access to data and educational materials would also be simplified.

INDIA'S ACCESSIBILITY TO GLOBAL INFORMATION

The regional and national infrastructure required to provide adequate access to the information age consists of strategic information systems necessary for sustainable economic development such as education, health, public financial management, and transportation, as well as the telecommunications networks and computer hardware and software. For the purpose of this paper, the issues pertaining to accessibility are discussed with reference to telecommunications and computer hardware and software, which represent the backbone of information systems.

Telecommunication has been recognized world-over as an important tool for socio-economic development for a nation and plays a phenomenal role in growth and modernization of various sectors of the economy. Over the last few years, Indian telecom market has shown overwhelming growth thanks to domestic demand, policy initiatives undertaken by the government and admirable efforts by the players of the industry and in the process, has managed to emerge as one of the youngest and fastest growing economies in the world today.

Factors like regulatory liberalization, structural reforms and competition played a very important part in this rapid transformation. The fact that India is one of world's fastest growing telecom markets in the world, has acted as the primary driver for foreign and domestic telecommunication companies investing into the sector. It is also recognized as one of the most lucrative markets globally, resulting in massive investments being made in the sector both by the private and government sector in the last decade.

The telecom industry has witnessed significant growth in subscriber base over the last decade, with increasing network coverage and a competition-induced decline in tariffs acting as catalysts for the growth in subscriber base. The growth story and the potential have also served to attract newer players in the industry, with the result that the intensity of competition has kept increasing.

Liberalization of the sector has not only led to rapid growth but also helped a great deal towards maximization of consumer benefits, evident from a huge fall in tariffs. Telecom sector has witnessed a continuous rising trend in the total number of telephone subscribers. From a meager 22.8 million telephone subscribers (wireless plus wire line) in 1999, it has grown to 926.53

million at the end of December, 2011, reaching tele-density of 76.86 %. The total number of urban subscribers today stand at 611.19 Million (65.59 %) and rural subscribers at 315.33 Million (34.41 %). Wireless telephone connections have contributed to this growth as the number of wireless connections rose from 35.61 million in 2004 to 893.84 Million at the end of December, 2011. In addition, broadband segment has seen significant growth with total internet subscribers reaching 20.99 million in September 2011, which includes 13.30 broadband subscribers.

The industry has touched newer heights with the rollout of newer circles by operators, successful auction of third-generation (3G) and broadband wireless access (BWA) spectrum, network rollout in semi-rural areas and increased focus on the value added services (VAS) market. Meanwhile, the introduction of Mobile Number Portability (MNP) in India has made the Indian Telecom market more competitive, in terms of service offerings and quality. With lower voice tariffs and low ARPUs in India, emergence of new technologies and advancements towards 3G amongst others reasons are motivating operators to shift their focus on VAS. Particularly, past few years have been quite revolutionary for the industry as it witnessed the emergence of smart phones, GPS enabled sets, and 3G handsets. Initiatives to connect the rural masses are already visible with service provider's tie-ups with content providers for services related to agriculture, weather and livelihood.

The emergence of the mobile has benefitted people across all walks of life. Going forward, it is expected to play a significant role in bridging the digital divide between the rich and poor, between near and far, thus in connecting the nation. It has not only become the primary communication medium for people, but is also finding numerous uses across various domains. Today, it is being used for banking transactions, making payments, acting as an educational and multimedia tool, etc. However, the urgent need is to deliver services that could enable efficient day- to- day life for the larger masses efficiently. It can be an efficient mode of spreading governance, and can be used across verticals such as agriculture and healthcare. The rapid rise of high-end mobile phones (smart phones) has enabled the customers to access and utilize numerous software applications as utility or for entertainment.

The rapid pace of growth in telecommunications makes it necessary to develop India as a Global manufacturing hub. With its proven record of accomplishment in the skill-intensive industries and the global trend to manufacture and source products in low cost countries, India is well placed to emerge as one of the leading hub for manufactured exports.

With the liberalization of the Indian economy, the telecom sector has become very attractive for mergers and acquisitions. M&A in India is subject to various laws the principle of them being The Companies Act 1956, Income Tax Act 1961 and the Takeover Code (for public listed companies). Regulatory considerations are also equally important to take note of in telecom M&A.

India offers an unprecedented opportunity for telecom service operators, infrastructure vendors, manufacturers and associated services companies. A host of factors is contributing to enlarged opportunities for growth and investment in telecom sector:

- An expanding Indian economy with increased focus on the services sector,
- Population mix moving favorably towards a younger age profile,
- Urbanization with increasing incomes.

Investors can look to capture the gains of the Indian telecom boom and diversify their operations outside developed economies that are marked by saturated telecom markets and lower GDP growth rates. An attractive trade and investment policy and lucrative incentives for foreign collaborations have made India one of the world's most attractive markets for the telecom equipment suppliers and service providers.

Key factors, which will fuel the growth of the sector include increased access to services owing to launch of newer telecom technologies like 3G and BWA, better devices, changing consumer behavior and the emergence of cloud technologies. Majority of the investments will go into the capital expenditure for setting up newer networks like 3G and developing the backhaul. Moreover, the introduction of Mobile Number Portability (MNP) in India has made the Indian Telecom market more competitive, in terms of service offerings and quality.

The contribution of India's IT industry to economic progress has been quite significant. The rapidly expanding socio-economic infrastructure has proved to be of great use in supporting the growth of Indian information technology industry.

The flourishing Indian economy has helped the IT sector to maintain its competitiveness in the global market. The IT and IT enabled services industry in India has recorded a growth rate of 22.4% in the last fiscal year. The total revenue from this sector was valued at 2.46 trillion Indian rupees in the fiscal year 2007. Out of this figure, the domestic IT market in India accounted for 900 billion rupees. Therefore, the IT sector in India has played a major role in drawing foreign funds into the domestic market.

The growth and prosperity of India's IT industry depends on some crucial factors. These factors are as follows:

- The cost of skilled Indian workforce is reasonably low compared to the developed nations. This makes the Indian IT services highly cost efficient and this is the reason as to why the IT enabled services like business process outsourcing and knowledge process outsourcing have expanded significantly in the Indian job market.

- India is home to a large number of IT professionals, who have the necessary skill and expertise to meet the demands and expectations of the global IT industry.

- India has a huge pool of English-speaking IT professionals. This is why the English-speaking countries like the US and the UK depend on the Indian IT industry for outsourcing their business processes.

The emergence of Indian information technology sector has brought about sea changes in the Indian job market. The IT sector of India offers a host of opportunities of employment. With IT biggies like Infosys, Cognizant, Wipro, Tata Consultancy Services, Accenture and several other IT firms operating in some of the major Indian cities, there is no dearth of job opportunities for the Indian software professionals. The IT enabled sector of India absorbs a large number of graduates from general stream in the BPO and KPO firms. All these have solved the unemployment problem of India to a great extent. The average purchasing power of the common people of India has improved substantially. The consumption spending has recorded an all-time high. The aggregate demand has increased as a result. All these have improved the gross production of goods and services in Indian economy. Therefore, in conclusion, it can be said that the growth of India's IT industry has been instrumental in facilitating the economic progress of India.

CONCLUSIONS

Information technology is rapidly changing economic and social activities. It provides opportunities and challenges for making progress with accelerated growth and poverty reduction in India. The emerging global infrastructure could make it increasingly possible for students to study and carry out research using the electronic networks to reach remote universities and libraries. Physicians could remote-view entire images and patient data, diagnose diseases and perform consultations with outside sites. Decision makers would be able to promote effective economic management and good governance; and for businesses to complete more effectively with timely and accurate market information, to name a few. For India, information and telecommunication innovations present opportunities for "leapfrog" strategies that could accelerate the development of the continent. To exploit these opportunities, Indian countries need, as a matter of priority, to upgrade their capabilities through the improvement of their telecommunication infrastructures and the acquisition of computer and computer related equipment. National institutions responsible for data collection and processing need to be strengthened and their traditional information collection and dissemination structures need to be modernized if they are to fully participate in the international information evolution. Sub-regional trade information systems would need to be improved to provide meaningful backing to national efforts in this area.

Governments have to facilitate information transmission and connectivity to the global infrastructure by passing the necessary laws and regulations. Governments need to create the supportive external environment for promoting the use of information technology. It will be essential to reduce or abolish import taxes on information technology hardware such as computers, printers, satellites, televisions and radios. In some Indian countries such equipment are treated as luxury items and, hence, heavily taxed.

The numerous long-term benefits from encouraging the use of information technology through the reduction of taxes on hardware would more than offset the loss of government revenue. These desired improvements need to be pursued within the framework of comprehensive national or sub-regional plans to link Indian countries to each other and to the global information technology infrastructure. Within the framework of such plans, there is a strong case for earmarking the proceeds that arise from the privatization of public telecommunications to support the computerization of the economy and improve its accessibility to global information. In these and other related objectives, the Indian Development Bank Group could play a leading role through project financing, mobilizing foreign resources, advisory services and technical assistance. The Bank Group needs to develop the capacity to respond quickly and flexibly respond to the changing needs of its member countries. In this regard, information and knowledge must be viewed as strategic resources. To perform its role as strategic advisor and knowledge centre on Indian development policy issues, the Bank must develop and maintain appropriate human, information and telecommunication infrastructure assets.

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ATTENDANCE MANAGEMENT SYSTEM USING BIOMETRIC FINGERPRINT: A NEED FOR ACADEMIC ADMINISTRATION PERFORMANCE

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ABSTRACT

Today's globalization scenario, the world of technical higher learning institutions is becoming more competitive in terms of academic quality service and product. Most of such institutions are trying and ready to improve in academic performance as well as administrative process. Technical higher learning institutions realize that there will much improve performance if their staffs work together with proper management in attendance and time. For fast growing performance of an educational organization, tracking and monitoring employee and student time and attendance become an important consideration of academic administration. However, using traditional attendance system singing on the register may have causes an error in attendance management. In addition, such there are tedious, time consuming and risk on preparation of employee payroll and student attendance report as it is prone to error.

Biometric time and attendance system is one of the most successful applications of biometric technology, serves an alternate for traditional manual signing process. One of the main advantage of a biometric time and attendance system is it avoids a major loophole which we believed there exist in the traditional time and attendance systems. Biometric technology that involves the identification and verification of individuals by analyzing the human fingerprint characteristics has been widely used in various aspect of life for different purposes, most importantly as regards this study the issue of employees and students attendance. In this study the proposed system is mainly focus on the higher technical institutions as such academic institutions is becoming competitive in terms of quality to benchmark and internationally standard.

KEYWORDS

Biometrics, Fingerprint, Employee, Student, Attendance etc.

INTRODUCTION

Today the educational institutions behave like educational markets and are becoming global to benchmark and internationalize in their academic activities. In such scenario, academic institutions have to develop strategies of using technologies in all aspect of academic activities and administration performance. Higher technical learning institutions in India are always challenged to fast growing up in academic performance. Higher learning technical institutions are stay relevant in terms of both education and research. However, most of the Institutions are giving less importance to infrastructure development on the part of employee and students attendance management system with emerging biometric technology. Such cutting edge technology coupled with attendance management systems have led to increased quality tracking and assessing of employee, lecture and student time and attendance performance without delay and enhancing all-round performance development in academic administration activities. If biometric technology recognition attendance principle is applied to higher technical education institution, will enhance the quality of academic administration process and will meet the growing demand on performance.

Biometrics can be defined as the technique of studying the measurable physical characteristics or personal behavioral trait of a person such as fingerprints, hands geometry, eye structure etc. to establish his or her identity and recognize or verify the claim identity. This science is primarily to identify individuals [1, 2] A fingerprint is an impression of the friction ridges on all part of the finger. A finger ridge configuration does not change throughout the life of an individual except due to accidents such as bruises and cuts on the fingertips. The term fingerprint is refers impressions transferred from the pad last joint of fingers through fingerprint reader typically a record portion. Fingerprint is becoming an essential component of person identification solution effectively because fingerprint identifiers cannot be shared or misplaced and it intrinsically represents individual's bodily identity [3]. Biometric Fingerprint identification is one of the most well known automatic biometrics attendance management systems. The uniqueness and consistency over time of fingerprints have been used for identification over a century, more recently becoming automated due to advancements in computed capabilities.

Biometric technology has been widely used in various aspect of life for different purposes as it involves the identification and verification of individuals by analyzing the human body characteristics. The most importantly considered in this study the issue of employees and students attendance in higher technical educational institutions. The numerous advantages of the biometric system

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and its impact to the organizational performance development across the globe, most biometric technology users face the issue of defining the right and accurate biometric technology system that will be cost effective in solving particular problems.

UNIQUE FEATURE OF FINGERPRINT

The individual epidermal ridges and furrows have deferent characteristics for different fingerprints. Configurations and minute details of individual ridges and furrows are permanent and unchanging, these individual variable are within the limits and allow for systematic classification. There are two main feature of fingerprint can be considered i.e. fingerprint pattern and Minutiae feature.

A. Fingerprint Pattern

Considering all characteristics and facts of fingerprint, it is the most strategies of identification of an individual and according to the current most widely used Galton –Henry system, the fingerprint is divided into five classifications and easy [4,5]:

- **Arch**: The fingerprint pattern is made up of ridges lying one above the other in general arching formation. The fingerprint lines start from side of the finger and end at the other side, do not return and on the core points and delta point.
- **Tented Arch**: Like an arch fingerprint, but at least one up thrusting ride, which tends to bisects superior ridges at right angle more or less.
- **Left Loop**: Circular pattern that is fingerprint lines access from one direction then back from the same direction after a rotation around. To the left is Left Loop. There is a core and a delta at the lower left.
- **Right Loop**: To the right is Right Loop. There is a Core and a delta at the lower right.
- **Whorl:** At least one fingerprint stripe rotate into a closed curve around the center, there are two core points in center, a triangular point on each side when the cores are not in the same vertical line, here will form a double helix.

B. Minutiae Features

It is one of a major feature of a fingerprint, using which comparisons of one point with another can be made. The major Minutia features of fingerprint ridges are ridge ending, bifurcation, and short ridge (or dot). The ridge ending is the point at which a ridge terminates. Bifurcations are points at which a single ridge splits into two ridges. Short ridges (or dots) are ridges, which are significantly shorter than the average ridge length on the fingerprint. Minutiae and patterns are very important in the analysis of fingerprints since no two fingers have been shown to be identical [6]. The widely used for fingerprint authentication is minutiae based algorithm. It focuses on the endings of ridges and bifurcations. Global and local characteristics of fingerprints are used for identification of individuals. Global features are the ones that can be seen with naked eye like ridges, pattern area and delta while local characteristics are the minutia points [7]. There is no continuous finger print ridge a number points at which ridges change and end and these points are called minutia points. Minutia points provide the unique identifying features. A raw image is taken from the sensor and algorithms are implemented on the image to enhance it and further extract the minutia points directly from this representation. This procedure provides a much more efficient and reliable result as compared to other methods of fingerprint verification [8].

BIOMATRICS AND ATTENDENCE

Biometrics is the detailed measurements of the human body. Biometrics deals with automated methods of identifying a person or verifying the identity of a person based on physiological or behavioral characteristics [9]. Fingerprints are graphical flow-like ridges present on human fingers and it formations is depend on the initial conditions of the embryonic. With fingerprint biometric authentication technology, it is easier to track employee's time and attendance with on touch of a finger. Biometric fingerprint authentication is the most accurate way to collect employee's time and attendance information. However, technological advances in biometrics have now made this surprisingly affordable and popular. The biometric fingerprint reader has a capable of reading sensor scans any fingerprint in less than 1 second; this in turn will make clocking in and out much faster for your employees and at the same time saving your company time and money by paying your employees for the exact time they work. Your company will also reduce costly payroll and data entry errors caused by the old time card system [10].

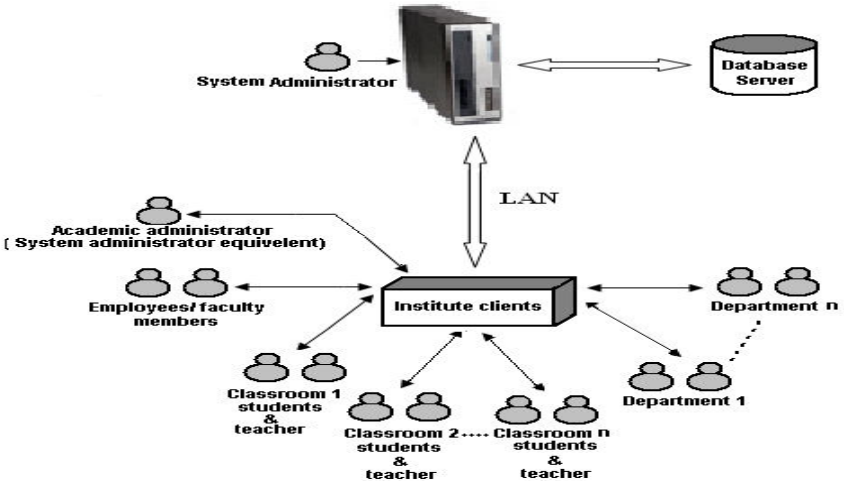
Today, many educational institutions are experiencing technological advancement and changes in the mode in which they carry out their academic administration activities processes. With the rise of globalization, it is becoming essential to find an easier and more effective system to help the educational organization improvement and their employee's productivity and student's academic performance records. In spite of this matter, there are still educational establishments that use the old-fashioned way i.e. the manual process of recording employee's and student time and attendance. Employee attendance management system is an easy way to keep track of attendance of employees within an organization. It covers the requirements of the personnel department in terms of day to day monitoring of employees, calculation of overtime and transfer of relevant information to the payroll system and manpower analysis. Hence, staff attendance is an important issue every kind of organization must take into consideration in order to be productive [11]. In addition, a report from the Shropshire council stated that staff productivity is greatly affected by the attendance of staffs [12]. The use of the traditional methods for attendance maintenance, for example staffs signing on

attendance sheet on entering the organization also contribute to the poor performance of the employee's productivity, the impact of staff absentee and staffs running late vary differently amongst different market sectors. Every organization whether it be an educational institution or business organization, it has to maintain a proper record of attendance of students or employees for effective functioning of organization. Designing a better attendance management system both for employees and students so that records are maintained with ease and accuracy becomes an important key in today's educational organization. This would improve accuracy of attendance records because it will remove all the hassles of roll calling and will save valuable time of the students as well as teachers.

PROPOSED SYSTEM ARTITECHTURE

Most of the higher technical education has the existing computing architecture of LAN system. According to us, the present existing computing architecture of the higher technical education from the point of usages of biometric technology attendance system using fingerprint identification is shown in figure 1. The overview of proposed system workflow is illustrated as follows:

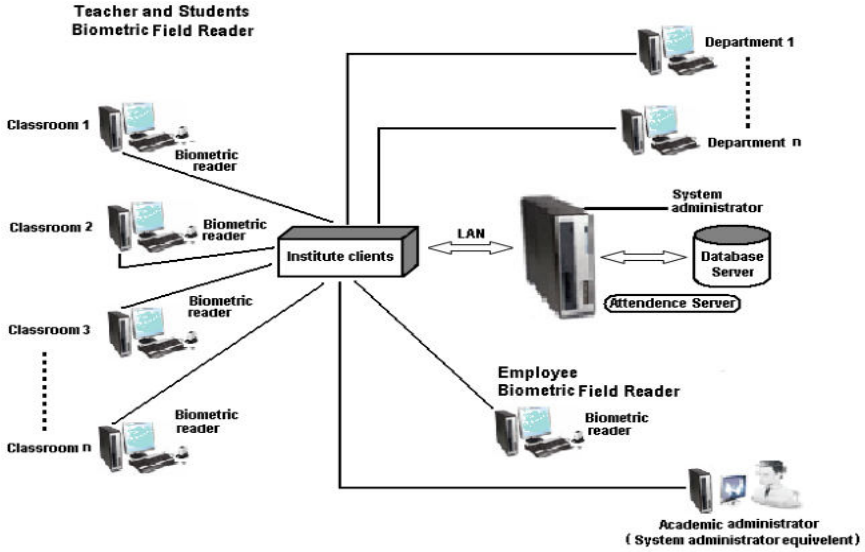
Figure-1: Proposed System Flow



Sources: Authors Compilation

All existed classroom in the institute has to be connected through LAN as a biometric terminal (BT). Biometric reader is installed in every classroom and administrative office as a BT. Departments of the institute should connected to as simple terminal to view the individual records when they are desire. The data from all biometric terminals of various locations is fetch to the LAN server, work as a biometric attendance server. The data flow of the system is shown using the figure 2.

Figure-2: Data Flow Diagram of Proposed System



Sources: Authors Compilation

When the teacher is enters into the classroom for a particular session of lecture, and then only the teacher and students will scan their fingerprints on the scanner of biometric reader every time they enter or leave the classroom. The computer software has to provide the subject ID and current semester using the ID of the teacher. After verification and identification process with template existing fingerprint on the database of teacher and student, the attendance of the corresponding class will be updated. If the teacher does not enter, the classroom biometric will not start. For any late entrance the system may allowed a period say 10 to 20 minute, after this no attendance will be given because of late entrance as shown in the figure 3. The employee attendance is given in the administrative biometric terminal is a common biometric terminal for all the employees working in the institute including faculty members of all the departments as shown in figure 4.

Figure-3: Classroom Biometric Terminal

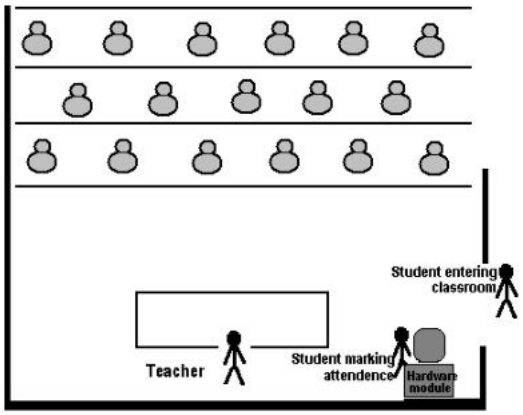
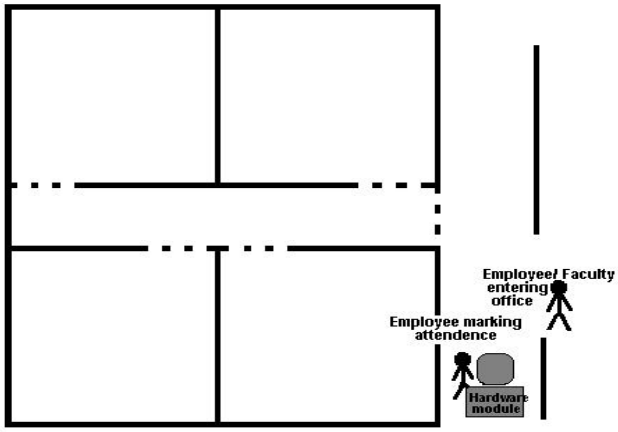


Figure-4: Administrative Office Biometric Terminal

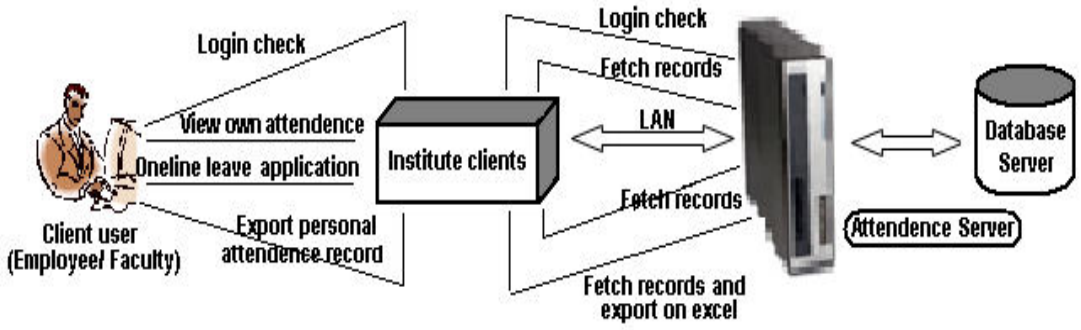


Sources: Authors Compilation

This terminal will provide to capture the faculty member is present on the day but not taking class or does not having classroom lecture session on the particular day or every need not to enter the classroom to give the biometric signature. The system administrator or academic officer (system administrator equivalent) have the authority to access and update the details attendance records to the database.

The user say employee or faculty member can apply online all types of leave application provided by the institution through login process in their terminals. A user i.e. employee or faculty member can also view their leave application status and monthly attendance status when they are desire to see according to different access permission are set on the users as shown in the figure 5.

Figure-5: User Online Leave Application Submission and Export Own Attendance

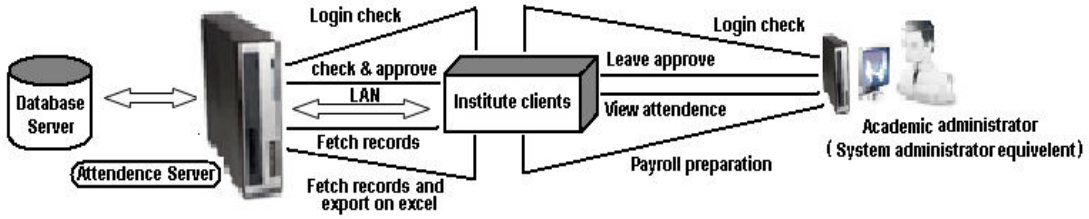


Sources: Authors Compilation

All the heads or academic administrator will approve the leave application of the corresponding faculty members or employees are working under them using their user name and password. The system administrator is the authenticate person to generate the payroll by integrating the biometric attendance with leave application and finally academic administrator authenticate manually by singing on the payroll sheet.

Academic administrator has a power of system administrator equivalent; he/she can view all the records of employees and faculty members of the institute using user name and password as shown in the figure 6.

Figure-6: Academic Administrator Records Viewing of Employee



Sources: Authors Compilation

CONCLUSIONS

This paper presents a proposed biometric attendance system-using fingerprint for higher technical education institute of employee and student. In many institutions, the employees and students attendance is very important factor for various purposes and it is one of the important criteria in academic administration to grow up its performance. This proposed system will make a way for perfect management of employees, faculty members and students attendance and produce more accuracy than traditional attendance system singing on register. This proposed system is also very helpful in saving valuable time of teacher and students and faster in implementation than any other biometric identification system. The proposed system was using the LAN system, further an idea of using PDA along with wireless LAN or a new spectrum of IT cloud computing recently started introduce in higher education.

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BRAND BUILDING: OPPORTUNITIES AND CHALLENGES ON THE INTERNET

R. Jesse Rezin Grand[25]

ABSTRACT

With the rapid growth of E-commerce and on-line consumer shopping trends, the consequence of brand building and maintaining customer loyalty in electronic marketplaces has come into sharper hub in marketing practices. Internet ultimately become an integrated component of business strategy of all firms, customer expectations are influenced by their purchase experiences in both online and offline environments, understanding how to harness the reach and interactivity of the Internet to build brand and maintain customer loyalty is becoming vital. An innovative mindset is needed to execute on-line branding strategy and by contributing exceptional empirical insights into the e-branding phenomenon that reflects more about enhancing benefits to customers which can build and maintain customer loyalty. This paper explores the emerging brand-building milieu, identifies new brand-building frameworks and reviews the issue pertaining to the development of E- brand building.

KEYWORDS

E-Branding, E-Tailing, Brand-Building Strategy etc.

INTRODUCTION

The Internet has a profound impact on the way business is being conducted. Supply chains have been re-thought, products and services reconfigured, and business models revamped. Such change inevitably has created not only new challenges, but also stimulating opportunities. Internet provides the opportunity for companies to reach a wider audience and create compelling value propositions and provides new tools for promotion such as interaction and relationship building. It empowers customers with more options and more information to make well-versed decisions. Internet also represents a fundamental shift in how buyers and sellers interact, as they face each other through an electronic connection, and its interactivity provides the opportunity for brands to establish a dialogue with customers in a one-to-one setting. As such, the Internet is changing fundamentals about customers, relationships, service and brands, and is triggering the need for new brand-building strategies and tools.

Building brand and maintaining customer loyalty has been a central theme of marketers and to establish sustainable competitive advantage. The advent growth of "Business to Consumer" (B2C) has magnified the importance of building brand and maintaining customer loyalty (e-loyalty) through E- commerce. Most B2C E-business models have relied initially on an intensive effort to generate a large enough customer base and subsequently on achieving profitability based on "lifetime revenue potential" from each loyal customer (Porter, 2001).

In the new world of e-branding, internet has become more than a gimmick or a mere line item on the communications budget. It plays a pivotal role in enhancing brand relationships and corporate reputations. Traditionally the issue of trust was addressed in a few ways. Personal face-to-face meetings, exchange of information, and trustworthiness of the parties. However, the characteristics of E-Commerce transactions differ vastly. An open technology of the Internet has brought together an unusually large number of buyers and sellers, online markets promote buying and selling of goods and services worth several million dollars in an anonymous fashion. In such an open market place, assurance and trust are difficult yet important. In the case of Business-to-Consumer online transactions, online consumers often perceive a lack of control over the access others have to their personal information during the online navigation process. Absence of robust mechanisms for addressing online trust increases the risk of trade and creates more friction in the market. E-tailing companies, such as Amazon.com, Yebhi.com, Flipkart.com, Infibeam.com, Myntra.com, E-bay.com, and India times shopping, have emerged to exploit these capabilities and have built powerful brands in a few years.

PURPOSE OF PAPER

- To understand the role of brands.
- To explore how Internet is changing the brand-building environment.
- To identify new sources of values, tools and strategies to build brands on the Internet.
- To identify the patterns in which E Commerce organizations could build trust.

THE EMERGING BRAND-BUILDING ENVIRONMENT

There has been much debate concerning the importance of brands online. On one hand, in addition to providing benefit, brands were traditionally a substitute for information - a way for consumers to simplify the time consuming process of search and comparison before deciding what to buy. However, the Internet makes search and comparison much easier, and directs focus

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towards price. This threatens to undermine the value of brands, and erode their ability to justify a price premium. On the other hand, transactions on the Internet require customers to provide detailed personal information, and people generally have concerns about sharing such information. In addition, the intangible nature of the Internet, and the fact that customers are buying goods that, in most cases, they have never handled or seen (except on-screen), has placed greater importance on trust and security. As a result, people prefer to transact with sites they know and trust - sites that provide a wealth of information and make comparison-shopping easy, where the user feels involved, and sites that understand the user's needs and preferences. This highlights the surfacing of information and relationships as key sources of benefit in the Internet economy. Furthermore, with the explosion of choice and available information, and the large variety of advertising and selling messages, consumers are experiencing 'information overload' and are looking for short cuts and have reverted back to reputable brand names, which provide the confidence and desired stability - allowing customers to cut through the risks and complexity of choice. Consequently, brands may be even more important on the Internet, particularly for pure online players, who are essentially intangible, and therefore customers have little to go on other than a recognized brand name. Furthermore, given the tremendous clutter in today's e-commerce marketplace, and the high cost of acquiring online customers, the most successful sites will be those that can attract customers and build brand loyalty and enthusiasm that extends the brand-customer relationship beyond a single transaction.

Therefore, building awareness, attracting traffic to the site, turning browsers into buyers, and turning first-time buyers into loyal repeat customers has become the Holy Grail of online brand strategies. However, with the emerging realization that brand loyalty is vital for online success, traditional methods are no longer sufficient in this interactive environment. The Internet, on the other hand, offers interactivity, whereby a company can establish a dialogue and interact with individual consumers on a one-to-one basis. In doing so, a company can listen, learn, understand, and relate to customers, rather than simply speak at customers. This creates the opportunity for companies to build stronger relationships. As such, the Internet is changing fundamentals about customer expectations, relationships, service and brands.

BRANDING ON THE INTERNET

Bonding brands with customers has always been about building relationships. Interactive technology enables marketers to inexpensively attract consumers into one-to-one relationships fueled by two-way conversations played out via mouse clicks on a computer. Internet is a true differentiator and challenge for e-marketers. This requires a new method of thinking about how to design Web sites and related marketing communications.

E-RELATIONSHIP BUILDING PROCESS

Awareness: The first is the consumer becoming aware of the company or its brands. At this stage, the prospective buyer can recall or recognize the name of the company. That does not mean trust in the brand, but simply a sense of the company as a player in some product or category.

Familiarity: During the second stage, the prospect becomes familiar with the company through acquiring an appreciation of the products or services offered, and various related features.

***Trust*:** The next stage takes the relationship to a deeper level. The potential customer becomes motivated to purchase a product or service because of the perceived benefits derived from particular features. During this phase, positive imagery about the brand or company encourages a feeling of trust, which in turn, enhances the relationship-building process.

Commitment: The final stage is the most important. At this stage, a transaction occurs that consummates the relationship. The prospect and the company each get something from the other. They are no longer strangers. Both comprehend something about each other, hopefully encouraging many repeated exchanges.

CONSIDERATIONS BEFORE INITIATING ONLINE BRANDING EFFORTS

Research Audience

To build brand online, companies must have a clear understanding of their audience, especially before creating content strategies and communication plans. Tools that can help to identify target audience such as:

- www.comscore.com
- www.nielsen.com
- www.compete.com

These tools allows to learn more about audience, including gender, age, marital status, household income, and locale.

Voice of Brand

Based on research, determine what audience wants to hear and what message to put forward. This will form the foundation for brand's voice. Nevertheless, in doing so, following things should be considered:

- An open mind and considering all ideas
- Consistent in messaging as people look for consistency in a brand.

Balance Online Media Mix

Build brand through multiple channels. Display and content networks can build brand through repetition, and get ads out in front of target audience using behavioral targeting, site specific targeting and re-messaging. From an organic search perspective, make sure that brand name and messaging is consistent in title tags and in Meta descriptions. By creating consistent messaging throughout the buying cycle, companies allow consumers to continually recognize and recall brand. This will make a clear choice when customers are ready to make a purchase.

Plan Social Media Integration

What a brand want to say or do online? What types of interactions needed for consumers to have with a business? Is Face book is right? or, Twitter? There are no answers at this point, but a little research will help to understand where audience is and how to interact with them. Start by listening and considering who is talking about brand. If no one is, then start the conversation. However, it should be a conversation leading to interaction, not a means to force a message on consumers.

Web Strategy & Content Services

For a long time, corporate web sites were a little more than brochure. Today, the Web is a vibrant, interactive medium, full of communities and conversations. As a result, the Web has begun playing an increasingly strategic role as marketing, brand building and customer-acquisition channel for corporations.

From a marketing perspective, companies use their web site to meet three primary objectives:

- Brand communication,
- Customer touch point,
- Customer-employee acquisition.

To succeed in the intensely competitive online landscape, it is important for companies to define a clear-cut web strategy and road map before embarking on building a new site or revamping an existing one.

Blip Model Framework

The BLIP model is a new framework for understanding, managing, and organizing the full scope of brand management tasks. It emphasizes the need to consider not just how to build and advertise brands, but how best to leverage them, how to identify the positions that they hold, and how to protect past brand investments.

Brand building is indeed important, but focusing on it alone risks, neglecting the other critical elements of strategic brand management. One-way to help combat this myopic focus is to utilize an overarching framework that highlights the need for continued management of brands well beyond their initial creation. This is what the BLIP model hopes to achieve. It identifies four components of branding:

- Building,
- Leveraging,
- Identifying,
- Protecting Brand.

KEY FACTORS THAT CONTRIBUTE TO BUILD A SUCCESSFUL ONLINE BRAND

Power on the Internet for Brand Edifice

Power on the Internet is 100% about content and connections. Company must have a strategy for creating content on an ongoing basis, and a strategy for connecting with individual, users, visitors, etc. Companies must create lots of content to sell products online. Creating great content serves several purposes.

- It helps with search engines…these days if unable to win lot of searches then invisible to a large segment of the population.

- It provides lot of content to share on social networks. Shared content is a great way to connect with people who like brand and for them to share it with their friends.

- Lots of content that is regularly updated gives people a reason to keep visiting website or blog, creates demand for new products, and increases the amount of trust people have in brand.

Direct Marketing On Online

Organize all the data about potential customers, website visitors, etc. so that to sell them more!

There are a lots of inexpensive relationship management tools that vary in their level of complexity and functionality.

- By gathering all the contacts of current and past customers. Companies can plan to develop direct response campaigns to convince them to buy more products and can offer specific specials propositions or announcement of new products.

- Once companies get more sophisticated in your direct marketing, it might experiment with specially targeted direct mail campaigns, highly segmented email, or anything new that companies might think of.

- The main thing is that direct marketing always circles back around to brand building. Major goal is to strengthen brand through direct transactions and sell to contacts more products and services.

Substance on the Web Site

It capture the attention of those prospects who know nothing or very little about the company, but are interested in its category. It also builds awareness of what the company does within the context of the industry in which it is competing. For those who already know something of the company, but not the advantages of doing business with it, site content identify and link benefits sought by the consumer to the company's products and services. This material needs to deepen to a level that triggers a desire to do business with the company. Clearly, those individuals wishing to become customers need easy site access to satisfy their needs and assure the relationship develops even further. In addition, most importantly, existing customers of the company need to feel their interaction with the site, identifying them as more than just an anonymous browser.

E-Apparatus for Customer Services

Every e-merchant wants to make sales but savvy e-business owners understand the value of building lifelong customer relationships. Customer loyalty does not happen overnight but by engaging in some of the best e-commerce practices, companies can build a loyal customer base faster. Customer service is a major influence on their decision to shop.

Completely Accessible

Customers should not need to try too hard to find a way to contact. There are unlimited opportunities to provide customer service. Like live video, text chat, phone number or e-mail, customers should not encounter any trouble when they try to reach customer service. The more outlets for communication, the more brand trust can be built.

Constantly Provide Solution

Every customer matters. It is important to maintain this philosophy in today's social world where bad news can travel very quickly. Make sure customer service department always provides unsatisfied customers with a satisfying solution. Whether it is a discount on their next purchase or store credit, customers are expecting you to meet their needs and not doing so could end up being more expensive.

Monitoring Review Sites & Handling Negative Review

It is important to know what is being said about brand in the digital world. By knowing when a negative review is posted, it can be someone handled immediately. Ignoring negative feedback is probably the worst e-commerce practice. Customers who voice their discontent are likely to exercise their ability to share it online. No matter what the situation is do the best to meet the needs and wants. If done so, the most displeased customers often turn into greatest advocates.

Knowing How to Handle Complaints

Before contacting the customer marketer should know and anticipate what they will say and their want and need. The only goal should be to please customer:

- Who was the advisor and technician or salesperson?
- What did they purchase or what service did they have done?
- Will they need to return to the dealership?
- How long have they been a customer?

By preparing for complaints and negative reviews and knowing what to do to prevent negative reviews and unsatisfied customers, companies can proactively manage and build your online reputation to secure a lifelong supply of loyal customers.

Reward Loyalty & Thank Them

Incentivize customers to come back by rewarding them. Make them feel appreciated with a personalized thank you e-mail after they make a purchase or include a small gift in their package. This is the greatest way to thank your customers for being loyal and encourages them.

Loyalty as the New Imperative Strategic

Companies have long counted on revenue from repeat purchasers, while seeking to entice those customers to spend more or buy more frequently. Cross-selling and up-selling are not new concepts but with customer expectations at all-time highs and brand loyalty at risk from competitive and market pressures, businesses must devise new strategies to keep their valuable customers come back. Many companies are now putting increased focus on their loyalty and retention programs the nurturing of loyal customers is not only becoming a high priority, it is quickly becoming a strategic imperative.

Progression in E-Brand Building

Once the value proposition has been clearly defined and the company's resources developed and aligned to deliver the proposition, the next stage is to communicate the values of the brand and then reinforce brand associations to start the wheel of usage and experience, and keep it turning. The online customer choice pipeline, which represents the customer purchase process as a series of distinct resources. Each stage is explained as follows:

Unaware: Potential customers who have not heard about the brand. Number of people at this stage becomes aware of the brand (flow into the aware stage).

Aware: Potential customers who are aware of the brand, but not accessed the website or purchased a product.

Browsers: People who are interested in browsing and accessing the sites. They click off to return some other time, or purchase a product in that case they become customers, or discard the offering and become refusers.

Users: Browsers who completed the purchase process.

Loyals: Customers who return to purchase items from the website. They can be an important source of positive word-of-mouth, which usually accounts for the lion's share of customer visits to a website.

Refusers: Customers who have accessed the site or bought a product, but are dissatisfied with the experience. The accumulation of refusers depends on the brand's ability to fulfill expectations.

Companies must understand not only where consumers are in this pipeline but also, more importantly, how they can influence the flow rates between stages, particularly where bottlenecks occur, to increase the flow of consumers through the pipeline.

CONCLUSION

This dissertation set out to explore how the Internet is changing the brand-building environment, in order to identify the new sources of value, new brand-building tools and strategies, and to outline the key factors that contribute to the development of a successful online brand with power shifting to customers, the success of an online brand is largely determined by customer choice. The repeated choices of certain brand by customers and business partners generate the transactions and repeat business that counterbalances the costs of customer acquisition and infrastructure.

Repeat transactions provide the basis for a relationship that, when properly cultivated, creates value for both the company and its customers. This relationship is the basis for the customer loyalty that creates a successful online brand. The companies that are successfully building relationships and fostering brand loyalty are those that recognize that their brand's perceived value hinges on the total end-to-end customer experience, from the promises made in the value proposition, to its delivery to the customer. It is about enticing customers, gaining their trust, and making the experience so satisfying that they are confident in their choice and will return, and will tell others about it. It aims to create "apostles", As such, brand-building on the Internet extends beyond the traditional focus of positioning, advertising, promotions, catchy logos and slogans, to creating a business that can deliver complete and completely satisfying, experiences.

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TO INVESTIGATE THE SLURRY EROSION WEAR BEHAVIOUR OF CENTRIFUGAL PUMP SLEEVE SS-316 WITH THE HELP OF WC-12CO COATING

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ABSTRACT

Wear erosion needs special attention in pump design as it can lead to severe damage of the pump and restrict its lifetime significantly. It therefore determine to large extent to selection of pump. During the design process, it essential to accurately predict possible erosion in pump, adapt the design and select a proper material to minimize and prevent erosion. Particle parameter like hardness, shape and size, material structure and hardness, as well as the flow pattern play an important role and determine erosion in pump. Particle parameter is given by the application and hence, can hardly be influenced, whereas the material of the pump is selectable.

This paper discusses the observations made during erosive wear testing on centrifugal pump shaft sleeve made of low-carbon steel SS-316 having carbon content 0.03% in slurries. The slurry was made by separately dispersing 30% sand and dust particles (collected from the industry) in tap water. The tests were performed using a centrifugal pump having a sleeve on its shaft of rotation 1440 rpm at room temperature. In the current investigation, ceramic coating Tungsten carbide cobalt (WC-12Co) was deposited on sleeve material SS-316 steel by detonation gun (D-gun) thermal spraying process. To see the influence of slurry wear response, weights of each rate of material loss when compared with uncoated steel. Results have been explained on the basis of experiment were, weight of uncoated sleeve made of SS-316 is reduced by 0.29 gram after 42 days and Weight of coated Sleeve made of SS-316 is reduced by 0.02 gram after 42 days.

KEYWORDS

Wear erosion, Slurry, Steel, Weight of Coated Sleeve etc.

INTRODUCTION

Centrifugal pumps are often applied for the hydraulic transport of solids, as it is the case in mining, production, extraction, or pulp and paper industry. In these cases, a large amount of solids is transported. Other cases are present, in which the solid appears in low concentration, as within the application of water and oil drawn from wells or rivers. Because of the solid particles, it can yield erosive wear of different pump components, which hence can lead to severe damage of the pump and restrict the lifetime significantly. During the design process, it is essential to accurately predict possible erosion in pump, adapt the design and select proper material to minimize and prevent erosion.

In erosive wear has been defined as the process of metal removal due to impingement of solid particles on a surface. In this case, particles are generally entrained in a fluid, such as in slurry. The wear caused in pipelines handling abrasive slurries would be one example another would be the wearing action caused by sand and grit in air streams. In processes using slurry as the working fluid, wear due to solid particles and pump component define the erosion processes. A particle sliding along a surface under pressure, with large tangential velocity component and a low impingement angle is impinging on elements of the process units is a serious reliability issue.

Slurry erosion (SE) is commonly observed in almost all kinds of components and machineries involved in fluid (liquid) transfer and delivery. This problem becomes more severe during the transfer of fluid containing slurry particle in the industry. Therefore, due to heavy economic losses associated with slurry erosion, this problem has attracted the attention of the researchers worldwide Erosive wear tests are increasingly applied to surface engineered components, since they have the potential for use as quality assurance methods. In many engineering applications, surface coatings are used to increase the lives of components exposed to erosion. Moreover, it has also been observed that the surface hardening of materials plays a dominant role in the erosion process. SS-316 steel is commonly used in centrifugal pump components because of their excellent mechanical properties and resistance to corrosion. However, during longer hours of exposure, these steel are affected by slurry erosion because of their lesser hardness in comparison with very hard erodent particles of hardness of about 1100 HV. Therefore, there is a need to develop some solution to enhance their slurry erosion resistance. It has been learnt from the literature survey detonation gun (D-gun) thermal spraying coatings can offer industrial viable solution in this regard. As the erosion is a surface phenomenon and it occurs mostly at outer surfaces, therefore it is more appropriate to use Thermal spraying techniques rather than using high cost erosion resistant alloys/metals. Thermal spraying techniques are coating processes in which melted (or heated) materials are sprayed onto a surface. The "feedstock" (coating precursor) is heated by electrical (plasma or arc) or chemical means (combustion flame), Detonation gun (D-gun) spray process is a thermal spray coating process which gives an extremely good adhesive strength, low porosity, coating surface with compressive residual stresses, low oxide contents, and high inters plat strength.

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LITRATURE REVIEW

Different factors contribute to wear erosion. This section explains the erosion processes that can be distinguished. Every contact between solid particle and pump component yields an interaction and contribute to wear. Hence, particle parameter and flow conditions need to be considered.

Erosion Processes

The type of interaction between solid velocity component and a low impingement angle is a friction –like process. It mainly occurs along pressure or velocity side of an impeller blade, at the tip clearance of an open impeller or along hub. A particle hitting a pump component with a large normal velocity component and a high impingement angle is a shock-like process. This happens at blade and hub.

Key Parameters of Particles

Particle Concentration

The particle concentration has a strong influence on the erosion rate. The interaction of particles and pump component increases with the particle concentration, the ratio is roughly proportional. However, for high particle concentration the particles start interaction with each other, which yields in less contact with the component; the erosion rate then stays content

Impingement Angle

The erosion process strongly depends on impingement angle α: for $\alpha \longrightarrow 0$ degrees the process is friction-like, for $\alpha \longrightarrow 90$ degrees the process is shock like, and variation in between. Experiments showed that the maximum erosion rate is not only dependent on the impingement angle but also on the material: for a brittle material, it rises continuously to a maximum at α=90 degrees, for a ductile metal it attains a maximum at about α=30 degrees.

Particle Size

The kinetic energy of a particle impinging on the wall at a given velocity and angle increase with the particle mass. In principle, the wear rate rises with the particle grain size, but not all tests exhibit this behavior. As a rule, the particle grain sizes, comprises a spectrum that is characterized by the average particle diameter for which various definition are in use.

Key Parameter for Flow Conditions

Flow Velocity

Theoretically, the erosion rises with a power of the kinetic energy and therefore with the flow velocity relative to the wall. Various experiments conducted show, however, a variation of this power coefficient between 0.9 and 5. Prechtle (2001) claims that for a power coefficient of 3, the erosion rate is stable. The material is softening with a power coefficient larger than 3 and hardening for a power coefficient smaller than smaller than 3.

Turbulence

Local excessive turbulence as induced by a roughed surface or geometrical irregularities can faster erosion. Turbulence induces a transport perpendicular to flow direction. If the mobility of the particle is large enough to overcome the reduced Reynolds number of the boundary layer, particles will be transported to the wall surface and cause erosion there.

Pump Wear

In the moment of starting a new pump, that pump is headed for a day when it will need repair even if the design and operation is correct. One factor that determines the repair is internal wear Imagine and ideal application where the pump is operating at best efficiency point (BEP) and the system is Stable. Does this condition ever exist? If you answer yes, you are one of the fortunate few. However, at some point, even if it does not break, the pump will go to the shop because of internal wear. Erosion is the wear and tear of the pump internal parts by suspended solid particles contained in the fluid being pumped. The most affected parts are: wear rings, shaft sleeves, packing, mechanical seal faces, lip seals, the pump casting, and the impeller. Erosion can be caused by small particles not visible to the human eye, like dissolved minerals in "hard water." Larger solids like sand, boiler scale, and rust can also cause serious erosion inside the pump. The fluid being pumped is often not well defined. Terminology like well water, industrial effluent, raw water, boiler feed water, condensate water, etc., is usually the only definition we have of the fluid being pumped. Any of these fluids can contain several concentrations of solids that cause erosion and wear inside a pump. When the liquid being pumped is known to have a large concentration of solids, the materials inside the pump should be changed to more materials that are resistant. Materials such as carbon steel, high chrome iron harden stainless steel, or hard coatings like ceramic or tungsten alloy are some of the most used.

You can expect the pump to lose 1.5 to 2 percent efficiency points for each one thousandths (0.001 inch) wear in a wear erosion is the wear and tear of the pump internal parts by suspended solid particles contained in the fluid being pumped. The most affected parts are: wear rings, shaft sleeves, packing, mechanical seal faces, lip seals, the pump casting, and the impeller. Erosion can be caused by small particles not visible to the human eye, like dissolved minerals in "hard water." Larger solids like sand, boiler scale, and rust can also cause serious erosion inside the pump. The fluid being pumped is often not well defined. Terminology like well water, industrial effluent, raw water, boiler feed water, condensate water, etc., is usually the only definition we have of the fluid being pumped. Any of these fluids can contain several concentrations of solids that cause erosion and wear inside a pump. When the liquid being pumped is known to have a large concentration of solids, the materials inside the pump should be changed to more materials that are resistant. Materials such as carbon steel, high chrome iron harden stainless steel, or hard coatings like ceramic or tungsten alloy are some of the most used. You can expect the pump to lose 1.5 to 2 percent efficiency points for each one thousandths (0.001 inch) wear in a wear ring beyond the original factory setting. This setting is based on the operating temperature of the application. Let us consider how much money the lost efficiency costs. We still use some formulas on useful work and efficiency.

$$\text{Cost per Year} = \frac{0.000189 \times \text{GPM} \times \text{TDH} \times \text{Rs.Kwh} \times \text{sp.gr.} \times 8{,}760}{\text{Eff. Pump} \times \text{Eff. Motor}}$$

Where:
0.000189= Conversion Factor,
GPM= Gallons per Minute,
TDH= Total Dynamic Head,
RsKwh= Cost per Kilowatt-hour,
sp.gr. = specific gravity,
Eff. Pump= Pump Efficiency,
Eff. Motor= Motor Efficiency,

To show cost increase, consider this newly installed pump in a properly designed system. We have the following values:

GPM= 2,00
TDH= 120 ft.
RsKwh= Rs 6
sp.gr. = 1 (water)
Eff. Pump= 77%
Eff. Motor= 93%

The electricity cost to run this pump for a year is Rs.33293. After being in line for six months, this pump is disassembled and it is noted that the tolerance in the wear bands has opened 0.004 inch from the original factory setting. This wear represents and 8% decrease in efficiency. Now the pump is 69% efficient. Let us do the math with all the other factors constant. This reduction in the efficiency represents annual electricity costs of Rs.37107. The additional electricity is Rs.3814. Four-thousandths wear (0.004 inch) has cost the company almost Rs.3900 per year for just one pump. Just to mention, a new wear ring may cost up to Rs.360 plus the labor to change it (this will never add up to the Rs.3900).

DESIGN OF PROBLEM

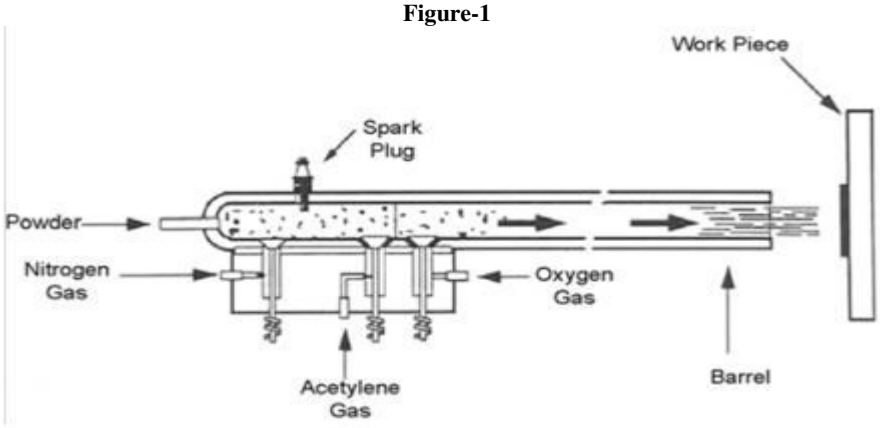
The centrifugal pump used for slurry transportation is driven by a 7.5 H.P./1440 rpm electric motor. The sleeve of shaft of the centrifugal pump made of SS-316 material was selected as a material for the research work for wear test. Pump shafts are usually protected from erosion, corrosion, and wear at the seal chambers, leakage joints, internal bearings, and in the waterways by renewable sleeves. Unless otherwise specified, a shaft sleeve of wear, corrosion, and erosion resistant material shall be provided to protect the shaft. The sleeve shall be sealed at one end. The shaft sleeve assembly shall extend beyond the outer face of the seal gland plate. (Leakage between the shaft and the sleeve should not be confused with leakage through the mechanical seal).This leakage can be preventing by applying the coating on the sleeve and due to this coating life of shaft sleeve is improved so much. The coating was done with the help of following technique.

Detonation Gun Spraying Coating (DSC) Technique

This detonation spray coating process is sometimes referred as the D-gun process. It is different from the flame spray process. Instead of a continuous combustion process, it uses an intermittent series of explosion to melt & propel the particles onto the substrate. A barrel is filled with a small amount of powder and an explosive oxygen-acetylene mixture. With the use of a spark plug, the mixture is ignited. After ignition, detonation waves accelerate and heat the entrained powder particles. The obtained particle velocities are high. Consequently, the coatings are dense and exhibit high bond strength. After each detonation, the barrel is purged with nitrogen gas (inert gas) which also avoids backfiring and the process repeats itself several times per second. This process is repeated repeatedly to achieve desired coating thickness. The process produces noise level that can exceed 140 decibels and requires special sound and explosion proof rooms. Based on the energy source, thermal spray methods can be divided into a

few main groups: a) Plasma spray method b) Combustion flame spray methods (flame spray), c) High velocity oxy/air-fuel methods (HVOF/HVAF), d) Electrical arc methods (wire arc), e) Detonation method (D-Gun), and f) Cold gas methods (CGS).

Figure-1



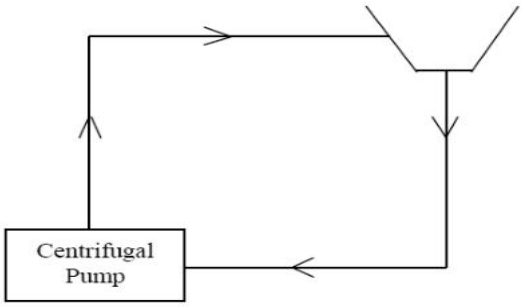
Sources: Authors Compilation

Above figure shows the basic elements of a D-gun consisting of a long barrel of 25mm inside diameter and 1350 mm long. Powder of 60-micron particle size is feed into the combustion chamber and detonated with the help of spark plug. The detonation temperature is about 3900º C that is sufficient to melt most of the materials. The Detonation produces a particle velocity of about 3500 m/sec. Detonation is repeated 3 to 8 times per second and nitrogen gas is used to flush out the combustion products after each detonation. Each detonation produces a coating thickness of a few microns. The typical range for coating thickness is 200-250 microns with the surface roughness of as-deposited coating in the range of 1-6 μm Ra

EXPERIMENTAL SETUP

Erosion Testing was done on centrifugal pump. It is a recirculating-type rig as shown in Figure:

Figure-2



Sources: Authors Compilation

The measured quantities of water and sand are mixed in the tank to obtain the required concentrations of the slurry. The cone shaped tank does not provide any space for the sand particles to sediment as shown in Figure-1. In cone shape tanks, the particles are easily facilitated to flow under gravity. The centrifugal pump used for slurry transportation is driven by a 7.5 H.P./1440 rpm electric motor. Slurry from the tank, sucked through a 100-mm G.I. pipe with the help of a pump, is delivered to the tank. The sleeve is within the pump. It is made up of material SS-316. The chemical composition of SS- 316 given in table.

Table-1

Element	By weight %	Element	By weight %
C	0.03	Mn	2
Cr	16-18	Si	1
Ni	10-14	P	0.045
Mo	2-3	S	0.03
Fe	Balance		

Sources: Authors Compilation

Coating Deposition

One of the sleeves is coated with the WC-12Co powder was deposited onto pump sleeve using the commercially available detonation gun facility at SVX Powder M surface Engineering Private Limited, Noida, India. Thickness of coating is 200 microns. Coating deposition, the polished steel samples were grit blasted using alumina particles of grit size 80. The grit blasting provides the sites for mechanical anchorage, which in turn improves the adherence of the using a hot mounting press. Sand particles of particular size can be achieved by sieving. Mesh size used was 400 microns.

EXPERIMENTATION

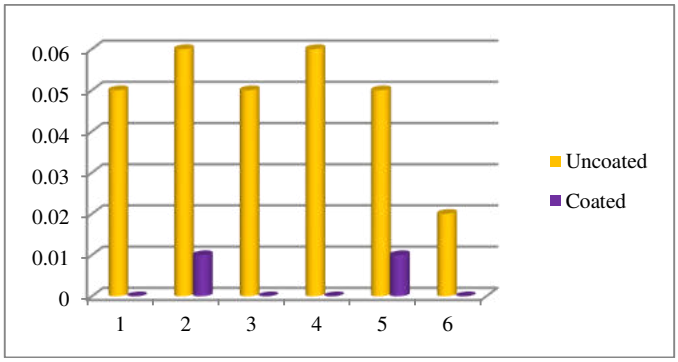
Table-2

	Uncoated		Coated	
	Weight (gms)	**Erosion (gms)**	**Weight (gms)**	**Erosion (gms)**
0	16.10	-----	16.20	-----
1	16.05	0.05	16.20	-----
2	15.99	0.06	16.19	0.01
3	15.94	0.05	16.19	-----
4	15.88	0.06	16.19	-----
5	15.83	0.05	16.18	0.01
6	15.81	0.02	16.18	-----
After 6 weeks	Net Erosion (gms)	0.29	Net Erosion (gms)	0.02

Sources: Authors Compilation

The daily run of the pump is 4 hours. The readings were taken after a one-week or 28 hours. The total time taken for the run of the pump is 6 week. The same procedure was adopted for both coated and uncoated material. The reading for the experiment is shown in the table and graph.

Figure-3: Effect of Erosion in Coated & Uncoated Condition



Sources: Authors Compilation

CONCLUSIONS

Erosion results in the large amount of wear of the material all over world every year and combined action of erosion corrosion, the results are tremendous. Thermal spray processes with several advantages such as lower porosity, higher bond strength and hardness with fine grain structure for developing the coatings with excellent corrosion and wear protection. Detonation Gun sprayed coatings play an important role to protect metals and alloys to combat various surface degradation processes such as wear, erosion, corrosion, etc.

Various types of sprayed coatings investigated by no. of researchers subjected to slurry erosion have been studied. By going through the spraying method employed for different types of coatings, it could be seen that detonation gun spray coating is better in terms of microstructure obtained and defects in the coatings. This advantage of plasma is due to more control of working environment and high spraying velocities. Various other conclusions were also obtained which are as following:

- Performance of coatings is directly affected by the it's microstructure and defects such as porosity, cracks, oxide inclusion etc.

- Various operating parameters such as velocity, impact angle, concentration and standoff distance do affect the erosion performance of coatings.

- It is cleared from the experiment performed using a centrifugal pump having a sleeve on its shaft of rotation 1440 rpm at room temperature. In the current investigation, ceramic coating Tungsten carbide cobalt (WC-12Co) was deposited on sleeve material SS-316 steel by detonation gun (D-gun) thermal spraying process. To see the influence of slurry wear response, weights of each rate of material loss when compared with uncoated steel. Results have been explained on the basis of experiment were, weight of uncoated sleeve made of SS-316 is reduced by 0.29 gram after 42 days and Weight of coated Sleeve made of SS-316 is reduced by 0.02 gram after 42 days.

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A PROPOSED CONCEPTUAL MODEL OF CLOUD COMPUTING FOR HIGHER TEACHER TRAINING INSTITUTE

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ABSTRACT

The growth of higher teacher education in India has its own benefits and a tremendous demand of ICT infrastructure adoption and support. Due to constantly fast growing information technology there is a need of continuous updating of ICT infrastructures in every teacher educational institutions. It is one of the great challenges facing by teacher education training college in ICT infrastructure and support in teaching and learning process. Cloud computing the new emerging technology can be a welcomed optioned to solve this challenged in the area of education. It is a distributed computing technology offering required software and hardware through internet. Cloud computing gives a better choice and flexibility to the computational infrastructure once build then uses for several purposes for several times. In this research paper design and developed a conceptual proposed model of cloud computing base system in higher teacher training education of Indian environment. Further a description of proposed model and detail step of implementation at the higher teacher education institutions or college based on the latest technology and benefits for higher teacher education are discussed.

KEYWORDS

ICT, Cloud Computing, Teacher Education, Teacher Education Institute, Higher Education etc.

INTRODUCTION

The Indian Education sector has seen a tremendous rise in the field of higher education, which has led to demand of automation in all levels of education sector in order to cater to the need of information of various stakeholders. Using the ICT one can expects the fast access of relevant information in a manner of anytime, anywhere. Such facility of ICT network infrastructure adopting in the educational organization like institutions and college has a great advantages in collaborating, exercising and maintaining over manual academic activities. The rising of higher education sector, there has been a phenomenal growth in the number of teacher education institutions and college in the country. This growth of teacher education is shown in table 1 that having the information from *shodhganga.inflibnet.ac.in* [1].

Table 1
Showing Teacher Training Institutions and Average Enrolment per Institution

Year	*Teacher Training Institutions*		*Average Enrolment per*		*Proportion of School to College*
	Secondary	Elementary	Secondary	Elementary	
(1)	(2)	(3)	(4)	(5)	(6)
1970-71	274	1288	175	107	4.70
1980-81	500	879	137	118	1.76
1990-91	474	1167	181	104	2.46
1991-92	538	1202	181	100	2.23
1992-93	557	1328	180	100	2.38
1994-95	586	1194	174	100	2.04
1995-96	633	1179	193	109	1.86
2007-2008	4034	4136	129	71	1.03
2009-2010	6363	6165	101	56	0.96

Sources: www.shodhganga.inflibnet.ac.in/bitstream/10603/.../10_chapter%204.pdf

The ICT infrastructures use in teacher education creates ever-new challenge for teacher. At this point, necessary infrastructure, skills, and level of understanding how ICT can be used in teaching and learning process. In the recent years, integration of ICT in teacher education has been forefront of the education sector. Integration of ICT tools enhances the quality of education by helping teacher to do their job by helping students to learn more effectively [2].

Teacher needs to learn the skill of using ICT and to learn how to design innovative instructions through an integration of ICT with curriculum. Reasonably, for undergraduate, graduate, and postgraduate students who are prospective schoolteacher or teacher in higher secondary school, they should be well prepared for using ICT in education. Therefore it seems logically the vicarious learning of ICT skills will be enhanced by integrating ICT tools within the teacher training education that are offered in teacher

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education program curriculum units. A well-designed teacher-training program is essential to meet the demand of today's teacher who wants to learn to use ICT effectively for their learning [3]. There are several prospects and benefits which the ICT in conjunction with the new paradigm in educational technology unless a good initiative are undertaking.

Realizing the importance of this advance technology statutory bodies like UGC and NCTE etc. has already moving towards to adoption of ICT to control and transparency in their daily activities. At the same time, there is a need to bring together uniformities of teacher education throughout the country and tie together all the university and affiliated institutions and colleges in a common platform to make collaboration and easy monitor of their individual activities. This is possible only when the introduction of cloud computing. This technology is ensues the sharing, availability, security and reliability of information involved.

ICT ON PRESENT TEACHER EDUCATION AND CLOUD COMPUTING

National Council for Teacher Education (NCTE) as a capacity building exercise ICT literacy camps for teacher educators throughout India. The targeted TEI's in this first phase camps were covered in the 100 countrywide camps and hands on interactive experience was provided through a series of self learning CDs developed by the NCTE. In a mode NCTE covered a large number of TEI's and could motivate the teacher educators to use computers in various activities. Other initiatives of the regulatory bodies include initiative of NCERT in conducting Computer Literacy Programmes under the CLASS project, organizing computer programmes for teachers from the vocational and technical education streams by the Indian Society for Technical Education (ISTE), organizing Management Information System series for Higher education teachers by the UGC, etc.[4] Apart for these statutory and Government organizations, various corporate sectors like INTEL, WIPRO and Azim Premji foundation etc. are actively involved in technology enabled teacher development.

UGC and NCTE recognized and approved university has developed and designed their own teacher-training syllabus and curriculum according to NCTE guideline and offering the teacher education. Many teacher education institutions (TEIs) have conducting teacher training education program of their respective affiliated university. In such cases the many university department and TEI has different syllabus and curriculum. There is uniformity throughout all universities and institutes or colleges which has running the teacher education in India. However, most of the university provides ICT in education as a core subject. This core subject ICT in education is not included in B.Ed. (teacher training education) syllabus or curriculum in Manipur University. In this scenario, ICT infrastructure is an important tool to be implemented in the institute or college and has to provide enough facilities at any level of training program. Moreover, such ICT facility availability becomes an important in terms of practical view.

In present scenario, most of high teacher educational institutes are facing the problem with fast growing need of ICT infrastructure. Many university and TEI or college required to update their ICT infrastructure and data. At present, they are trying to update but facing few challenges like cost, flexibility, accessibility and security. These challenges can be solved by cloud computing as it is a service of SaaS, IaaS and PaaS that one can subscribes PAYGO-Pay-as-you-go basis. In addition, such Cloud Computing appears that provides a new solution to ICT infrastructure problem to integrate in higher learning teaching education. Cloud allows system to dynamically provide the computing resources that a user need, reducing maintenance cost, resources cost, energy consumption and improving on their scalabilities.

OBJECTIVES OF STUDY

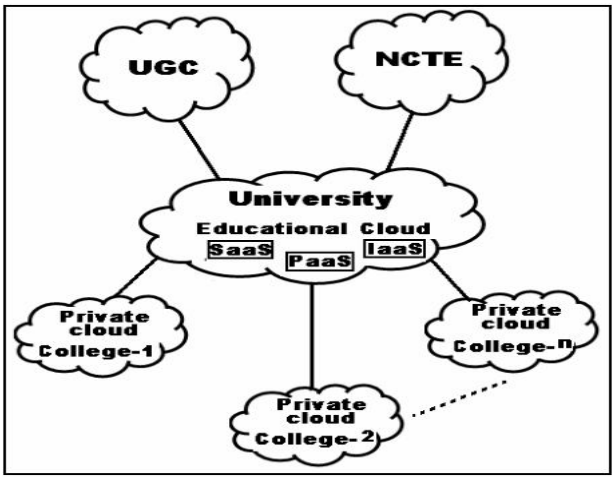
- To study the need and benefits of cloud base technology to enhance the efficiency and effectiveness of higher teacher training education in the State.
- To design the cloud technology base conceptual proposed framework model for higher teacher training education in Indian environment with reference to Manipur.
- To develop the feasibility and implementation strategy of cloud computing of proposed model.
- To study the need and benefits of cloud computing technology to enhance the efficiency and effective solution of ICT infrastructure problem use in higher teacher training education.

PROPOSED MODEL

In this proposed conceptual model of cloud technology based is particularly designed for higher teacher training institute. This proposed model will be mainly useful to bring the present non uniformity of teacher training college in terms of syllabus and curriculum into uniformity throughout all universities and institutes or colleges which has running the teacher education. It also will help to improve the effectiveness and efficiency of higher teacher education system. This will be also helpful for reducing ICT infrastructure cost and time.

This proposed conceptual framework model has consists two main statuary bodies which monitor of higher education and Teacher education i.e. UGC, and NCTE and then University and Teacher training Institute or College shown in figure 1 .

Figure-1: Proposed Model of Cloud Computing for Higher Teacher Training Education



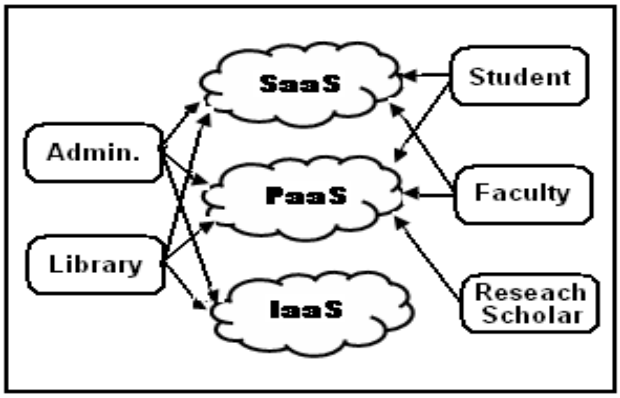
Sources: Authors Compilation

The UGC and NCTE, the two government statuary bodies that monitor the higher education and teacher education process running through various universities and their affiliated colleges. These two statuary bodies will prepare the guidelines for higher education and teacher education courses and curriculum that make sure all university and institute or college will follow the same.

University is another body consists in this framework where the proposed cloud computing model base system has to be implemented. This level consist IaaS, PaaS and SaaS and the access system is will be provided to government bodies UGC and NCTE as well as affiliated institutes as per their requirement through login process. The two apex bodies is considering in this proposed model that higher education is provided through university department under their supervision and provide all the guideline of higher education and teacher education.

Institute or College will consist in this proposed model as they are conducting higher teacher training education. The institutes or college affiliated to the university and approved by UGC and NCTE which providing higher teacher education. At this level, various users such as student, teacher, research scholar, administration and library etc. will access the cloud technology based system through the institute or college level according to different access permission are set on the users as shown in the figure 2.

Figure-2: Cloud Service Delivery Model Base System across Various User through Institute or College



Sources: Authors Compilation

IMPLEMENTATION STRATEGIES OF PROPOSED MODEL

In this section, we discussed the implementation strategies of proposed study. It is the continuous improvement process until the user (higher teacher training education) attained their goal of complete migration from traditional computing structure to cloud computing. The following are shown in figure the steps of strategies about how one should proceed.

A. Formation of Cloud computing steering committee- A steering committee which have the responsible to monitor all the implementation process activities of cloud computing in the teacher training institute or college needs to form within the institute or college. Such committee member must be the dedicated employee who needs to have a regular communication with system

users like students, faculty, scholar, administrative staff, and library of the teacher-training institute or college until the completion of system implementation process. These members also need to monitor in concern with cost benefit of the system solution, progress to achieve the objective of system implementation.

B. Increasing knowledge & awareness of present system – As cloud computing is entirely new concept, thus it is necessary all the users first to understand it well. The cloud computing committee has to conduct the training, workshop and seminar to gain the knowledge and aware of cloud computing to the users. In addition, the committee members need to develop the knowledge by attending seminar, conferences on cloud computing. At the same time, the committee also consults with recent researcher of cloud computing implementation in the educational institutions and must discuss with the cloud service provider.

C. Experimenting the proposed system (Feasibility study) - At this stage the committee has to find a well verse computer expert to check ICT infrastructure available in the institute, the availability of internet, speed of the internet etc. for cloud computing solution. Thus, if available at least minimum facilities then it will be well and good for have to upgrade. In addition, in a system implementation process feasibility study is required because weather the proposed system is feasible into two main concern i.e. economic concern and technical reliability concern. One of the important processes in implementation of a system is feasibility system.

D. Training - After completion of feasibility study, there is need of training to the user of proposed system. Such training will get the entire user like students, faculty, research scholar, administration staff and library the maximum advantage of using the cloud computing service.

E. Continuous improvement - At this stage, it is essential to run out the proposed system and check the results. If any errors are detected, recheck repeatedly. This will covered all the errors of the system until the institute or college gets the functional cloud computing base system using live data.

Figure-3

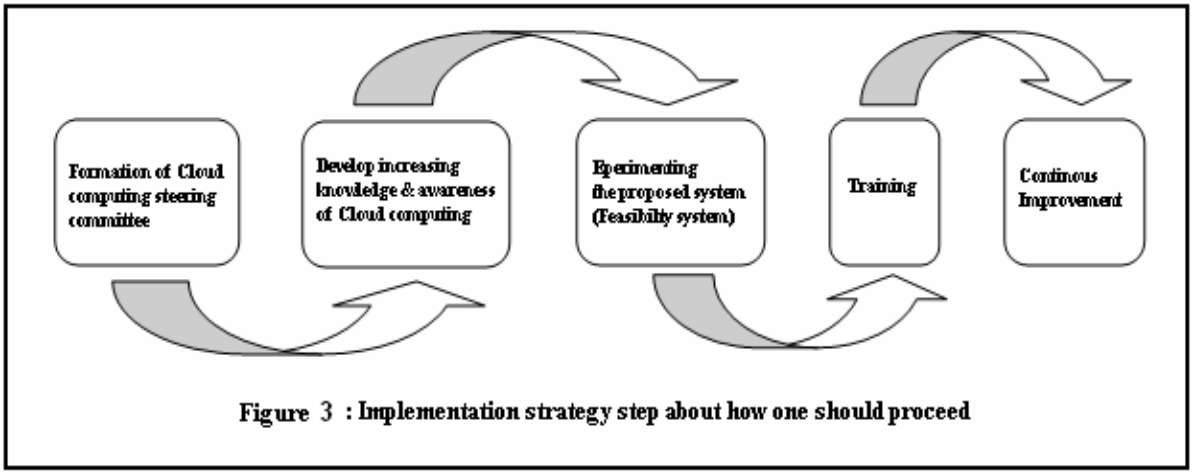


Figure 3 : Implementation strategy step about how one should proceed

Sources: Authors Compilation

BENEFITS OF CLOUD COMPUTING IMPLEMENTATION IN TEACHER EDUCATION

Due to continuous development and upgrades in IT technologies infrastructure, software and hardware has put a great deal of pressure on budgets and expenses of education institutes/college. Cloud computing services provide higher education institutes/college of the new IT technologies to take advantage at an affordable cost. The benefits of adopting of could computing in small college like teacher training college could be listed as:

A. Reduction of Cost - Cloud system will make a reduction on the cost by allowing the facility of pay per use. The user institute/college has to pay only for the resources, which they are using, and thus it does not put any financial burden on any part to the institute, government or student.

B. Simplicity – It is simple to use, the user no need to have good technical knowledge as it is set up all the services. The teacher training institutes do not have to worry about resource management and other hassles that come with infrastructure set up and management.

C. Elasticity and Scalability of Service- in a single moment, any stakeholders of the institute/college can store data, and there is no limitation on storage space. Moreover, user's capacity to store data increase largely means that resource allocation can get bigger or smaller depending on user requirement demand.

D. Availability and quality of service- Availability of the services is one of the most important that desired by the user using the education cloud. 24x7 is the availability that is needed by system user without failure with quality of service.

E. Support teaching and learning- It has significant impact on the teaching and learning environment. Teacher could prepare their lecture note, presentation anytime without software hassles and stop worrying about additional software.

F. Reduced maintenance cost and resource cost- Cloud computing could will help training college to reduce the operation and maintenance cost. In particular, maintenance cost is important in IT infrastructure. With cloud computing, academic staff can focus on their own research, instead of dealing with the complexity of high performance computing systems. Colleges can reduce or eliminate IT capital expenditures and decrease ongoing operating expenses by paying only for the services they used and potentially by reducing IT staff.

G. Ease of implementation- Without the need to purchase hardware, software licenses, or implementation services, any small college, training institute/college, and university can deploy cloud computing easily.

CONCLUSION

The growth of higher teacher education in India has its own benefits and a tremendous demand of ICT integration and support. To keep up ICT infrastructure support in teacher training institute or college with pace, a cloud base system that take care of reliability hardware and software for the individual stakeholder. The current ICT infrastructure application are setting as individuals where as the proposed model make them together as they are need to bring together and make exchange the information between statuary bodies and affiliated approved institute or colleges.

With this conclusion, cloud base technology is saving the institutional important and gaining popularity as an inexpensive way of providing required hardware and software for teacher training institutions or college. In this paper, we have given a conceptual framework proposed model for higher teacher training institution or college and discussed clouds computing solutions. Also, suggest the strategy of implementation of cloud computing in higher teacher training institution or college, which includes seven stage and shows that it is continuous process until institute or college attained the goal.

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IMPACT OF INFORMATION TECHNOLOGY ON BANKING SECTOR

Palvinder Kaur Bakshi[32] Dr. Bibhu Prasad Sahoo[33]

ABSTRACT

Liberalization brought several changes to Indian Banking Sector. The Rapid development in information technology has led a philosophical impact on the banking industry. It has become a tool that facilitates banks, organizational structures, business strategies, customer services and other related functions. Through this paper, an attempt is made to study the impact of information technology development on productivity, cost and profitability of the Banking Sector.

KEYWORDS

Indian Banking Sector, Internet Banking, E-Banking etc.

IMPACT OF INFORMATION TECHNOLOGY ON BANKING SECTOR

In the world of banking and finance, nothing stands tranquil. The biggest change of all is in the span of the business of banking. Apart from traditional business, the acceptance of deposits from the customers, the lending of surplus of deposited from the customers who wish to borrow, banks now a day provide a wide range of services to satisfy the financial needs of all types of customers from the least account holder to the biggest company and in some cases of non-customers. Liberalization brought several changes to Indian service and industry. Post-liberalization, the tables have curved. It is a consumer-oriented market there. Indian banking industry learnt a marvelous lesson.

Technology is revolutionizing every field of human effort and activity. One of them is prologue of information technology into capital market. The internet banking is changing the banking industry and is having the major effects on banking relationship. Web is more important for retail financial services than for many other industries. Retail banking in India is maturing with time, several products, which further could be customized. Most happening sector is housing loan, which is witnessing a cutthroat competition. The Other retail banking products are personal loan, education loan and vehicle loan. Almost every bank and financial institution is offering these products.

Plastic Money

Plastic money was a delectable gift to Indian market, giving respite from carrying too much cash. Now several new features added to plastic money to make it more attractive. There are different facts of plastic money credit card is synonyms of all. Credit card is a financial instrument, which can be used more than once to borrow money or buy products and services on credit. Banks, retail store and other businesses generally issue these. Based on their credit limit, they are of different kinds like classic, gold, silver or platinum. Charged cards-these too carry almost same features as credit cards. The fundamental difference is you cannot postpone payments charged generally have higher credit limits or some-times no credit limits. Debit cards-this card is may be characterized as accountholder's mobile ATM, for this you have to have account with any bank offering credit card.

Mobile Banking

Taking advantages of the booming market for mobile phones and cellular services, several banks have introduced mobile banking, which allows customers to perform banking transactions using their mobile phones. Mobile banking has been especially targeted at people who travel frequently and to keep track of their banking transaction.

Rural Banking

One of the inventive schemes to be launched in rural banking was the KISAN CREDIT CARD (KCC) SCHEME started in fiscal 1998-99 by NABARD. KCC made it easier for farmers to purchase important agricultural inputs. In addition to regular agricultural loans, banks to offer several other products geared to the needs of the rural people. Private sector banks also realized the potential in rural market. In the early 2000's ICICI bank begun setting up internet kiosks in rural Tamilnadu along with ATM machines.

NRI Services

With a substantial number of Indians having relatives abroad, banks have begun to offer services that allow deportee Indians to send money very easily to relatives India that is one of the major improvements in money transfer.

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E-Banking

The E-Banking is driven by twin engine of "customer-pull and bank push". E-Banking is becoming increasingly popular among retail banking customers. E-Banking is helpful in cutting costs by providing cheaper and faster ways of delivering products to customers. It also helps the customer to choose the time, place and method by which he wants to use services and gives effect to multichannel delivery of services by the bank.

IMPACT OF IT ON THE BANKING SECTOR

The recent "IT revolution" has exerted far-reaching impacts on economies, in general, and financial services industry, in particular. The rapid development in information technology has had a philosophical impact on the banking industry and the wider financial sector over the last decades and it has now become a tool that facilitates banks' organizational structures, business strategies, customer services and other related functions. There has been a sea change compared to the old days when carrying out a transaction as simple as cash withdrawal sometimes took hours. Remember those were the days when automation had not touched Indian banks.

Now, increasingly, visits to branches of banks especially in the metros and bigger towns are rare. With ATMs, internet banking and phone banking, banking has turned out to be more of an inter-face with a machine or in other words, it has become face-less. Any evolution is a gradual process and keeps on changing with time. That is applicable to banking technology to banks now gearing up for the next level-mobile banking. ETIG knowledge forum collaborated with KPMG and did a brainstorming, looking at the pros and cons of banking technology, specially the upcoming business of mobile banking.

The Indian banking industry has a very large customer base but with a relatively smaller ticker size (transaction value) per customer. The ticket size in India is $1/10^{th}$ of the global standard. Further, the ticket size in rural area of India is again $1/10^{th}$ of the urban area. So for a bank, the physical infrastructure cost per transaction becomes very high. This poses a strong challenge for a bank. Moreover, this is where technology can help banking companies.

Many companies in India have adopted this strategy and have managed to lower the interaction of the customer with the bank branches. For instances, 10 years ago, 90% of all transactions made by the customers of ICICI bank were through the branches and 10% were through on-line. Now, after 10 years, the trend has exactly reversed.

Adoption of technology not only delights the customers in terms of convenience and satisfaction but also brings in certain other advantages- scalability, reliability and low cost-to the bank. For instance, banks can carry out data analytics to measure the customer's needs and thus offer customized products to a precise category of customers. "Banks can use technology as an enabler as well as a differentiator", said Ms Chanda Kochhar.

For a country like India, which has a inheritance system, the cost of technology is much less compared to developed countries. The banks in India are constantly innovating newer technology for the convenience of customers. First, it is ATM then internet banking and now it is barometric smart card with mobile banking to follow. The profile of Indian banking customers is much diversified. On the one hand, we have rich high net worth individual and on the other hand, there are poor illiterate customers from rural and semi-urban areas. Nevertheless, probably the one thing common between them is the dispersion of the mobile phone, at least to a certain extent, thanks to the telecom revolution in the country. The application of information technology gradually decreases the costs of delivering financial services. The corporation that can automate delivery systems has a competitive advantage because it faces lower total costs.

OPPORTUNITIES OF INFORMATION TECHNOLOGY IN BANKING SECTOR

Information technology does not always mean fewer costs for banks to operate, but it has become a necessity in today's competitive market. For example, Bank HSBC launched mobile services in March 2005. Mobile and wireless technology enable banks to satisfy clients who demand real time information and mobile payment accessibility for example buying top-up cards for your mobile.

To access mobile banking you will need a WAP-enabled mobile phone. Through a mobile phone, an individual can access his or her account information, effect transfer to third parties, request banking services as well as other information and pay bills. There may be times when it is not possible to access a personal computer. It is in these particular situations that one can use mobile and telephone banking. The latter is also an innovative way of conducting banking from the commodity of one's home with…

- From both customer and banking perspectives, it shows that the internet is a convenience tool available whenever and wherever customers need it. It is also found that the internet has improved the factors in service quality like responsiveness, communication and access. It is concluded that the internet has an important and positive effect on customer perceived banking services and service quality has been improved since the internet has been used in banking sector.

- It is generally secure. However, one has to make sure that the website being used has a valid secure certificate. This lets the site to be protected from cyber-thieves looking to steal any personal and financial information.

- It gives 24-hours access so that one can still access required account and make transaction online. It is a very convenient alternative for those that cannot get to the bank during normal hours because of their work schedule, health or nay other reason.

- It allows the client to access their account from virtually anywhere. If the customer is on business trip or vacationing away from home, they can still a keep a watchful on their money and financial transactions- regardless of their vacation.

- Conducting business online is generally faster than going to the bank. Long teller lines can be time-consuming, especially on a payday. However, online, there are no lines to contend with. Anyone can access their account instantly and at their leisure.

- Many features and services are typically available online. For example, with just a few clicks the client can apply for loans, check the progress of his/her investments, review interest rates and gather other important information that may be spread out over several different brochures in the local bank.

- Technology has opened up new markets, new products, new services and efficient delivery channels for the banking industry. Online electronics banking, mobile banking and internet banking are just a few examples.

- IT has also provided banking industry with the wherewithal to deal with the challenges the new economy poses. Information technology has been the cornerstone of recent financial sector reforms aimed at increasing the speed and reliability of financial operations and initiatives to strengthen the banking sector.

- The IT revolution has set the stage for unparalleled increase in financial activity across the globe. The progress of technology and the development of worldwide networks have significantly reduced the cost and time of global funds transfer.

- IT which enables banks in meeting such high expectations of the customers who are more demanding and are also more techno-savvy compared to their counterparts of the yester years. They demand instant, anytime and anywhere banking facilities.

- IT has providing solutions to banks to take care of their accounting and back office requirements. This has, however, now given way to large-scale usage in services aimed at the customer of the banks.

- IT also facilitates the introduction of new delivery channels- in the form of Automated Teller machines, Net banking, Mobile Banking.

- Use of De-mat account online trading enables a person to buy and sell shares anytime. The share trading companies and AMC's can give improved and faster services with the help of technology.

- There are many useful features and services available online besides for the usual transactions. For example, one can apply for credit cards, manage investments and pay bills through the online account portal. One can also perform more mundane tasks such as ordering new checks requesting additional deposit slips, or reporting a lost or stolen debit cards.

CHALLENGES OF INFORMATION TECHNOLOGY IN BANKING SECTOR

Banks and financial institutions are relying increasingly on information technology to support growth and expansion into the global marketplace. The major technologies, which are used nowadays, include internet banking, mobile banking, telephone banking, smart cards, credit cards and automated teller Machines. These methods allow customers to carry out may routine transactions without going into a branch. However, with all of the benefits that technology brings to the banking industry, it also brings increased risks and threats.

- Online banking is generally secure, but it certainly is not always secure. Identify theft is running rampant, and banks are by no means immune. In addition, once the information is compromised, it can take months or even years to correct the damage, not to mention possibly costing the customers thousands of rupees, as well. This generally does not happen in case of traditional methods of banking.

- Some online banks are more stable than others. Not all online setups are an extension of a brick-and mortar bank. Some operate completely in cyberspace. Without the benefit of a branch that one can actually visit if need be. With no way to physically check out the operation, one must be sure to thoroughly do one's homework about the bank's background before giving them any of customer's money.

- Before using a banking site that the customers are not familiar with, check to make sure that their deposits are FDIC-insured, if not, one could possibly lose all of your deposits if the bank goes under, or its major shareholders decide to take an extended vacation in Switzerland.

- Customer services can be below the quality that the customer used too.

- Some people simply comfort in being able to talk to another human being face to face if they experience a problem. Although most major banks employ a dedicated customer service department specifically for online users, going through the dreaded telephone menu can still be quite irritating to many. Again, some are considerably better or worse than others.

- Not all online transactions are immediate. Online banking is subject to the same business-day parameters as traditional banking. Therefore, printing out and keeping receipts is still very important, even when banking online.

- If the bank operates only online or simply does not have a branch office in your local area, the customer will not be able to reach a representative in person for discussion of account issues. Normally this is not a problem, but sometimes customer service by telephone or email can be spotty and may prove to be more of a hassle if customer has a serious issue that is not easily resolved. Some banks are better than others in this department, so the client need to do some research if this is an important consideration for him.

- Using online banking effectively requires some basic computer literacy and familiarity with navigating the internet. While this is not a problem for technological people, those who are afflicted with technophobia or are simply inexperienced with this particularly genre may not be comfortable with this concept. There are also a significant number of people who are suspicious of anything having to do with the internet because it is outside of their comfort zone. Others are simply too stubborn to acquire the relevant knowledge and skills.

CONCLUSIONS

IT development has undoubtedly brought in enormous benefits to banks, particularly in terms of productivity increases, cost reduction through labour saving and increased profitability. Consequently, IT development in bans has become more products centric and retail and wholesale IT products have positively influenced productivity and profitability. IT use has increased outputs and reduced costs as both IT capital investments and IT human resources have a positive relationship to productivity.

Banks should stay ahead of the game and sustain growth by taking bold decisions to survive and beat competition. The time has come to should be given an opportunity to enjoy their share of benefits stemming from IT development. This would increase banks competitiveness through differentiation and customer services improvement, reduced transaction costs, better risk avoidance and maintain a stable customer base and market share.

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MORPHOLOGICAL IMAGE PROCESSING TECHNIQUE AS AN ARTIFICIAL INTELLIGENT TOOL FOR DETECTION OF DENTAL CARIES

Dr. Avnesh Verma[34] Munish Kamboj[35] Dr. Monika Nagpal[36]

ABSTRACT

The image processing is used to diagnose the image of an object. It has a very important application in the field of bio-medical applications such as; diagnosis of diseases, analysis of medical results and automatic identification in bio-medical imaging system. One of the most important applications of such type of image processing can be used in Dental cavity recognition. Since the cavities or other type of diseases in tooth can reduce the strength and decomposes the teeth. In this paper, we have used a Morphological image processing technique with the help of MatLab to identify the extent of tooth destruction from dental X-rays. The dental X-rays will be scanned and processed through software. Here with the help of morphological reconstruction technique the damage caused to the tooth will be detected. Numerous samples collected from different patients' X-rays from different hospitals have been studied to make the intelligent recognition of different stages in the tooth cavity in terms of their effects on shape and size of the teeth.

It can be concluded that the morphological technique give the exact result of the destruction in the form of digital image and can be compared with the ideal images to aid in final diagnosis. This tool can be further extended to analyze the outcome of the treatment.

KEYWORDS

Morphological Image Processing Technique, Artificial Intelligent, Dental Caries etc.

INTRODUCTION

Image processing is a technique, which can be segmented in fundamentals of image video and computer vision categories. It has many applications and one of its important applications is in the field of bio-medical applications. In its bio-medical, it is used mainly in diagnosis of diseases, analysis of medical results and automatic identification in bio-medical imaging systems. To perform bio-medical application using distinguishes software the data is gathered from X-Ray, M.R.I, C.T scan etc. The images are separated into different forms for further content analysis and image understanding after satisfactorily performing of task. In the last two decades, it has been noticed that image-processing technique has been widely used for the analysis of biometric and bio-medical image processing.

One of the most important applications of such type of image processing can be used in diagnosis and treatment of dental disease. It has been observed that the dental disease affects large number of human population. The initial diagnosis in dental science is performed through the visible identification or dental radiographic test. The further treatment and cure depends upon the results of dental radiographic analysis, such as lesion recognisation or caries identification etc.

To identify the change in tooth composition is most popularly detected through X-Ray examination. A computer aided interpretation and quantification of annular perio dental bone effects radio-grafical, dental analysis was first performed by P.F.Vander Stelt and Wil G.M. Geraets. Now a days computer aided analysis not only gives better observation but also gives data analysis through software-oriented results. These results are precise and accurate also. In the paper we have introduce simulink Matlab based model for verification of dental caries problem in teeth's.

In this model, the image is segmented in different structures and textures /grey scale uniformly. The model will help in identifying the image region within bounding contours, identification of effected portion etc.

RELATED WORK

Gonzalez et al. stated that the basics of image processing which are used in different process related to techniques of the image processing (1).

Mohd Shafry Mohd Rahim et al., has explained different methods such as; automatic segmentation and feature extraction for the dental X-Rays in the paper. The purpose is explained to implement traditional image processing techniques by clustering k-means method (2).

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Tiwari et al. presented in this paper about dental X-ray image enhancement based on human visual system and local image statics. He has emphasized that helpful in improving low contrast quality image in to high contrast quality image (3).

Oprea et al. has discussed in their paper about the implementation of a specialized object oriented environment for image-processing techniques can be used in dental X-ray Image Analysis (4).

Nagpal et al. presented in this paper that the image processing edge detection could be used in dental problems. Focus has been made on processing of an image pixel by pixel and have resulted a comparison between distinguished coding techniques (5).

Li Ma et al. in this paper. have stated that an efficient algorithm used in image recognition, which is invariant to translation, scale and rotation. This method relates the texture of the image as a kind of transient signals and explains the wavelet transform to process such signals (6).

Kumar et al. have discussed in this paper about the enhancement of image segmentation using morphological operation. Proposed method contains pre-processing, color space conversion, threshold adjustment, feature extraction, segmentation and evaluation stages (7).

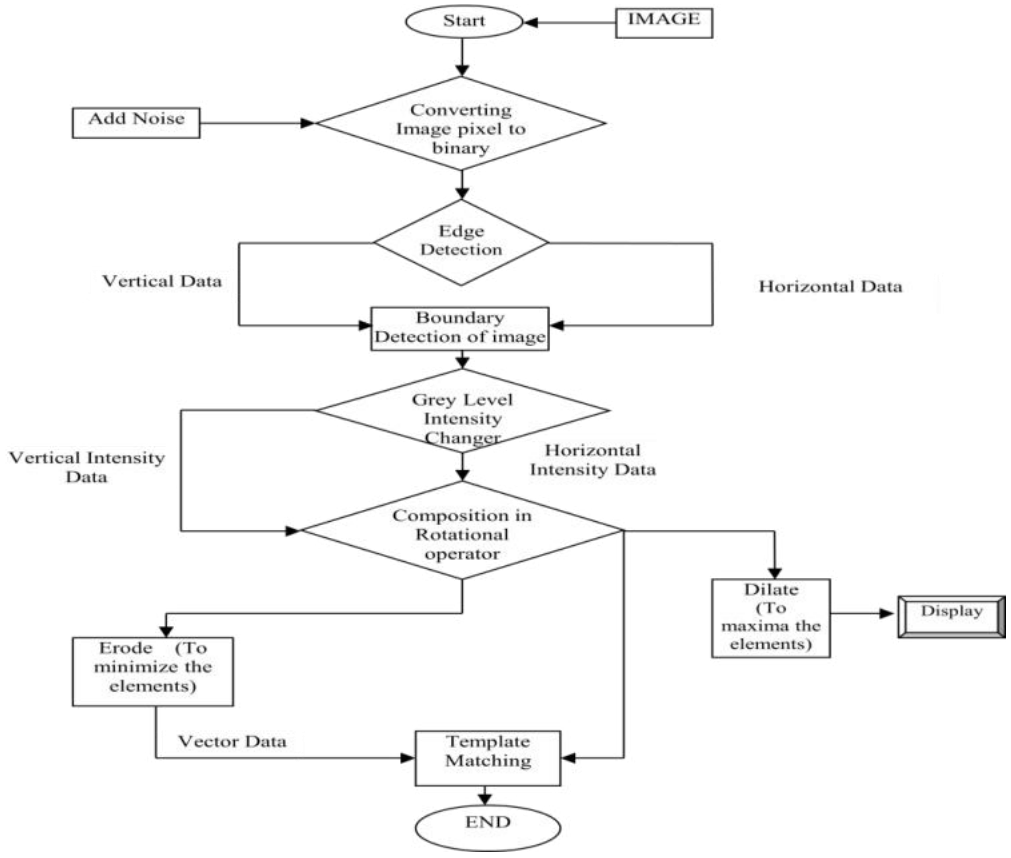
Hsiung et al. explored the possibility of best image segmentation technique for image recognition is Hough Transform. The results show that Hough Transform techniques are capable of recognizing the low-resolution image with the accuracy of 100% in comparison to the Daugman' s Integro Differential Operator, which only gives 86.88% (8).

Sattar et al. presented in their paper a new method for segmentation and object detection of dental radiograph images. Paper describes local image structure and image scaling, rotation, translation, variable lighting conditions as well as process noise (9).

Raut et al. presented in this paper FPGA implementation for image processing algorithms using Xilinx system generator. Discussed that the Xilinx System Generator provides rapid means to do hardware implementation of complex techniques used for processing images with minimum resource and minimum delay (10).

METHODOLOGY

Figure-1: Flow Chart of the Proposed Methodology



Sources: Authors Compilation

The objective of the work is to prepare a model **f**or the detection of dental diseases such as tooth carries through image processing. We have constructed a model to achieve the above objective.

Figure-1 Shows the flow-chart of the program, which elaborates the procedure upto, result findings. At the beginning of the program, the X-ray of the patient will be scanned and converted into the image. Then the format of the image will be converted into from JPG file to PNG file. After completing this process, the PNG image will be called into the program to execute the procedure. Once the image has been fully loaded for the initiation, a component of impurities will be added into the image to inculcate the disturbances in the image. Then in next step, the image will be converting into data by converting its pixels into binary. After passing through this procedure, the edges of the image will be detected through edge detection. This edge detection procedure will convert the data into two parts; Vertical data and Horizontal data. These two processes will further clarified through boundary detection of the image. Once the boundaries and edges of the image are identified, the intensity of the image will be changed to the gray scale. This step will bifurcate the data into two parts i.e. vertical intensity data and horizontal intensity data. Then relational operator will be applied to both types of data and two different outcomes will be applied with maxima and minima theorem. The elements will be maximized through Dilate and minimized through Erode. The Dilate outcome will be displayed and the erode output which is in the form of Vector data 1's or 0's will be compared with relational operator output in the template matching.

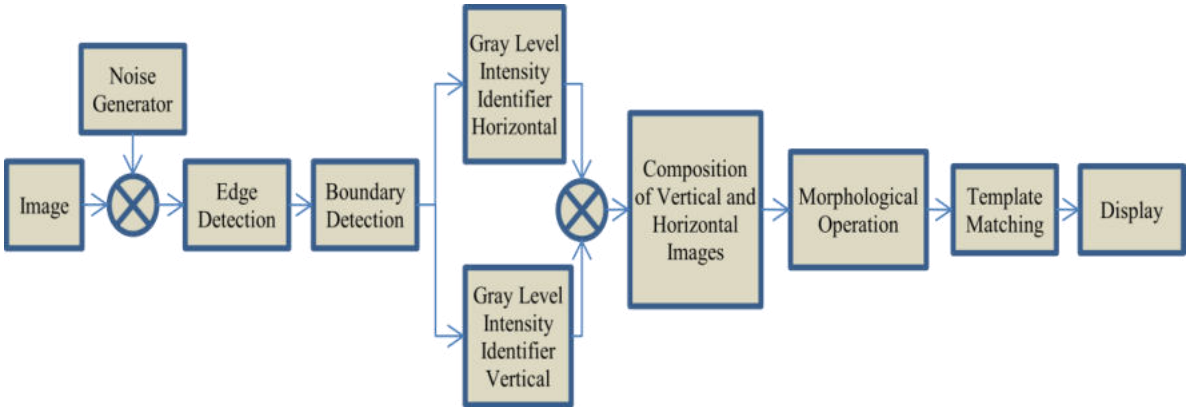
Block Diagram

To execute flow chart program the procedure will be followed in block diagram. To outline the elementary procedure of simulink-MatLab programming the block diagram has been constructed.

Figure-2 shows the block diagram of the methodology. The image is converted into the array in the image block file. This image has a number of rows and coulombs of arrays in it. Then the noise will be added to get the mean value and the variance in scalar or vector. When co-variance matrix is diagonal and its diagonal elements are relation to variance vector then Gaussian noise generator is unsuitable, but when variance is a square matrix it is of diagonal elements then Gaussian noise generator is suited.

Edge detection detects the gradient magnitude of the image and convolves the input matrix. The vertical and horizontal data is used further in minimum blocks, which will identify the value and position of the smallest element. The subtract is used to take the difference of the two inputs. The maximum block identifies the position of the largest elements in each row and column of the input along the entire input. The divide mathematically defined and divides the numbers of rows and columns of the matrix.

Figure-2: Block Diagram of the Proposed Methodology



Sources: Authors Compilation

The relational operator compares two inputs to the top of input port and the second input to the bottom input port. To execute the Morphological technique the opening block will be used. The dilate and erode i.e. dilation and erosion are the parts of morphological techniques. It will perform an erosion operation followed by dilation in a predefined neighborhood and structuring element.

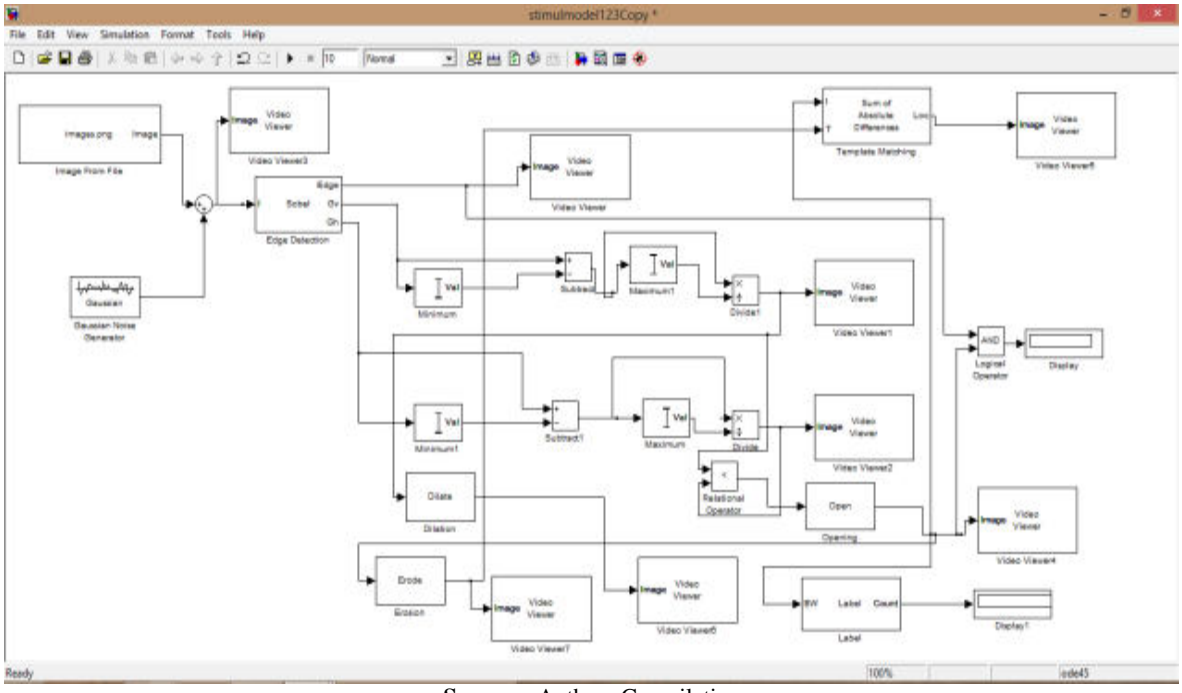
The label block labels the object in binary image in which background is represented by pixels equal to '0' and objects are represented by pixels equal to '1'. The logical operator block performs the and logic operation on its inputs. The video viewers are used to show the pictures. The displays are used to display the mean value difference and the numeric values.

RESULT AND DISCUSSION

A Simulink- MatLab model has been designed in correspondence with the methodology. Since the computer vision system toolbox displays double and single precision floating point pixels values which, should be in between '0'and '1'. Then the noise is

added and the mean value and the variance will be getting in the form of scalar or vector. The original x-ray image has been converted from the jpg format to PNG during simulation as shown in fig.4 (a). Normally the individual elements or coulombs are unmatched with each other in the frame-based output.

Figure-3: Simulink-MatLab Program



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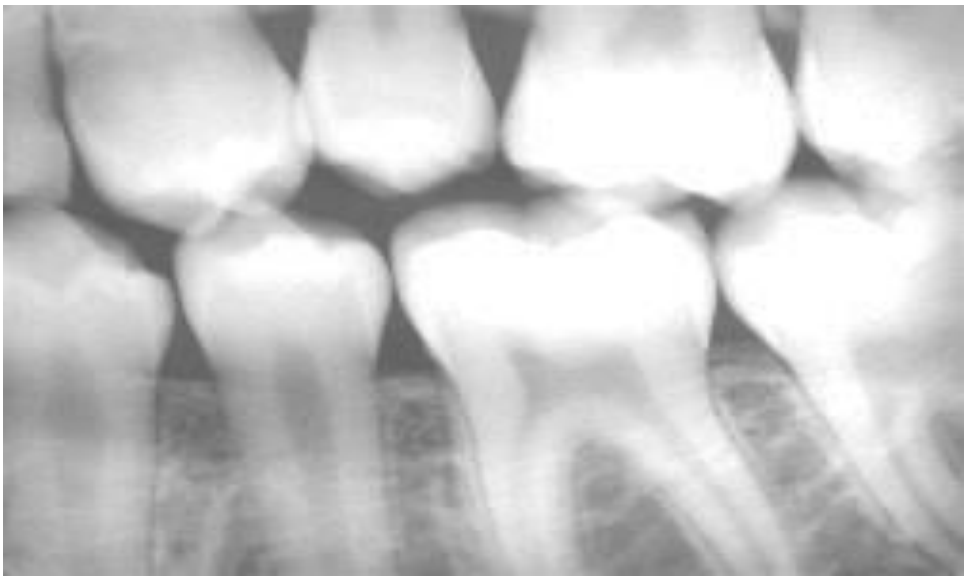
To initiate the Gaussian random variable process in the image the initial seed parameters are inculcated to initializes the generator process i.e. to match our Image parameters we have opted the Gaussian noise generator to initiate the artificial disturbance. Edge detection finds the edges of the image by calculating the gradient using the derivative of the Gaussian filter.

Figure-4 (a): Original Image



Sources: Authors Compilation

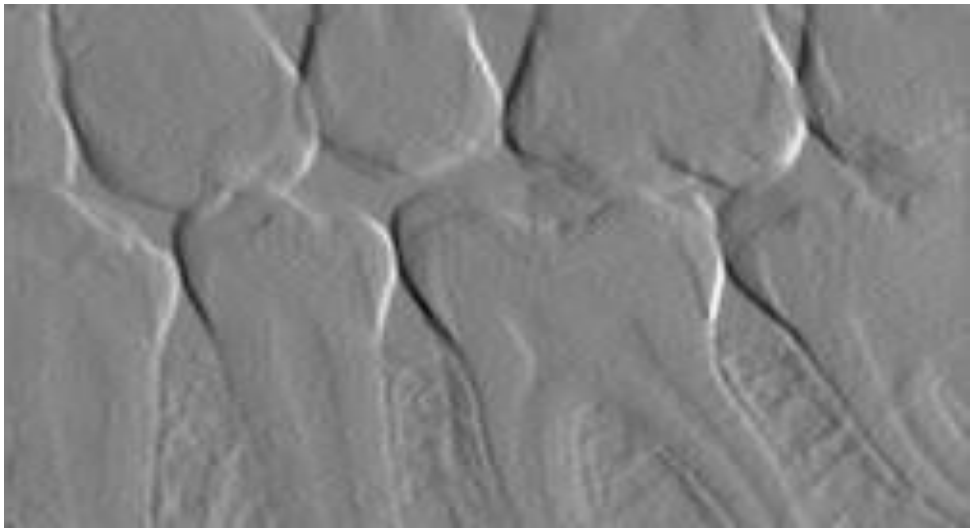
The Sobel edge detection block depicts marking of the boundaries of the patient's teeth X-ray image under subject as shown in figure-4 (b).

Figure-4 (b): Edged Image

Sources: Authors Compilation

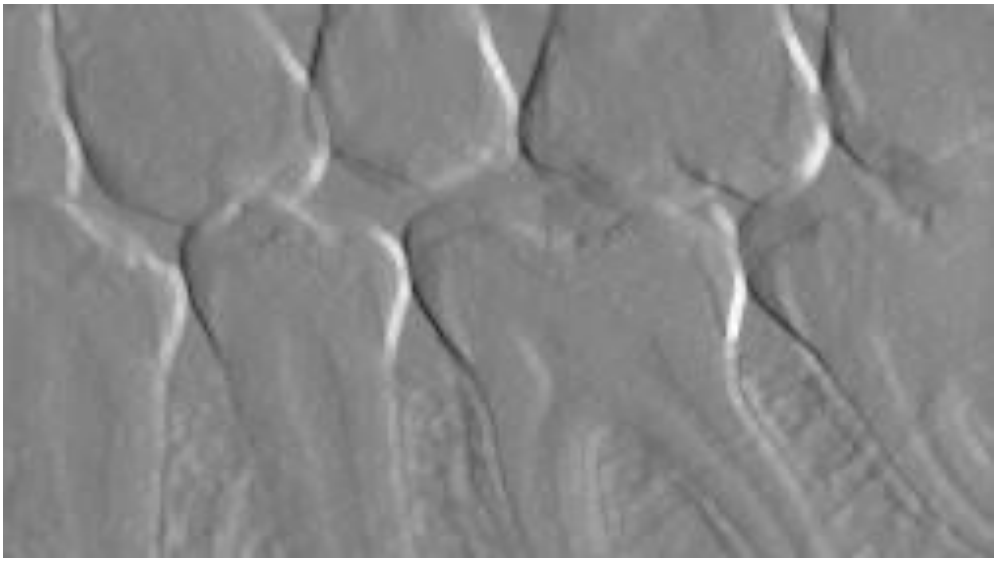
The vertical and horizontal data will be processed in minimum blocks to identify the smallest element in every row or column of the input. This will specify the vector specification dimension of the entire input as shown in Figure 4 (c) and (d).

Figure-4 (c): Vertical Image



Sources: Authors Compilation

Figure-4 (d): Horizontal Image

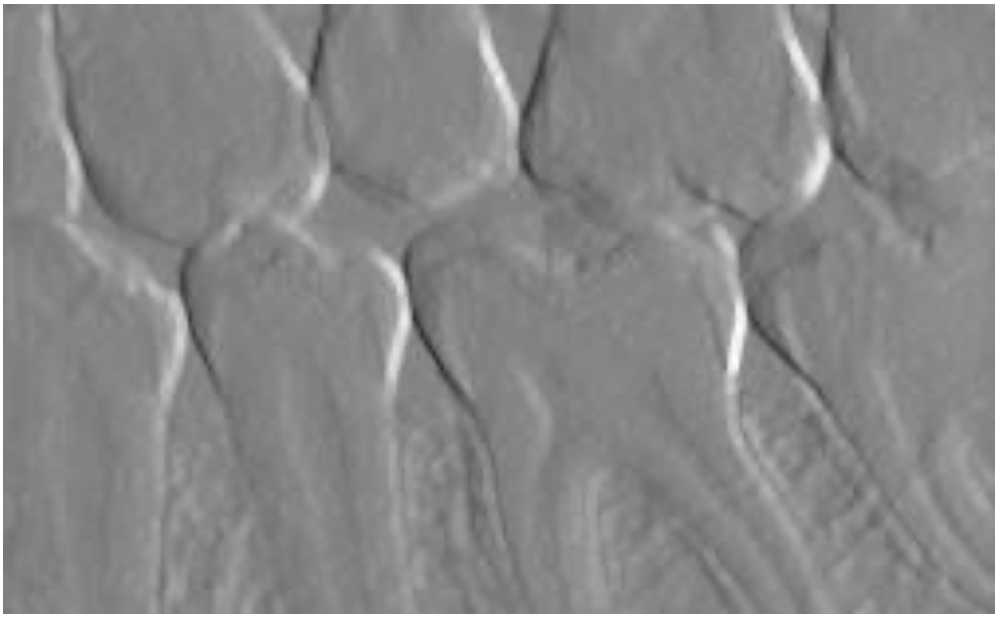


Sources: Authors Compilation

Similarly, the maximum block will specify the largest elements in each row and column of the input. The subtract and divide will apply mathematical function during this process and then they will defined the numbers of rows and columns of the matrix.

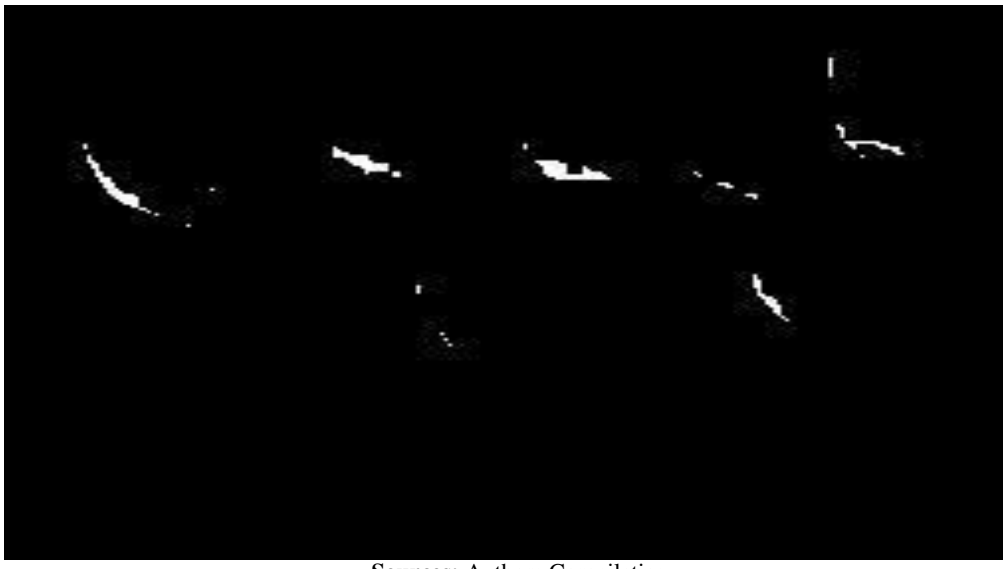
Now to compare the two inputs relational operator starts working as soon as the signal reaches the relational operator block. After relational operator operation, Morphological technique has to be implemented to identify the maxima and minima values. Morphological technique operation will be performed through an erosion operation followed by dilation in a predefined neighborhood and structuring element. The dilation rotates the neighborhood element 180 degrees and finds local maxima and creates the output matrix from these maximum values. The erosion slides the neighborhood element over an image and find local minima and creates output matrix for these minimum values as depicted in Figure 4 (e) & (f).

Figure-4 (e): Dilate Image



Sources: Authors Compilation

Figure-4 (f): Erode Image



Sources: Authors Compilation

The values find out from erode and dilate will be converted into binary by representing its pixels in the form of 0's and 1's.

CONCLUSION AND FUTURE WORK

Morphological technique provides a better artificial tool for detection of dental caries as the image received after simulation can directly be used to recognize the dental cavity i.e. no hard copy of x-ray required. In addition, problem related to contrast adjustment and concentrate on a single point defect in dental caries overcome by this technique.

It can be concluded that the morphological technique give the exact result of the destruction in the form of digital image and can be compared with the ideal images to aid in final diagnosis.

This tool can be further extended to analyze the outcome of the treatment by comparing the diagnose image with the ideal diagnose and helps in instant diagnosis against cavities problems. It is found out during the experiment that this type of study has advantage to restore the dental history of the patients in digital format and can be used as a reference case history in future.

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HIGH PERFORMANCE MULTI-PRECISION MULTIPLIER DESIGN USING RAZOR BASED DYNAMIC VOLTAGE SCALING

P. Suresh[37]

ABSTRACT

In this paper, we present a multiprecision (MP) reconfigurable multiplier that incorporate variable precision, parallel processing (PP),razor based dynamic voltage scaling (DVS),and dedicated MP operand scheduling to provide optimum performance for variety of operating conditions. All of the building blocks of proposed reconfigurable multiplier can work as either independent small precision multiplier or parallel to perform higher- precision multiplications. While still maintain full throughput, the dynamic voltage and frequency scaling management unit configures the multiplier to operate at the proper precision and frequency. Adapting to the run-time workload for targeted application, razor flip-flops together with a dithering voltage unit then configure the multiplier to achieve the lowest power consumption. The single-switch dithering voltage unit and razor flip-flops help to reduce the voltage margin and overhead typically associated to DVS to lowest level. Finally, the proposed MP multiplier can further benefits from an operand scheduler that rearranges the input data, hence determine the optimum voltage and frequency operating conditions for minimum for consumption. The 32×32-bit, low power multiprecision multiplier has been implemented in AMIS 0.35-µm technology. The proposed MP design feature 28.2% and 15.8% reduction in circuit area and power consumption compared with conventional fixed-width multiplier. When combining this MP design error-tolerant razor-based DVS, PP, and the proposed operand scheduler, 77.7% - 86.3% total power reduction is achieved with total silicon area overhead as lowas11.1%. This paper successfully demonstrates that a MP architecture can allow more aggressive frequency and supply voltage scaling for improve power efficiency.

KEYWORDS

Computer Arithmetic, Dynamic Voltage Scaling, Low Power Design, Multi-Precision Multiplier etc.

INTRODUCTION

Consumer demand for increasingly portable yet high performance multimedia and communication products impose stringent constraints on the power consumption of individual internal components [1].of these multiplier perform one of the most frequently encountered arithmetic operation in digital signal processor (DSPs) [2]. Multiplier is typically designed for a fixed maximum word length to suit the worst-case scenario. However, the real effective work lengths of an application vary dramatically. The use of a no a non-proper word length may cause performance degradation or inefficient usage of the hardware resources. In addition, the minimization of the multiplier power budget requires the estimation of the optimal operating point including clock frequencies, supply voltage, and threshold voltage [1]. In most VLSI system designs, the supply voltage is also selected based on the worst-case scenario. In order to achieve an optimal power / performance ratio, a variable precision data path solution is needed to cater for various types of applications. Dynamic Voltage Scaling (DVS) can be used to match the circuit's real working load and further reduce the power consumption. Given their complex structure and interconnections, multiplier can exhibits a large number of unbalanced paths, resulting in substantial glitch generation and propagation [8]. This spurious switching activity can be mitigated by balancing internal paths through a combination of architectural and transistor-level optimization techniques. In addition to equalizing internal path delays, dynamic power reduction can also be achieved by monitoring the effective dynamic range of input operands to disable unused section of multiplier [6]. Therefore, an 8-bit multiplication computed on a 32-bit booth multiplier would result in unnecessary switching activity and power loss.

Several works investigated this word-length optimization. [1], [2] proposed an ensemble of multiplier of different precision, with each pair of incoming operands is routed to the smallest multiplier that can compute the result to take advantage of the lower energy consumption of the smaller circuit. This ensemble of point systems is reported to consume the least power but this came at cost increased chip area given the used ensemble structure. To address this issue, [3], and [5] proposed to share and reuse some functional modules within the ensemble. In [3], an 8-bit multiplier is reused for the 16-bit multiplication adding scalability without large area penalty. Reference [5] extended this method by implementing Pipelining to further improve the multiplier's performance. A more flexible approach is proposed in [15], with several multiplier elements grouped together to provide higher precisions and re-configurability.

Combining multiprecision (MP) with dynamic voltage scaling (DVS) can provide a dramatic reduction in power consumption by adjusting the supply voltage according to circuit's run-time workload rather than fixing it to cater for the worst-case scenario [2]. When adjusting the voltage, the actual performance of multiplier running under scaled voltage has to be characterized to guarantee a fail-safe operation. Conventional DVS technique consist mainly of lookup table (LUT) the LUT approach tune the supply voltage according to predefined voltage-frequency relationship stored in a LUT, which is

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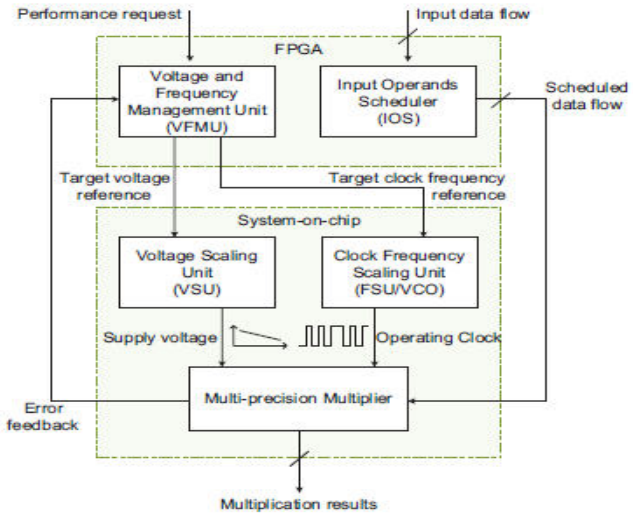
formed worst case condition (process variation, power supply voltage droops, noise many more) therefore, large margin are necessarily added, which in turn necessary decrease effectiveness of DVS technique. Therefore, voltage could be scaled to the extent that the replica fails to meet the timing. However, safety margins are still needed to compensate for the intradie delay mismatch and address fast-changing transient effects [24]. The aforementioned limitation of conventional DVS techniques motivated recent research efforts into error-tolerant DVS approaches [24]-[27], which can run-time operate the circuit even at a voltage level at which timing error occur, A recovery mechanism is then applied to detect and correct data. Because completely remove safety margins, error- tolerant DVS techniques can further aggressively reduce power consumption. In this paper, we propose a low power reconfigurable multiplier architecture that combined MP with an error-tolerant DVS approach based on razor flip-flops [25], the main contributions of this paper can be summarized follows:

1) A multiprecision multiplier architecture featuring, respectively 28%and 15% reduction in silicon area and power consumption compared with conventional 32-bit fixed width multiplier. In this paper, silicon area is optimized by apply reduction technique that replace a multiplier by adders / subtractors.
2) A silicon implementation of this MP multiplier integrating an error - tolerant razor - based dynamic DVS approach. The run – time adaption to the actual workload by operating at minimum supply voltage level and frequency while meeting the through put requirements.
3) A dedicated operand scheduler that rearrange operation on input operands so as to reduce the number of transitions of the supply voltage and, in turn, minimize the overall power consumption of the multiplier

SYSTEM OVERVIEW AND OPERATION

The Proposed MP Multiplier System

Figure-1: Overall Multiplier Block



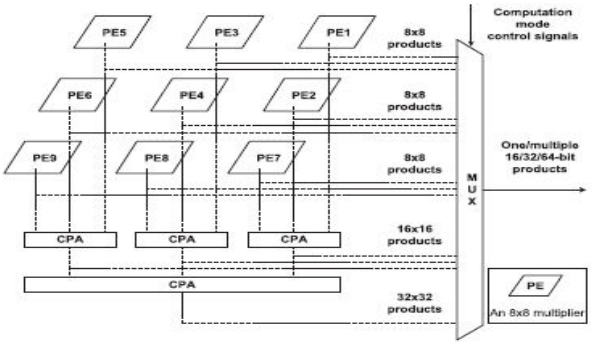
Sources: Authors Compilation

Figure-1 comprises five different modules that are follows:

- The MP multiplier;
- The input operand scheduler (IOS) whose function is to reorder the input data stream into buffer, hence to reduce supply voltage transitions;
- The frequency scaling unit is implemented using voltage controlled oscillator (VCO), its function is to generate required operating frequency of multiplier;
- The voltage-scaling unit (VSU) implemented using voltage dithering unit, its function is to dynamically generate the supply voltage.
- The dynamic voltage / frequency management unit (VFMU) that receive the user requirements (e.g., throughput).

The VFMU sends control signal to the VSU and FSU to generate the required supply voltage and frequency for MP multiplier. The MP multiplier is responsible for all computations. It is equipped with razor flip-flops that can report timing errors associated to sufficiently high voltage supply levels. Initially, the multiplier operates at a standard supply voltage of 3.3 V. if the razor flip-flop does not report any error, this mean that supply voltage can be reduced. This achieve through the VFMU, which send control signal to VSU, hence to lower the supply voltage level. When the feedback provide by razor flip-flops indicating timing error, the scaling of power supply is stopped.

Figure-2: Possible Configuration Modes of Proposed MP Multiplier



Sources: Authors Compilation

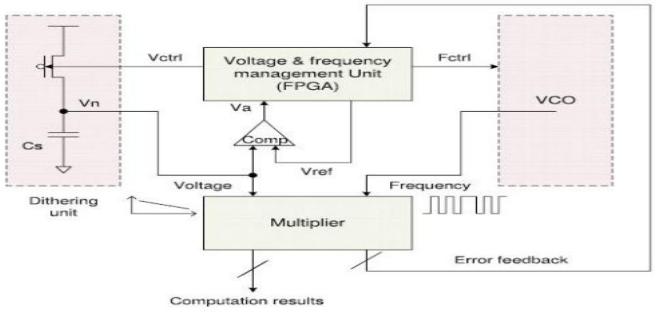
The proposed multiplier (fig. 2) not only combines MP and DVS but also parallel processing (pp). This multiplier comprises 8×8 bit reconfigurable multiplier. These building blocks can either work as nine independent multiplier or work in parallel to perform one, two or three 16×16 bit multiplication or a single-32×32 bit operation. PP can be used to increase the throughput or reduce the supply voltage levels for low power operation.

DYNAMIC VOLTAGE AND FREQUENCY SCALING MANAGEMENT

Dynamic Voltage Scaling (DVS) unit

In this implementation, DVS unit shows a dynamic power supply and a VCO are employed to achieve real-time dynamic voltage and scaling can be achieved when using voltage dithering, which exhibits faster response time than conventional voltage regulator. Voltage dithering uses power switches to connect different supply voltage to the load, depending on the time slots. Therefore, an intermediate average voltage is achieved.

Figure-3: Proposed Single-Header Voltage Dithering Unit

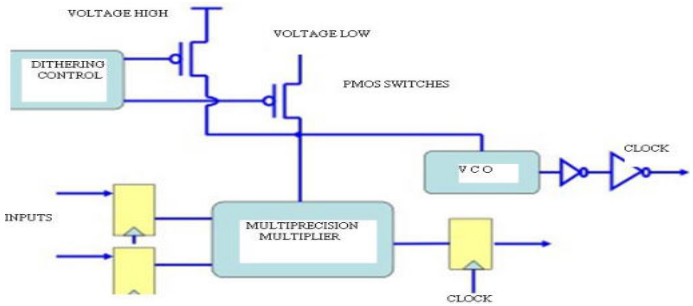


Sources: Authors Compilation

Voltage Dithering Unit

The Voltage dithering technique to limit silicon overhead dynamically generated the supply voltage so minimize the power consumption. In this architecture, The Voltage dithering technique to limit silicon overhead dynamically generated the supply voltage so minimize the power consumption.

Figure-4: Voltage Dithering Unit



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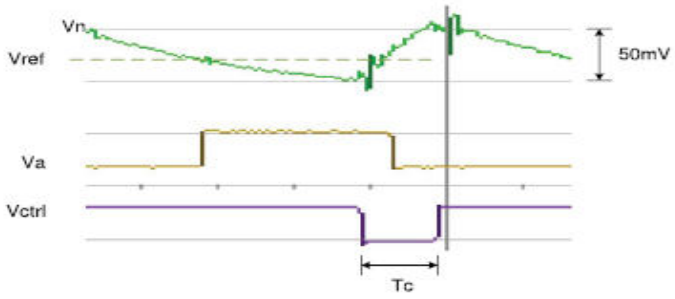
In this architecture, voltage dithering is utilized to provide near-optimum dynamic voltage scaling with much less overhead. A voltage dithering use a few of power switches and let them toggle between small numbers of voltage level for different fraction of time to achieve an intermediate average voltage. By tuning the on / off the complementary switches, the dithering voltage can set to be equivalent to the required value of voltage dithering was proposed as a low overhead implementation of DVS. The savings are only achievable if the voltage can change on the same time scale as the altering workload.

Figure-5: Experimental Timing Result Voltage Dithering



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In the single voltage dithering scheme fig which operates as follows. When supply voltage (Vn) of drops below the predefined reference voltage (vref), the comparator output (Va) toggles. Therefore, theVFMU turns on the power switch via Vctrl, when the operations of complementary switch turn on depend on Vctrl value. Fig. shows experimental result for voltage control loop.

Frequency Scaling Unit

In the proposed MP multiplier, dynamic frequency tuning is used to meet throughput requirements. It is based on a VCO implemented as a seven-stage current starved ring oscillator. VCO is an oscillator circuit in which the frequency of oscillation can be controlled by externally applied voltage. The VCO output frequency can be tuned from 5 to 50 MHz using four control bits (5 MHZ/step). This frequency range is selected to meet the requirements of general-purpose DSP applications.

Figure-6: Experimental Measurement of Worst Case Frequency Switching from (50 To 5MHZ)

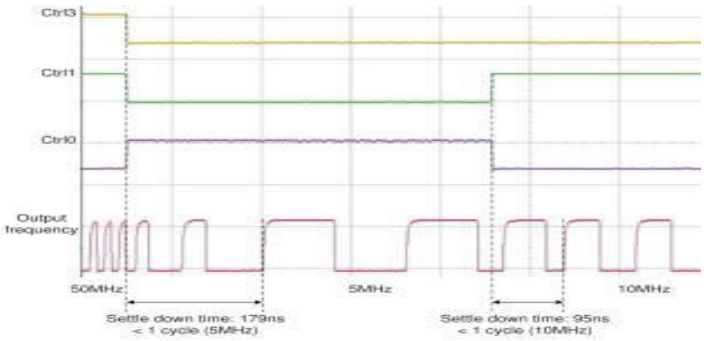

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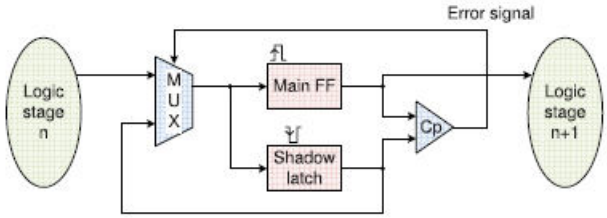
Figure 6 shows experimental measurements showing the transient response for the worst-case frequency switching (from 50 to 5MHZ). Clock frequency can settle within one clock cycle as required.

IMPLEMENTATION OF RAZOR FLIP-FLOPS

Although the worst-case paths are very rarely exercised, traditional DVS approaches still maintain relatively large safety margins to ensure reliable circuit operation, result in excessive power dissipated.

The razor technology is breakthrough work, which eliminates the safety margin by achieving variable tolerance through in-situ error detection and correction ability [25]. This approach is based on a razor flip-flops, which detects and correct the delay error by double sampling.

Figure-7: Conceptual View of Razor flip-flops



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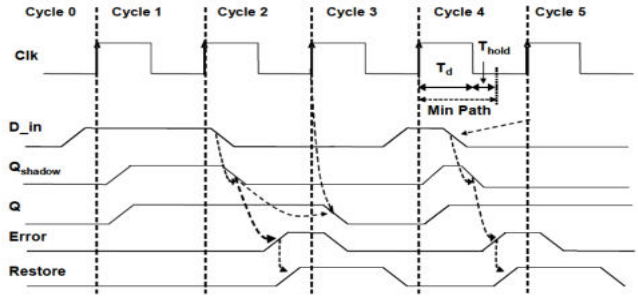
The razor flip-flops are constructed out of a standard positive Edge triggered flip-flops (DFF) augmented with a shadow latch, which samples at the negative clock edge. Thus, the input data is given additional time, equal to the duration of the positive clock phase, to settle down to its correct state before being sampled by the shadow latch. In order to ensure the shadow latch always capture the correct data, the minimum allowable supply voltage needs to be constrained during design time such that step-up time at the shadow latch. A comparator flags a timing error when it detects a discrepancy between the speculative sampled at the main flip-flops and the correct data sampled at the shadow latch.

Figure-8: Timing Diagram for Razor flip-flops



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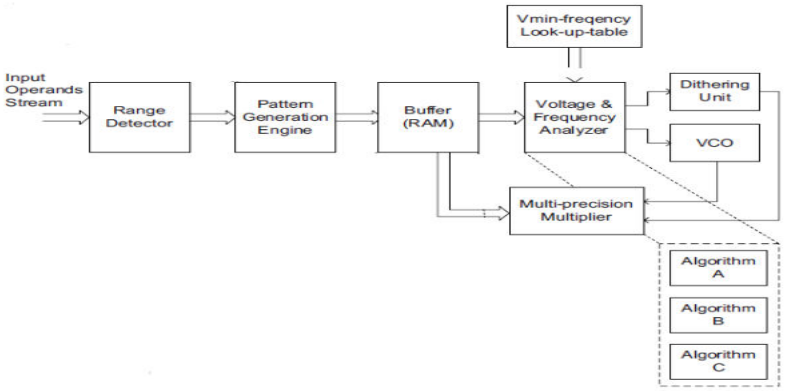
Error signal of individual R1FFs ORed together to generate the pipeline restore signal, which overwrites the shadow latch data into the main flip-flops, thereby restoring correct state in the cycle shows in Fig. 8 the timing diagram razor flip-flops.

Input Operand Scheduler Unit

Main motivation and operating principle of input operand scheduler that rearranges operations on input operands so as to reduces the number of transition of the supply voltage and, in turn, minimize the overall power consumption of the multiplier. Whose function is reordering the input data stream into a buffer, hence to reduce the required power supply voltage transitions?

Figure-9: Block Diagram for IOS



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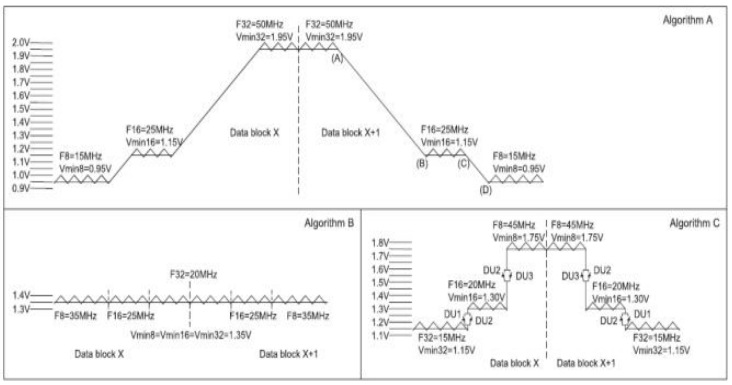
The multiplier provide three different precision modes (32×32bit, 16×16, 8×8-bits), the supply voltage would to transit dynamically between the minimum required voltage levels Vmin32, Vmin16, Vmin8,required for 32,16,8-bit operands, respectively, we propose an IOS that will perform following task:

- Reorder the input data stream such that same-precision operands are grouped together into a buffer.
- Find the minimum supply voltages (Vmin32, Vmin16, Vmin8), and operating frequencies (f_{32}, f_{16}, f_8) for three different-precision data grouped to minimize the overall power consumption while still meeting the specified throughput.

Figure-10: Operation Principle of Operand Scheduling Algorithm A, B and C



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Algorithm for IOS

There are three different algorithms to reduce this overall power consumption, algorithm A, B and C each of these algorithms constitutes a different approach to process the mixed-precision data held in the operands buffer. The performance of each algorithm is evaluated using a mixed precision data set with the corresponding to each precision (8, 16, and 32-bit).

Algorithm A

The algorithm A states the level of voltage and frequency is varying for different (8, 16, 32) bit precision.

Algorithm-B

This algorithm removes all transitions of the power supply voltage by making Vmin32, Vmin16, and Vmin8 equal and adjusting f32, f16, and f8 such that the overall throughput is kept unchanged.

Algorithm-C

Only one modification has been considered for compare algorithm-A with algorithm-C is inversely changing the frequency and voltage is remaining same.

POWER COMPARISION

Table-l.1 (a): Power Comparison for Proposed Method

Algorithms	Algorithm A	Algorithm B	Algorithm C	Percentage of Power Reduction
Total estimated power consumption	287mW	120mW	113mW	Algorithm A-25% Algorithm A-68% Algorithm A-70%

Sources: Authors Compilation

The comparison of power shows in table 1a. Which different algorithms are described A, B, C and the algorithm A is observed total estimated power consumed is 287mW the algorithm C consumes less power compared to algorithm A and B.

Table-1 (b): Power Comparison for Existing Method

Total Estimated Power Consumption	384mW

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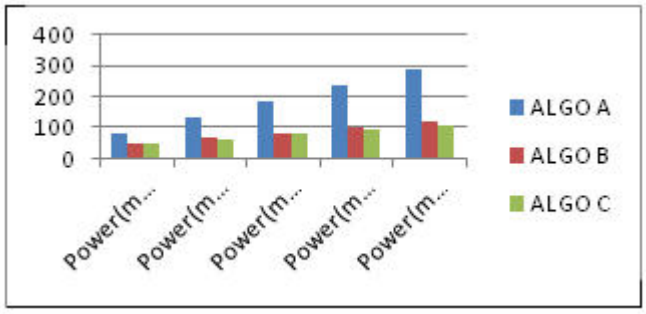
The comparison of power for existing method shows in table.1 (b) to compare both existing and proposed method, the 70% of power reduction achieved by proposed method to achieve the efficient operation.

POWER ANALYSIS

Power analysis between frequency and different algorithm A, B and C shows below Fig. 11. The algorithm C consumes less power compared algorithm A and B.

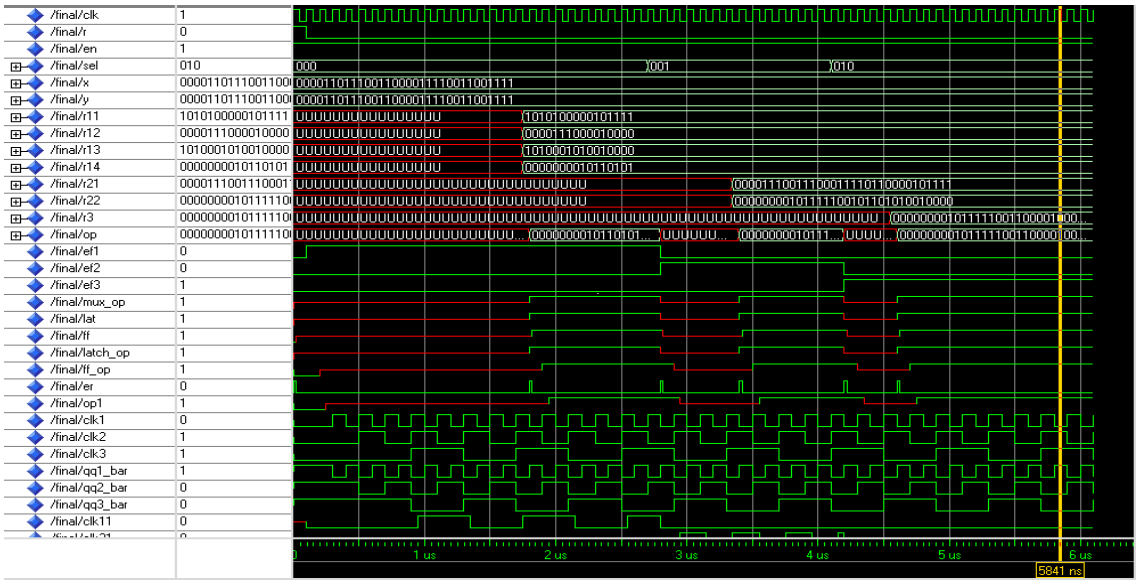
Figure-11: Power Analysis between Frequency and Different Algorithm A, B, C



Sources: Authors Compilation

SIMULATION RESULT OF MULTIPRECSION RECONFIGURABLE

Figure-12: Simulation Result of MP Reconfigurable Multiplier



Sources: Authors Compilation

Fig.12 shows the simulation result of multiprecision reconfigurable multiplier, in which dynamic voltage scaling and razor based error detection unit is used to provide full computational flexibility and low power application.

CONCLUSIONS

Variable latency functional units using adaptive operation precision can allow aggressive supply voltage scaling and clock frequency scaling for improved power efficiency. In this paper a multi-precision multiplier combining variable precision processing, scaled voltage and clock frequency are used efficiently to reduce circuit power consumption. Various algorithms and topologies are explored to obtain high performance. Reported result show that variable precision multiplier enables a reduction of power dissipation compared to fixed precision multiplier. When operating under different precision, the multi-precision multiplier is used in attractive various general-purpose low power applications. In future, design of area and power-efficient high-speed data path logic systems are one of the most substantial areas of research in VLSI system design. In digital adders, the speed of addition is limited by the time required to propagate a carry through the adder. The sum for each bit position in an elementary adder is generated sequentially only after the previous bit position has been summed and a carry propagated into the next position. In the future work multi-precision multiplier can be implemented using high speed adders such as carry select adder for improving the performance.

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An author must make available all requisite formal and documented ethical approval from an appropriate research ethics committee using humans or human tissue, including evidence of anonymisation and informed consent from the client (s) or patient (s) studied.

An author must follow national and international procedures that govern the ethics of work done on animals.

An author must avoid making defamatory statements in submitted articles which could be construed as impugning any person's reputation, for example, making allegations of dishonesty or sharp practice, plagiarism, or misrepresentation; or in any way attacking a person's integrity or competence.

An author must ensure all named co-authors consent to publication and being named as a co-author, and, equally, that all those persons who have made significant scientific or literary contributions to the work reported are named as co-authors.

Additionally, the author understands that co-authors are bound by these same principles.

(sd/-)
(Editor-In-Chief)

FAULT SECURE CONTENT ADDRESSABLE MEMORY DESIGN USING MAJORITY LOGIC DECODING

M. Manoj Muthuraj[38]

ABSTRACT

Nowadays, The memory applications are more concerned with single event upsets. Content addressable memories (CAM's) are a special type of memories that is commonly used in computing and networking. CAM compares the input data with that stored in the different positions of the CAM and outputs the address of the word (if any) that matches the input. CAM's are also used in that case to provide fast packet classification. In computing, CAM's are commonly used in caches or translation look aside buffers. The new key cannot be added into content addressable memory when the address is not used. This issue is analyzed and evaluated showing that, for large content addressable memories. The proposed scheme can be used effectively to reduce the cost of implementing the ECCs in the CAMs. In this proposed technique, area utilized is 4,947, the area can be represented in terms of gate counts in FPGA, and power consumed is 323mW. By hamming codes, error correction code technique the area utilization is being reduced to 4,764, power is also being reduced to 315Mw.

KEYWORDS

Filp Flop Memory Cells, Cyclic Decoders, Shift Registers, Memory etc.

INTRODUCTION

Content Addressable Memories (CAMs) are a special type of memories that is commonly used in computing and networking [1]. A CAM compares the input data with that stored in the different positions of the CAM and outputs the address of the word (if any) that matches the input. This functionality is useful, for example, in finding the outgoing port for a packet in a switch or a router [2]. In many networking applications, packets have to be classified for different reasons that include, for example, security, monitoring, and quality of service. CAMs are also used in that case to provide fast packet classification [3]. In computing, CAMs are commonly used in caches or translation look aside buffers [4].

For example, radiation-induced soft errors can change the values of some memory cells such that the data are corrupted. To mitigate the effects of soft errors in circuits, a wide number of techniques can be used [5]. For memories, the most practical approach is to use an error correction code (ECC) [6]. An ECC adds some additional bits to each word such that some errors can be detected and corrected. Single- error-correction–double-error-detection (SEC–DED) codes are commonly used to protect memories as they require few additional bits per word and the encoding and decoding is simple [7].

For terrestrial radiation environments where there is a low soft error rate (SER), codes like single error correction and double error detection (SEC–DED), are a good solution, due to their low encoding and decoding complexity. However, because of augmenting integration densities, there is an increase in the number of soft errors, which produces the need for higher error correction capabilities [4], [5]. The usual multierror correction codes, such as Reed – Solomon (RS) or Bose–Chaudhuri–Hocquenghem (BCH) are not suitable for this task. The reason for this is that they use more sophisticated decoding algorithms, like complex algebraic (e.g., floating point operations or logarithms) decoders that can decode in fixed time, and simple graph decoders, that use iterative algorithms (e.g., belief propagation). Both are very complex and increase computational costs Among the ECC codes that meet the requirements of higher error correction capability and low decoding complexity, cyclic block codes have been identified as good candidates, due to their property of being majority logic (ML) decodable. A subgroup of the low-density parity check (LDPC) codes, which belongs to the family of the ML decodable codes, has been researched in this paper, we will focus on one specific type of LDPC codes, namely the difference-set cyclic codes (DSCCs), which is widely used in the Japanese teletext system or FM multiplex broadcasting systems . The main reason for using ML decoding is that it is very simple to implement and thus it is very practical and has low complexity. The drawback of ML decoding is that, for a codeword of - bits, it takes cycles in the decoding process, posing a big impact on system performance. One way of coping with this problem is to implement parallel encoders and decoders. This solution would enormously increase the complexity and, therefore, the power consumption. As most of the memory reading accesses will have no errors, the decoder is most of the time working for no reason.

In the case of CAMs, an error can create two types of effects In the case of CAM's, an error can create two types of effects: false positives and false negatives. A false positive occurs when a corrupted key matches the input such that an erroneous address is sent to the output. Conversely, a false negative occurs when, for an input that should match the contents of a given address, the CAM does not return that address because the data stored is corrupted and, therefore, no match is found. False positives can be avoided using an ECC such that the data plus the ECC bits are stored in the CAM and used as input for the searches. For example, a SEC–DED code has a minimum Hamming distance of four such that three or less bit errors cannot produce a valid word (and therefore a match) [8]. To avoid false negatives, the architecture of the CAM has to be modified such that the comparisons allow for a mismatch in some bits. For example, for a SEC–DED code, 1-bit mismatch can be allowed such that false negatives are

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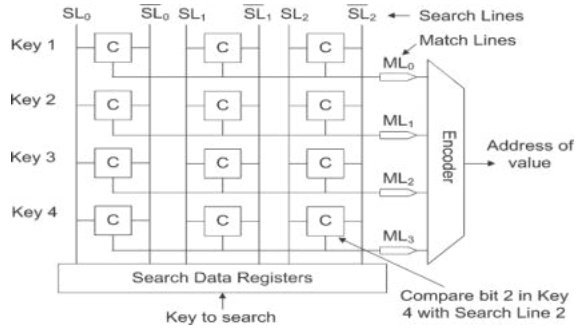
avoided for single-bit errors [8]. Including the ECC bits in the CAM comparisons can require a significant increase in area, and power consumption while modifying the CAM architecture is not trivial. Another possibility is to include elements to detect errors in the low- level circuitry of the CAM. This idea was explored in [9] to provide error detection only. Other solutions require replicating the information stored in the CAM externally, in another CAM [10], or in a bloom filter [11]. Specific schemes to protect ternary CAMs that can include don't-care bits in the entries have been also proposed [12].

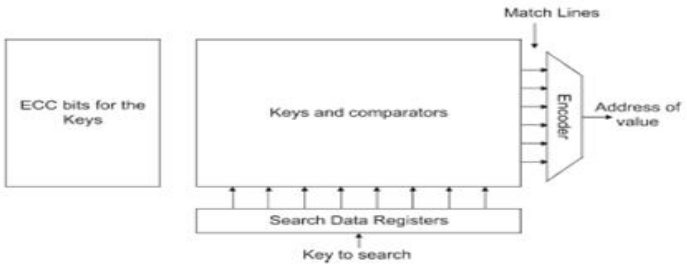
Figure-1: Block Diagram of a CAM



Sources: Authors Compilation

CAMS

Figure-2: Selected ECC Configuration for CAM

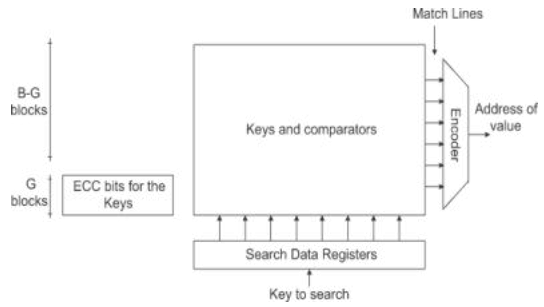


Sources: Authors Compilation

The contents of the CAM are commonly referred to as keys, and the input is compared against the stored keys to find a match. The input goes into the CAM through the search lines (SLs) and is compared in parallel with all the keys. An encoder returns the address of the key that matches the input. That address is then typically used as the address to access another memory where a value associated with that key is stored. For example, in a route lookup application, the destination address would be the key, and the value would be the outgoing port for that destination.

In Figure-1, it becomes apparent that a CAM is more complex than a conventional memory as additional logic for comparison has to be added to each memory cell. This results in a significant area and power consumption. Another observation is that, in a CAM, when a search is done, all addresses are accessed for comparison, which is completely different from a standard memory in which only the selected address is accessed. This explains why ECCs cannot be directly used on CAMs as the ECC decoder would have to be replicated for all addresses. Fig. 1 also makes clear the cost of adding the ECC bits directly into the stored keys and modifying the match lines to allow for some bit mismatches as proposed in [8]. As long as the address of the key is consistent with the address of the value, the correct value would be retrieved. In the following section, we discuss how this freedom in selecting the address to store the key in the CAM can be used to efficiently implement.

Figure-3: ECC Configuration with Proposed Technique



Sources: Authors Compilation

Finally, it is also worth mentioning that, in the case that a new key cannot be added with the proposed mechanism, it is possible to disable the procedure in an additional block (effectively increasing the value of G by one), so that the key can be added at the cost of leaving a block unprotected. This would ensure a graceful degradation if occupancy is very high. The probability that a new key cannot be added to the CAM when using the proposed scheme can be theoretically estimated. Initially, we will assume that the m ECC bits for the keys are uniformly distributed to the M = 2m positions inside a block.

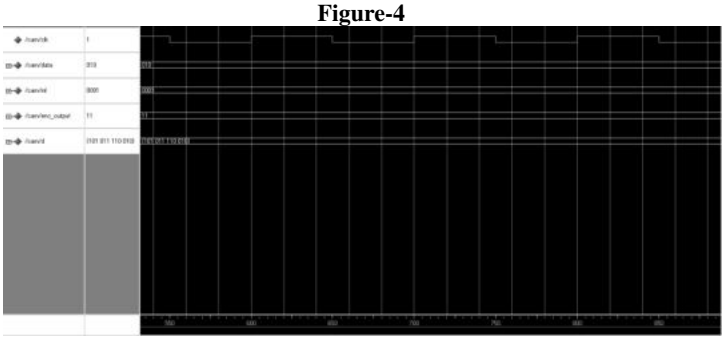
The situation in which a new key cannot be added can only occur when the last G blocks are full as otherwise a free entry in any of those blocks could be used to store the new key regardless of the value of the ECC bits. To estimate the likelihood of those blocks being fully occupied. The accuracy of the approximation will be better when M is large as the occupancy is obtained by adding M random variables and (2) approximates the occupancy by its mean. Therefore, as M grows, the standard deviation of the sum of random variables will be smaller such that the mean is a better approximation. Another issue is that the proposed scheme adds some complexity to the process of adding keys in to the CAM. However, this will not be an issue in many applications as the addition of keys to the CAM is orders of magnitude less frequent than search operations. For example, in a route lookup application, updates may be in the scale of seconds, while packet forwarding can occur in the scale of microseconds. Finally, it is important to mention that the reliability of the proposed scheme is similar to that of the traditional ECC- protected CAM as the same type of errors can be corrected.

RESULTS

To evaluate the proposed scheme, two main aspects are considered: 1) the power and area entries to the CAM; and 2) the effective CAM occupancy that can be achieved.

Simulation Result for Content Addressable Memory

Figure-4

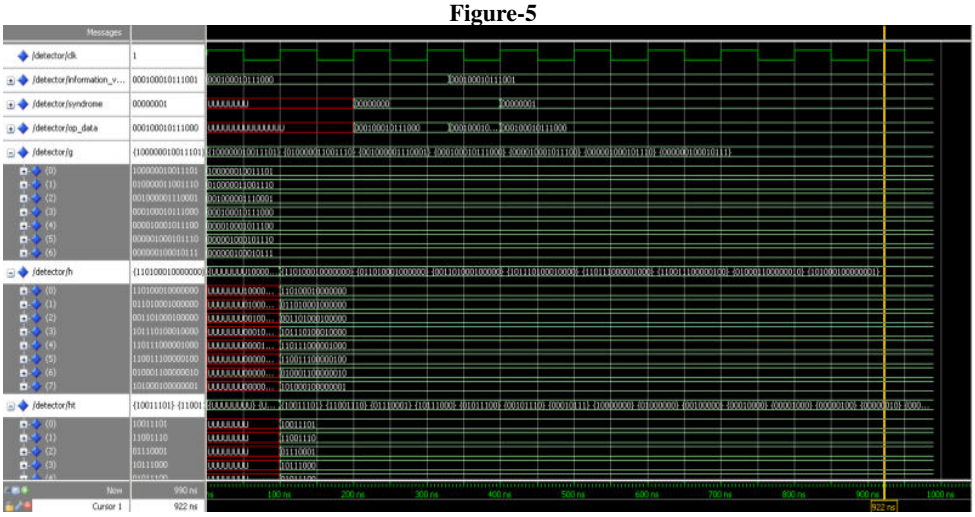


Sources: Authors Compilation

The simulation assumes that the ECC bits are not used in the comparisons and that errors are removed using scrubbing. In this simulation, we provide the search key inputs to our CAM module. As per my design, the input key is searched with the memory contents. In the modules provides the address of the memory block, when its content matches with the input key.

Decoder

Figure-5

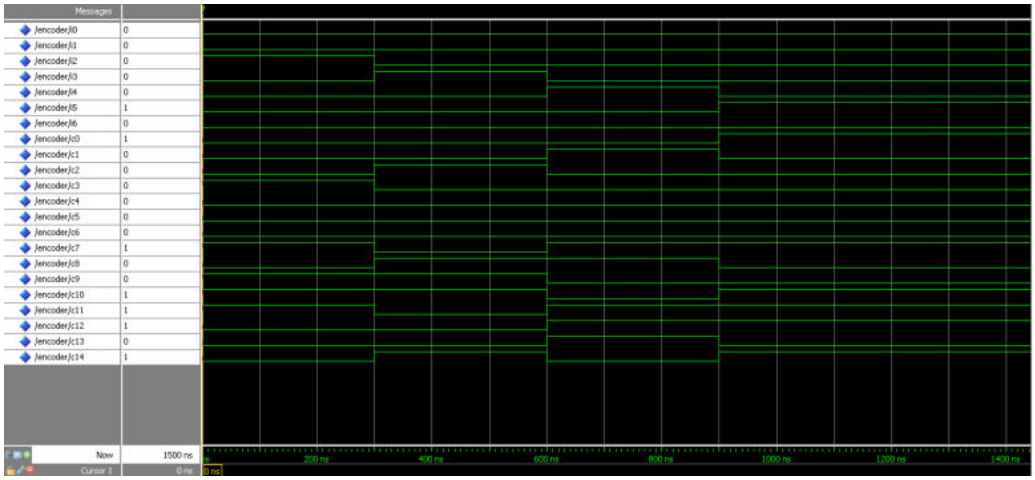


Sources: Authors Compilation

The simulated output for the detector block is shown and here the threshold timing value is 90ns. The output is obtained for series of inputs given and the detector block attains much reliability.

Encoder

Figure-6



Sources: Authors Compilation

The simulated output for the encoder block is shown. The input pattern is encoded and the expected values are obtained for the content addressable memory.

Simulation Result for Merging ECC bits with CAM

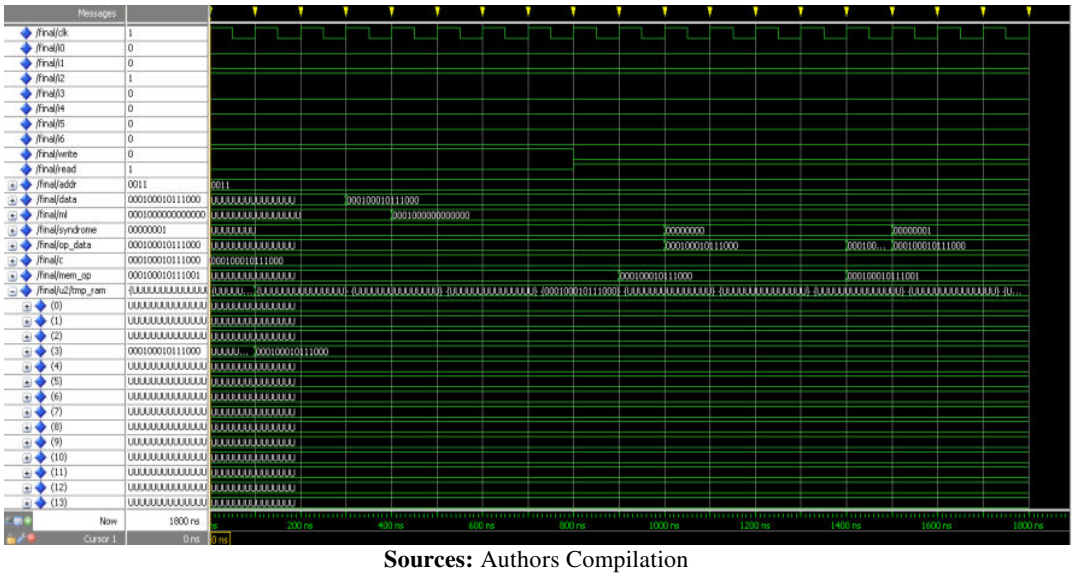
Result analysis of the merging the ECC bits with the CAM memory:

- By adding the Ecc bits for the keys to the keys and comparator.
- Hamming Codes are perfect one for error correcting codes.

The Power and Area entries to the CAM

- The effective CAM occupancy that can be achieved.

Figure-7

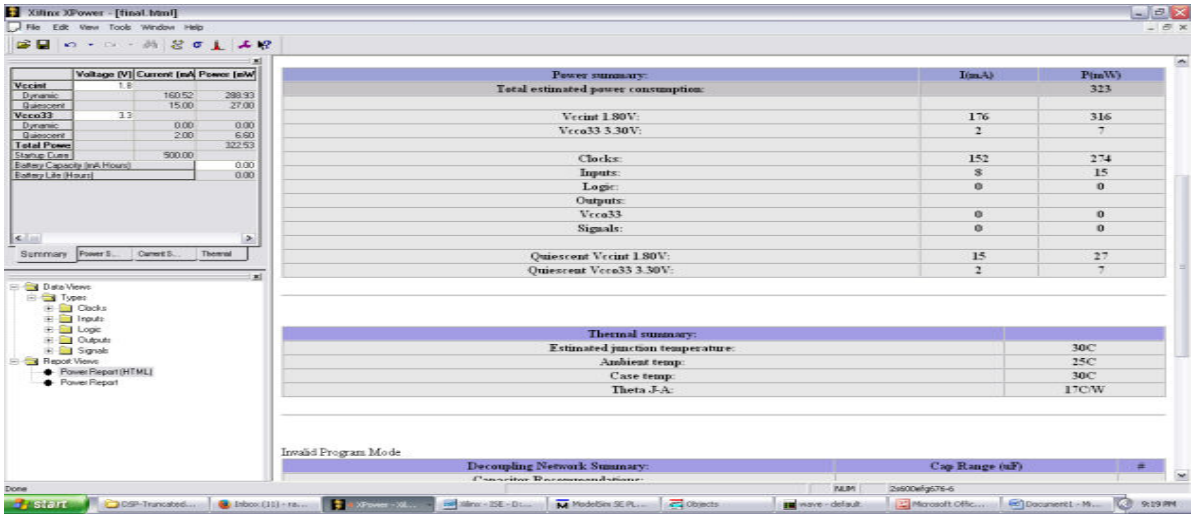


Sources: Authors Compilation

XILINX-POWER AND AREA COMPARISON ADDING THE ECC BIT

Power consumption by adding the ECC Bits

Figure-8



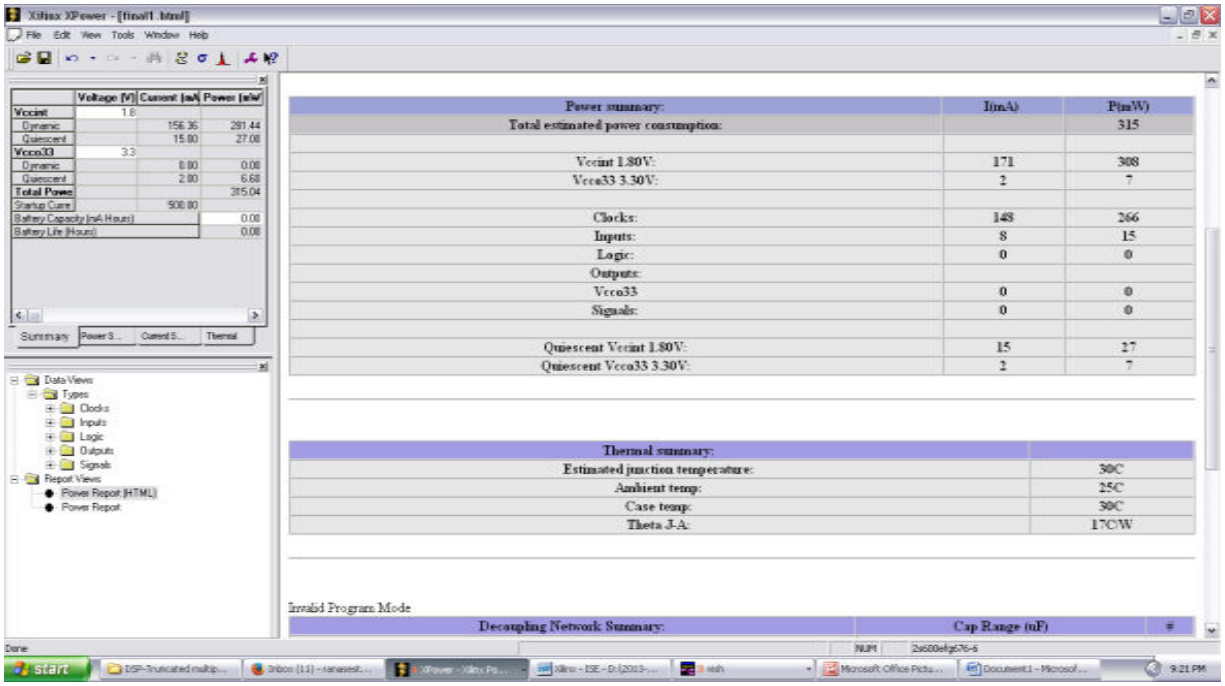
Sources: Authors Compilation

The Xilinx power characteristics for iscas298 circuit by adding the ECC bits to the cam. The total estimated power consumption is about 323mW.

Power consumption after reducing the ECC bits to the CAM

The Xilinx power characteristics for iscas circuit after reducing the ECC bits to the cam. The total estimated power consumption is about 315mW. The power and area characteristics are determined by synthesizing the code through the Xilinx navigator.

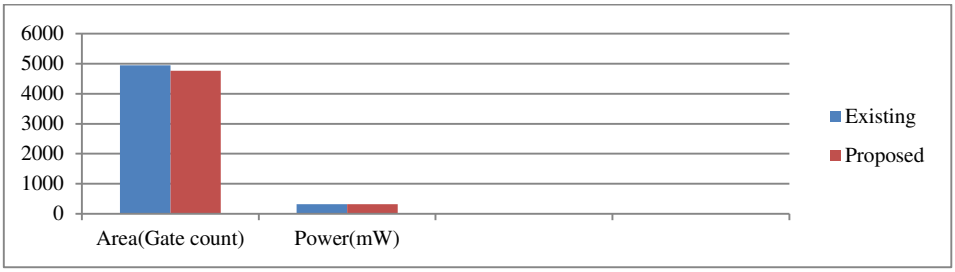
Figure-9



Sources: Authors Compilation

COMPARISON OF RESULTS ANALYSIS IN CHART

Graph-1



Sources: Authors Compilation

FUTURE WORK

Error correction codes are commonly used to protect memories from so-called soft errors, which change the logical value of memory cells like cam without damaging the circuit. As technology scales, memory devices become larger and more powerful error correction codes are needed. To this end, the use of more advanced codes has been recently proposed. These codes can correct a larger number of errors, but generally require complex decoders. To avoid a high decoding complexity, the use of one-step majority logic decodable codes can be implemented in future for memory applications. One-step majority logic decoding can be implemented serially with very simple circuitry resulting in area and power minimization.

CONCLUSION

A method to efficiently implement ECCs in CAMs has been presented. The main idea is to embed the ECC bits into the address in which keys are stored in a CAM such that they do not need to be physically stored in the memory. This has been achieved by restricting the addresses on which a given key can be stored. One potential issue of the proposed scheme is that it may not be possible to add new keys even when there are free addresses in the CAM due to the restrictions introduced. This issue has been evaluated by simulation showing that, for large CAMs, close to 100% occupancy can be achieved with a limited overhead. The benefits of the new scheme in a real application showing how the proposed scheme can enable significant power and area reductions in large CAMs. Future work will consider the evaluation of the scheme in other applications.

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E-COMMERCE: A CONCEPTUAL STUDY

Surbhi Siwach[39]

ABSTRACT

Ecommerce simply relates to the online business. As commerce is the exchange of goods and services. Ecommerce means electronic commerce i.e. commencing over internet .which enables online buying and selling goods, services provided, digital goods and configurable goods etc. Ecommerce is anything that involves an online transaction. Ecommerce provides multiple benefits to the consumer in the form of availability of goods at lower cost, wider choice and saves times. Ecommerce involves conducting business using modern communication systems: telephone, fax, payments, money transfer system, electronic data interchange etc. Financial services travel, entertainment and groceries are also done over electronic system. Ecommerce can enhance economic growth, increase business opportunities, competitiveness, better and profitable access to market. Ecommerce is emerging as a new way of helping business enterprises to compete in the market and thus contributing to economic success.

KEYWORDS

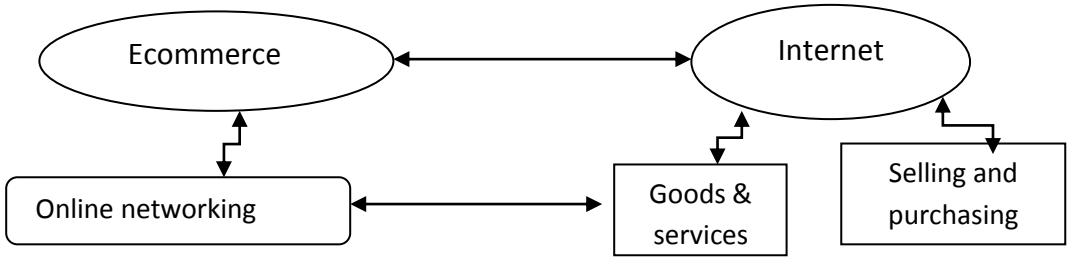
Ecommerce, Profit, Loss, Goods, Groceries, Transfer, Payment etc.

INTRODUCTION

E-commerce is the buying and selling of goods and services on the internet and on different online networks especially World Wide Web. The development of e-commerce has led to companies moving much of their business efforts to online environments. Dot com craze has stimulated a global commercial environment, which is now being exploited by many firms who are engaged in e-commerce. Electronic commerce over the Internet is a new way of conducting business. However, only three years old, it has the potential to alter the economic activities and the social environment.

A wide range of related activities are related to internet e.g. internet commerce (I-commerce), virtual commerce (v-commerce), cyber commerce(c-commerce) and web commerce (w-commerce). This is an effective and efficient way of communicating within an organization and one of the most effective and useful way of conducting business. Examples of ecommerce are myntra.com, flipcart.com, eBay, Amazon etc.

Figure-1



Sources: Authors Compilation

General category of e commerce can be broken down in two parts:-1) E-merchandise 2) E-finance.

1) E-merchandise: Selling goods and services electronically and moving items through distribution channels, for example through Internet shopping for groceries, tickets, music, clothes, hardware, travel, books, flowers and gifts.
2) E-finance: Banking, debit cards, smart cards, banking machines, telephone and Internet banking, insurance, financial services and mortgages online.

OBJECTIVES

Company must first choose between paying a service provider to host the site and self-hosting, external hosting options, shared hosting, dedicated hosting and co-location key element of electronic commerce software catalogues, shopping carts, and transaction processing capabilities commerce services provider used by small enterprises just starting an electronic commerce initiative if a company already has computing equipment and staff in place purchasing a midrange electronic commerce software packages provided more control over a site large enterprises with high transaction rates need to invest in larger, more

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customizable system. Finding and evaluating Web hosting services, Basic functions of electronic commerce software, advanced functions of electronic commerce, Electronic commerce software for small and midsize businesses, Electronic commerce software for midsize to large businesses, Electronic commerce software for large businesses that have an existing information technology infrastructure are the main objectives of ecommerce. Other objectives are to describe the phases a company go through using the Internet for business. Describe the forms of electronic commerce. Describe the purpose, characteristics, and uses of intranets and extranets. Describe the design and use of public Web sites for supporting business-customer transactions. Describe some of the technical requirements of electronic commerce. Describe some of the ethical issues of electronic commerce.

TYPES OF ECOMMERCE

Ecommerce can be broken into four main categories: B2B, B2C, C2B, and C2C.

- **B2B (Business-to-Business)**
  Companies doing business with each other such as manufacturers selling to distributors and wholesalers selling to retailers. Pricing is based on quantity of order and is often negotiable.

- **B2C (Business-to-Consumer)**
  Businesses selling to the public typically through catalogs utilizing shopping cart software. By dollar volume, B2B takes the prize, however B2C is really, what the average Joe has in mind about ecommerce as a whole. Having a hard time finding a book? Need to purchase a custom, high-end computer system? How about a first class, all-inclusive trip to a tropical island? With the advent ecommerce, all three things can be purchased literally in minutes without human interaction. Oh how far we have come!

- **C2B (Consumer-to-Business)**
  A consumer posts his project with a set budget online and within hours, companies review the consumer's requirements and bid on the project. The consumer reviews the bids and selects the company that will complete the project. Enlace empowers consumers around the world by providing the meeting ground and platform for such transactions.

- **C2C (Consumer-to-Consumer)**
  There are many sites offering free classifieds, auctions, and forums where individuals can buy and sell thanks to online payment systems like PayPal where people can send and receive money online with ease. EBay's auction service is a great example of where person-to-person transactions take place every day since 1995.

ISSUES IN ECOMMERCE

Since the development of the World Wide Web and the beginning of the commercial use of the Internet in the early 1990s, e-commerce has become Internet based.

Some of the issues related to ecommerce are:

Security & Privacy

Ecommerce fraud is on a rise and visitors are very skeptical about revealing their financial details online. Your ecommerce store should build a climate of assurance for every new visitor coming to your store.

- Have a Spam free, Popup free ecommerce storefront.
- Secure all transactions with latest SSL security standards.
- Host your store in a secure hosting environment.
- Display a disclaimer during the checkout process and respect the privacy of the visitor.
- Keep a constant watch on the changes in Internet security environment and periodically test your store for safeguards against any security threats.

Compromise with security issues can cost you dearly. It is always recommended to be with the best in the industry when it comes to security of your ecommerce store.

Processing Capabilities

The speed and accuracy of various processes that go in managing an ecommerce store are also very important. Your ecommerce store should be powerful, yet stable.

- Look for an ecommerce solution that gives you real time processing & inventory management capabilities.
- Accept all possible popular pay methods.
- Integrate with secure payment gateways for better payment processing.

The processing power of your e-store will be the foundation on which your online storefront will work. Make the best of the ecommerce software that is behind the performance of your store.

Order Fulfillment

Your major task is to deliver the orders placed on your online store within defined timeframe and above all, as shown on your ecommerce storefront.

- Place special importance on the order processing capabilities, as any mistake there will multiply further.
- Establish a powerful web of suppliers before you go online.
- Do not let your online store be overburdened with orders that cannot be fulfilled.
- Deliver goods through proven shipping carriers that reach to all locations within period.
- Allow users to track their orders online.

INFRASTRUCTURE ISSUES IN ECOMMERCE

Here are seven important infrastructure decisions that ecommerce businesses face.

Marketing

Of all the infrastructure elements, marketing may be the most important. To succeed, your website must be found. Once visitors are on your site, you need to keep them there and compel them to buy from you. That is the job of your marketing team. Whether its website design, social media, search marketing, merchandising, email, or other forms of advertising, it is all about marketing. To effectively manage marketing activities in-house is very challenging. Most small ecommerce businesses outsource some element of marketing.

Facilities

A key competitive advantage that ecommerce businesses have over brick-and-mortar stores is the investment in their physical offices and warehouses. In many cases, you can host your business out of a home office and your basement or garage. If you drop ship or outsource fulfillment, you may be able to do that for a long period. Even when you grow to have many employees, you can set up your offices in class B or C space, as you have no need for a fancy store in the right location.

A word of advice is to keep your options flexible. Try to find an office park that has a wide variety of spaces in different sizes. You may be able to start in a smaller space and move up to a larger one without penalty, as your needs change.

Customer Service

There are many choices today for delivering high-quality customer service. You can manage those activities in-house or outsource to a third party. Basic customer service for sales and post-sales activities can be handled using email, and by providing an 800 number for more extensive phone support. A customer-management system will make those activities easier, but for smaller companies it is not a requirement.

Live chat will affect your operations, as someone needs to be available during specified hours of operation. Be sure to gauge the impact of that on your organization, if you decide to handle those activities in house.

Information Technology

Choosing the right ecommerce platform is one of the most important decisions you will make in your business. Do you want to build and host your own system, outsource the development and then manage the system going forward, or use a hosted, software-as-a-service platform that is more turnkey and externally managed?

If you build and host your own system, you may need more cash up front and skilled administrators and developers on your staff. By using a SaaS platform, you will not need to host or manage the system in-house, but you may still need web developers on staff. Choosing to outsource the development and hosting will reduce your staffing costs, but you will incur higher costs for any future enhancements or changes to your websites. There are pros and cons to any approach. Just be sure to think through the impacts on both your staffing and your cash flow and bottom line before you move forward.

Fulfillment

Another key decision is whether you will manage your own inventory or outsource those activities to a fulfillment house or through drop shipping arrangements with your suppliers.

Managing your own inventory will provide you with a high level of control, but you will tie up your cash in inventory, warehouse space, and your own fulfillment staff. In some industries like the jewelry supply industry that my previous business was in managing your own inventory was the most logical choice. We had no alternative for drop shipping, and most items were purchased in bulk and were very small. We did not trust preparation and fulfillment to an outside service.

Select the best fulfillment option to meet your needs. Be sure to understand the costs involved and analyze the other options before moving forward.

Finance and Administration

As with other business operations, you will need to decide if you want to manage your finance and administration activities in-house, outsource, or a hybrid of the two. If your ecommerce platform is tightly integrated to your accounting system, you may have very little need for an in-house bookkeeper. If you use separate systems for your website, order management and accounting, you may need more help for data entry and making sure that the information is properly managed.

Many ecommerce companies use outside services for vendor payments, payroll, and other basic accounting activities. They decide to focus on the sales, marketing, and customer service. This allows them to maintain a focus on growing their businesses, instead of paying an internal accountant or doing that works you as the business owner. On the administration side, you need a leadership team and provide direction to them. Good communication is important, whether you have 3 or 100 employees. Whether you choose to be more authoritative or democratic in your management style is up to you. Nevertheless, choose a style and stay consistent. Be sure that everyone understands their roles, as well as the overall business strategies. You may need to adjust your approach as your business evolves.

Human Resources

Many small-business owners avoid the human resources function. Recruiting, setting up compensation, maintaining compliance and other HR activities are specialized and time consuming. You may choose to bring the resources in-house to manage those activities, but also evaluate outsourcing them. There are many individuals and agencies well equipped to take on your HR activities.

SEVEN WAYS OF ECOMMERCE BUSINESS

- **Online Only:** The only way to see the products is online.
  Examples: asos.com, lookfantastic.com, Made.com

- **Mail Order**: A transactional website plus a printed catalogue, and possibly one or two physical stores.
  Examples: Boden, House of Bath, Lands' End

- **Big Bricks and Clicks:** Lots of physical stores and an ecommerce website
  Example: Argos, Boots, Top shop

- **Boutique Bricks and Clicks:** Just one or two physical locations plus the ecommerce website
  Example: Boswells, Burford Needlecraft, Brownsfashion.com

- **Mainstream PiggyBack**: Using the likes of Amazon or eBay to market the products, with no website of their own
  Example: Amazon, eBay

- **Niche Piggyback**: Where sellers of similar products come together to market more easily, usually retaining their own blog or ecommerce site elsewhere too.
  Example: The craft world (Etsy, Folksy), Hotels (hotels.com, laterooms.com), Jewelry (Boticca), and Books (abebooks.co.uk) are good examples.

- **Full Multichannel**: Using multiple shops, catalogues, and ecommerce by far the most complex and most difficult to achieve and run.
  Example: Bravissimo, Crew Clothing, Next

Mail Order is very different to Online Only because a catalogue exists for a long time, which puts restrictions on your merchandising – you have to keep products in stock for longer, and you are very likely to have to deal with backorders. Bricks and Clicks are different to other types because you have all the overheads of stores to deal with, but also the opportunity to use those stores to drive traffic to your website and you can create a pick-up-in-store delivery option. The Piggyback types are a completely new way to do business online – no more struggling to get your website right, just use someone else has and let them bring your business. Then there is Full Multichannel – encompassing it all, and the most heavily reliant on good integrated systems.

IMPORTANCE AND USES OF ECOMMERCE

Exploitation of New Business Broadly speaking, electronic commerce emphasizes the generation and exploitation of new business opportunities and to use popular phrases: "generate business value" or "do more with less".

- **Enabling the Customers**: Electronic Commerce is enabling the customer to have an increasing say in what products are made, how products are made and how services are delivered (movement from a slow order fulfillment process with little understanding of what is taking place inside the firm, to a faster and rt1ore open process with customers having greater control.

- **Improvement of Business Transaction**: Electronic Commerce endeavors to improve the execution of business transaction over various networks.

- **Effective Performance**: It leads to more effective performance i.e. better quality, greater customer satisfaction and better corporate decision-making.

- **Greater Economic Efficiency**: We may achieve greater economic efficiency (lower cost) and more rapid exchange (high speed, accelerated, or real-time interaction) with the help of electronic commerce.

- **Execution of Information**: It enables the execution of information-laden transactions between two or more parties using inter connected networks. These networks can be a combination of „plain old telephone system" (POTS), Cable TV, leased lines and wireless. Information based transactions are creating new ways of doing business and even new types of business.

- **Incorporating Transaction**: Electronic Commerce also inco11'orates transaction management, which organizes, routes, processes and tracks transactions. It also includes consumers making electronic payments and funds transfers.

- **Increasing of Revenue**: Firm either use technology to lower operating costs or increase revenue. Electronic Commerce has the Potential to increase revenue by creating new markets for old products, creating new information-based products, and establishing new service delivery channels to better service.

- **E-businesses:** E-business affects the whole business and the value chains in which it operates. It enables a much more integrated level of collaboration between the different components of a value chain than ever before. Adopting e-Business also allows companies to reduce costs and improve customer response time. Organizations that transform their business practices stand to benefit immensely from innumerable new possibilities brought about by technology.

  Some of the India's retailing sites have shown high potential growth in ecommerce. These organizations provide all the facilities of inline storage, online shopping, online transaction, online orders and customer services.

Table-1

India's Top Retail Sites

SITE	TOTAL UNIQUE VISITORS (000)	% REACH
RETAIL	34,076	60.5
AMAZON SITES	8,016	14.2
FLIPKART	4,857	8.6
APPLE WORLDWIDE SITES	4,381	7.8
MYNTRA	3,959	7.0
SAMSUNG GROUP	3,918	7.0
NAAPTOL	2,849	5.1
ALIBABA CORPORATION	2,610	4.6
HOMESHOP18	2,438	4.3
BOOKMYSHOW	2,370	4.2
PRICEINDIA.IN	2,367	4.2

(SOURCE: COMSCORE MEDIA MATRIX, MARCH 2012; TOTAL AUDIENCE)

Sources: Authors Compilation

Some of the organization has shown top ranking in ecommerce in 2013. India's e-commerce market grew at a staggering 88 per cent in 2013 to $ 16 billion, riding on booming online retail trends and defying slower economic growth and spiraling inflation, according to a survey by industry body Assocham.

The Assocham Secretary General D. S. Rawat said, "The increasing Internet penetration and availability of more payment options boosted the e-commerce industry in 2013". According to the survey, India's e-commerce market, which stood at $2.5 billion in

2009, reached $8.5 billion in 2012 and rose 88 per cent to touch $16 billion in 2013. The survey estimates the country's e-commerce market to reach $56 billion by 2023, driven by rising online retail.

As per responses by 3,500 traders and organized retailers in Delhi, Mumbai, Chennai, Bangalore, Ahmedabad and Kolkata who participated in the survey, online shopping grew at a rapid pace in 2013 due to aggressive online discounts, rising fuel prices and availability of abundant online options. Among the cities, Mumbai topped the list of online shoppers followed by Delhi, while Kolkata ranked third, the survey found.

The age-wise analysis revealed that 35 per cent of online shoppers are aged between 18 years and 25 years, 55 per cent between 26 years and 35 years, 8 per cent in the age group of 36-45 years, while only 2 per cent are in the age group of 45-60 years. Besides, 65 per cent of online shoppers are male while 35 per cent are female. To make the most of increasing online shopping trends, more companies are collaborating with daily deal and discount sites, the survey pointed out. The products that are sold most are in the tech and fashion category, including mobile phones, iPods', accessories, MP3 players, digital cameras and jewelry, among others, it found.

India has Internet base of around 150 million as of August 2013, the survey said.

Table-2

Top in Ecommerce · Week beginning Jul 22nd 2013

Name	10k	100k	Million	Entire Web
VirtueMart	⬆4	–217	⬆6,587	⬇185,119
Magento	⬆40	⬆921	⬆10,081	⬇92,749
Zen Cart	–3	⬇155	⬆4,796	⬇83,333
osCommerce	⬇14	–281	⬆7,598	⬇59,024
WooCommerce	⬆12	⬇176	⬆2,664	⬆47,217
Ubercart	–5	⬇128	–1,892	⬇24,059
ECSHOP	–0	–1	–420	⬇23,295
BigCommerce	–4	–195	⬆4,088	⬇22,438
Yahoo Store	⬆19	–527	⬆4,534	⬇11,985
Shopify	–1	⬆59	⬆2,744	⬆11,065

Sources: Authors Compilation

STRENGTHS OF ECOMMERCE

- **Boundary Less (global location)**: E-commerce can be dealt globally as no specific boundary is required. It enables all the companies to expand them to global level.
- **Time Saving**: It saves time and transportation. Because there is no need to go anywhere physically.
- **No Time Constraints**: It can be used anywhere any time as there is no time constraints.
- **Price / Product Comparison**: Helps consumers to compare price and product effectively and efficiently.
- **Cost Effective**: Reduces logistical problems and puts a small business on a par with giants.
- **Direct Communication with Consumer**: Social networking sites, online advertising. Networks can be mediums to buzz about online store.
- **Improved customer interaction**: Quick feedback and comment forms are main features to interact with customers.
- **Flexible target market segmentation**: Target market segment here in e commerce is flexible can be modified any time.
- **Simple and easier exchange of information**: Improves information sharing among merchants and customers and enables prompt quick just in time deliveries.
- **Lowers transaction cost**: Things can be automated in a well-implemented online store. If online download facility is available then distribution cost can be cut off.
- **Easy arrangement of products**: Products can be arranged in the shelves within minutes. With online store, it is quite easy.
- **Faster buying procedure**: E commerce means better and quick customer services. Online customer services make customer happier. Due to absence of intermediaries for buying products.
- **No physical company setup**: Doing e business is cost effective because no physical set up is required for that.
- **Easy transactions**: Financial transactions through electronic fund transfer are very fast and can be done from any part of the world.

- **Niche products**: Almost everything can be sold on internet. Even if products targeted to smaller markets the buyer will be somewhere on net.
- **Low operating cost**: It can be started and continued with very low investment. Staff cost is very low.

WEAKNESSES OF ECOMMERCE

- **Security**: Security matter confuses customers especially about the integrity of the payment process.
- **Fake websites:** Fake websites can not only disgrace ecommerce but bring bad name to commerce also.
- **Fraud**: Concerns about misuse of financial and personal data is a great weakness in e commerce.
- **Fewer discounts and bargaining**: Hardly online businesses offer discounts and bargaining cannot be possible.
- **Long delivery timing**: Delivery time can be in days or weeks, which one cannot wait for.
- **No idea about quality and physical condition of the product**: Online products cannot be touched, wear or sit on the products.
- **Limitation of products**: Limited number of products can be available.
- **Lack of personal services**: Physical products can be available but lack in personal services, which are intangible.
- **More shipping cost**: Shipping cost increases if we order online.
- **Limited exposure**: In developing areas where internet is not accessible will have no or little exposure to e-commerce.
- **Limited advertising**: Limited advertising opportunities are available because in ecommerce one cannot go for mass advertising.
- **Customer's satisfaction**: There is no interaction between customer and the seller.

CONCLUSIONS

Ecommerce is very beneficent in this modern era of networking. It provides new opportunities to business, education and academics. Initially, new Internet users would be reluctant to conduct any kind of business online, citing security reasons as their main concern. In order to increase consumer adoption of e-services, the sources of consumer confusion, apprehension and risk need to be identified, understood and alleviated. Information technology has boosted ecommerce worldwide. Now it is easier to enter to a new market and one can evaluate his/her product and companies performance.

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NUCLEOTIDE ALGORITHM FOR FINDING SIMILARITIES BETWEEN DNA SEQUENCES

R. Preethi[40] A. Vidhyasekar[41]

ABSTRACT

Blastn is the sequence analysis tool used to find the similarities between two DNA sequences. Since the size of genomic database increases its search complexity, also get increased to accelerate searching speed more efficient, we introduce Wu-Manber algorithm. In this paper, we present a new approach for genomic sequence database scanning utilizing reconfigurable field programmable gate array (FPGA)-based hardware. In order to derive an efficient structure for BLASTN, we propose a reconfigurable architecture to accelerate the computation of the word-matching stage. The experimental results show that the FPGA implementation achieves a speedup around one order of magnitude compared to the NCBI BLASTN software running on a general-purpose computer.

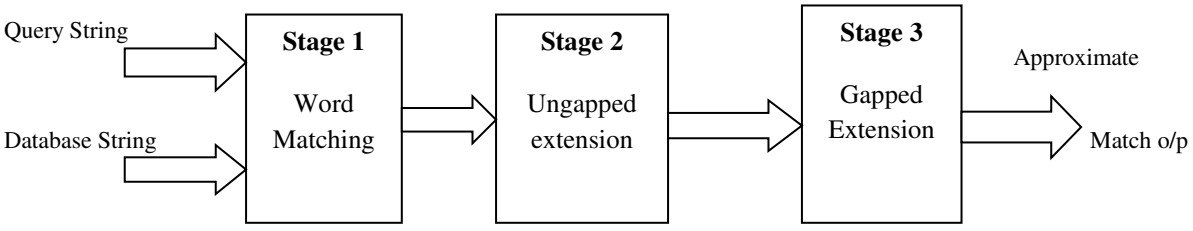
KEYWORDS

Bloom Filter, Genomic Sequence Analysis, Hash Table, Reconfigurable Computing, Wu-Manber Algorithm etc.

INTRODUCTION

VLSI (Very Large Scale Integration) is the level of computer microchip miniaturization and refers to microchips containing in the hundreds of thousands of transistors. The Genome sequence Database (GSDB) is a database of publicly available nucleotide sequences and their associated biological and bibliographic information. Several notable changes have occurred in the past year. The GSDB operated by the National Center for Genome Resources (NCGR), contains both genomic and expressed nucleotide sequences from essentially all organisms for which some sequence data has been determined. The aim of a scan operation is to find similarities between the query sequence and a particular genome sequence, which might indicate similar functionality from a biological point of view. Dynamic programming-based alignment algorithms can guarantee to find all-important similarities. However, as the search space is the product of the two sequences, which could be several billion bases in size, it is generally not feasible to use a direct implementation. One frequently used approach to speed up this time-consuming operation is to use heuristics in the search algorithm. One of the most widely used sequence analysis tools to use heuristics is the basic local alignment search tool (BLAST). The modified version of blast is blastn it consists of three-stages as shown in figure1, namely word matching, ungapped extension and gapped extension. Here the implementation of the first stage, word matching is considered. This stage determines the similarities between the query sequence and the default sequence. The data inputs used here are the DNA bases that are adenine, cytosine, guanine and thymine symbolized as {A,C,G,T}. The word-matching stage is considered as it is the most time consuming part in comparison to other stages. In this paper, an efficient architecture to accomplish the operation of finding similarities between sequences is determined. As increasing the performance of the first stage, the overall performance of the analysis tool is increased. In this paper, we propose a computationally efficient architecture to accelerate the data processing of the word matching stage based on field programmable gate arrays (FPGA). FPGAs are suitable candidate platforms for high-performance computation due to their fine-grained parallelism and pipelining capabilities.

Figure-1: Three-stage Pipeline Structure for BLASTN



Sources: Authors Compilation

RELATED WORK

There have been several approaches to accelerate bio-sequence similarity searches. Some of these approaches use special hardware, while others attempt to solve this problem in software using better algorithms or heuristics. Hybrid approaches employ both the general purpose computer and specialized hardware.

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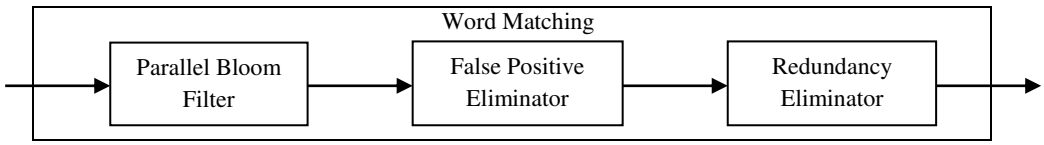
Mega BLAST [5] is used by the National Centre for Biotechnology Information (NCBI) as a faster alternative to BLASTN. It achieves a faster processing speed by sacrificing substantial sensitivity. BLAT [6] can quickly find alignments in sequences of high similarity. It indexes the entire database offline before being used in a search. By eliminating the need to scan the database, it achieves more than an order of magnitude speedup comparing to BLASTN. However, a trade-off is made between the processing speed and the sensitivity. Pattern Hunter [7] uses a spaced seed model to achieve faster processing speed and higher sensitivity; Pattern Hunter II [8] implements the optimized multiple seeds scheme to further increase the sensitivity. The spaced seed model is designed to gain profits based on the following constraints: an appropriately chosen model has a significantly higher probability of having at least one hit in a homologous region, compared to BLAST's consecutive seed model, while having a lower expected number of hits. If the spaced seed is not properly designed, there will be too many random hits to slow the subsequent computation. However, to find an optimal seed of given weight and length is NP-hard [8]. FPGAs can provide outstanding performance on parallel data processing, which make them a good option for algorithm acceleration.

PROPOSED METHOD

The first stage of BLASTN is used to find "seeds" or word matches. A word match is a string of fixed length *w* (referred to as "*w*-mer") that occurs in both the query sequence and the database sequence. Using the alphabet {*A*, *C*, *G*, *T*}, NCBI BLASTN reduces storage and I/O bandwidth by storing the database using only 2 bits per letter (or base). The default *w*-mer length for a nucleotide search is set to 11. The word-matching stage implementation of NCBI BLASTN first examines *w*-mers on a byte boundary (i.e., 8-mers). Subsequently, exact 8-mer matches are extended in both directions to find possible 11-mer matches. If two matching 11-mers occur in close proximity, they are likely to generate the same HSPs. NCBI BLASTN therefore implements a redundancy eliminator to avoid repetitive inspections on the same segment in later stages.

Our FPGA-based accelerator design for BLASTN does not follow exactly the same working mechanism presented in the NCBI BLASTN software. Instead, we have chosen FPGA favourable algorithms to achieve the same functionality. Our word-matching stage design can be decomposed into three substages, as shown in Figure 2. The first substage is a parallel Bloom filter; the second substage is a false-positive eliminator to examine the data passing the parallel Bloom filters, and the last substage eliminates redundant matches.

Figure-2: Three Substages of Word-Matching Stage of BLASTN



Sources: Authors Compilation

A. Wu-Manber Algorithm

The Wu-Manber algorithm is a high-performance, multi-pattern matching algorithm based on the Boyer-Moore algorithm. It builds three tables in the pre-processing stage: a shift table, a hash table and a prefix table. The Wu-Manber algorithm is an exact-matching algorithm, but its shift table is an efficient filtering structure. The matching flow matches patterns from the tail of the minimum pattern in the pattern set, and it takes a block of characters from the text instead of taking them one-by-one. The shift table gives a shift value that skips several characters without comparing after a mismatch. After the shift table finds a candidate position, the Wu-Manber algorithm enters the exact-matching phase and is accelerated by the hash table and the prefix table.

B. Parallel Bloom Filter Architecture

The word-matching stage aims to find good alignments containing short exact matches between a query sequence and a database sequence. Such matches could be computed using data structures such as hash tables or suffix trees. An alternative solution to this filtration problem is to use a Bloom filter. A Bloom filter is a simple space-efficient randomized hashing data structure suitable for quick membership tests on FPGA implementations.

A Bloom filter works in two steps:

- *Programming*
- *Querying*

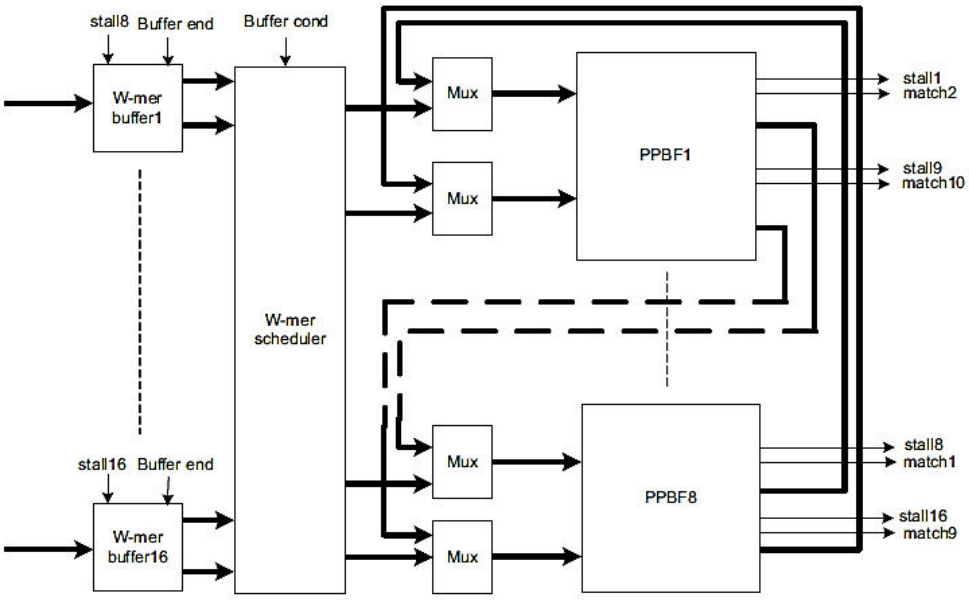
One key feature for the Bloom filter is that false-positive answers are possible. This is due to the fact that the hash function could hash two different keys into the same address with low probability. The Bloom filter only produces false positive results but never false-negative answers to the query. In this paper, we further analyse the influences of different architecture configurations on the partitioned Bloom filter, shown in figure 3. The three techniques to improve the throughput compared to the conventional Bloom filter architecture are considered.

- *Partitioning:* We first partition the Bloom filter vector into a number of smaller vectors, which are then queried by independent hash functions.

- *Pipelining:* We further increase the throughput of our design using a new pipelining technique.

- *Local stalling:* We use a local stalling mechanism to guarantee all *w*-mers are tested by the Bloom filter.

Figure-3: Parallel Bloom Filter Architecture with Eight PPBF



Sources: Authors Compilation

C. False-Positive Eliminator Design

The second substage of our word-matching accelerator design is false-positive elimination, which includes two Objectives:

- Find all false-positive matches generated by the Bloom filter;
- Get the corresponding position information in the query sequence for true-positive *w*-mers.
- One solution for this substage is to use a hash lookup table.

In our design, we try a less complicated approach with few hash collisions, called a bucket hash. Bucket hashing works as follows:

- Sort the query *w*-mers into different buckets according to their prefix (if the prefix length is properly chosen, the number of *w*-mers in a given bucket is relatively small).

- Find a simple hash function that is collision-free for all *w*-mers in the same bucket. If it is not possible to find such a perfect hash function, uses the hash function with the minimum hash collisions.

D. Redundancy Eliminator Design

Redundancy matches are eliminated by examining their diagonals. In NCBI BLASTN, it also uses the feedback from the ungapped extension stage to eliminate redundancy matches. In contrast, our design is less stringent.

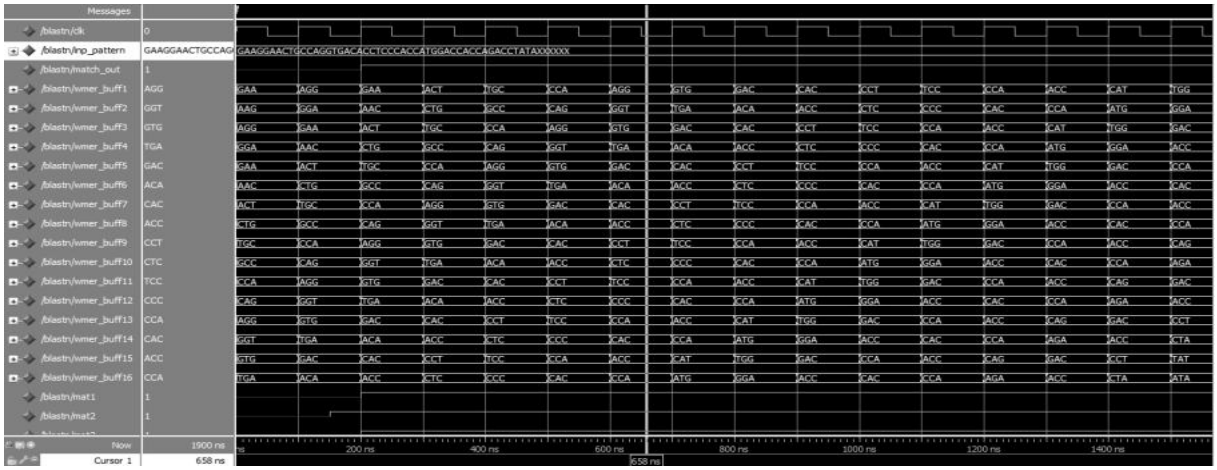
We only eliminate "true overlapping" match *w*-mers, i.e., if two consecutive matches share the same diagonal and they have an overlapping part, we discard the latter as a redundant match.

The non-overlapping diagonal will be updated, once a non-overlapping match is found. Although our heuristic is less stringent than NCBI BLASTN's, there is no significant influence on the overall performance.

EXPERIMENTAL RESULTS

This section shows the experimental results:

Figure-4: Simulation Result for BLASTN's Word-Matching Stage



Sources: Authors Compilation

BLASTN finds similar sequences, not by comparing either sequence in its entirety, but rather by locating short matches between the two sequences. This process of finding initial words is called seeding. The word size used here is 3 letters. In this case, using the given stretch of letters, the searched words would be GAA, AAG, AGG, etc... The heuristic algorithm defined locates all the common three-letter words between the sequence of interest and the hit sequence, or sequences, from the database. These results will then be used to build an alignment depends on sequence similarity. Once both words and neighbourhood words are assembled and compiled, they are compared to the sequences in the database and their matches are found, shown in figure 4. The false positive and redundant sequences are checked. The timing analysis computed is 10.902ns.

CONCLUSION

In this paper, we have presented a VLSI based program in MODELSIM tool to accelerate the word-matching stage of BLASTN, which is a bio-sequence search tool of high importance to Bioinformatics research. Our design consists of three sub stages, a parallel Bloom filter, an off-chip hash table, and a match redundancy eliminator. The timing analysis defines that the time used for execution of the word-matching stage is 10.902ns.

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IMPLEMENTATION OF LOW COMPLEXITY ADDRESS GENERATOR FOR WIMAX APPLICATION

Shanthi Thangavel[42]

ABSTRACT

In this brief, the Low-complexity and novel technique is developed to implement efficiently the address generation circuitry of the 2-D deinterleaver used in the WiMAX transreceiver. The floor function associated with the implementation steps, required for the permutation of the incoming bit stream in channel interleaver / deinterleaver for IEEE 802.16e standard is very difficult to implement in FPGA.

A simple algorithm along with its mathematical background is developed to eliminate the requirement of floor function and there by allows low-complexity FPGA implementation. The use of internal multiplier and sharing of resources for quadrature phase-shift keying (QPSK), 16-quadrature - amplitude modulation (QAM), and 64-quadrature - amplitude modulation along with all possible code rates makes this approach to be novel and highly efficient when compared with conventional look-up table-based approach. This approach exhibits significant improvement in the use of FPGA resources. A VHDL coding algorithm is used to eliminate the floor function. So that the complexity of the network is been reduced.

KEYWORDS

Error Correction, FPGA, Floor Function etc.

INTRODUCTION

Broadband wireless access (BWA) is continuously becoming a more challenging competitor to the conventional wired last mile access technologies [1]. IEEE has developed standards for mobile BWA (IEEE 802.16e) popularly referred to as mobile WiMAX [2]. The channel interleaver employed in the WiMAX transreceiver plays a vital role in minimizing the effect of burst error. In this brief, a novel, low-complexity, high-speed, and resource efficient address generator for the channel deinterleaver used in the WiMAX transreceiver eliminating the requirement of floor function is proposed. The grouping of incoming data streams into the block to reduce the frequency of memory access in a deinterleaver using a conventional look-up table (LUT)-based CMOS address generator for WiMAX.

Hardware implementation of floor function is very complex and consumes abnormally large amount of resources [6]. Conventional LUT-based technique is found to be unattractive from many aspects such as slowness in operation, consumption of large logic resources leading to inefficiency in resource utilization, etc. A comparative study with a LUT-based technique confirms the superiority of our proposed design. As compared with the complicated and lengthy expressions, particularly for 16-QAM and 64-QAM, due to the 2-D translation in [6], a compact and user-friendly mathematical representation and subsequent algorithm is proposed. To make the design compact, the authors adopted optimization by sharing the common hardware between the modules for quadrature phase-shift keying (QPSK), 16-QAM, and 64-QAM. This architecture is modeled in VHDL and implemented on the Xilinx Spartan-3 FPGA. Software simulation using ModelSim is performed to verify the functionality of the proposed algorithm and hardware. FPGA implementation results along with their possible comparison with recent similar work have been made. In this brief, use of FPGA's embedded multiplier provides performance improvement by reducing interconnection delay, efficient resource utilization, and lesser power consumption compared with a configurable logic block-based multiplier. Our work shows betterment over the LUT technique to the tune of approximately 49% in terms of maximum operating frequency.

INTERLEAVING IN WIMAX SYSTEM

The mandatory blocks of a WiMAX transreceiver are shown in Fig. 1. Data stream received from a source is randomized before being encoded by two forward error correction (FEC) coding techniques, namely, Reed–Solomon (RS) and convolution coding (CC). The channel interleaver permutes the encoded bit stream to reduce the effect of burst error. When convolutional turbo code (CTC) is used for FEC, being optional in WiMAX, the channel interleaver is not required, since CTC itself includes an interleaver within it [7].

Modulation and construction of orthogonal frequency-division multiplexing symbols are performed by the two subsequent blocks, namely, mapper and inverse fast Fourier transform of Figure-1. In the receiver, the blocks are organized in the reverse order enabling the restoration of the original data sequence at the output [8].

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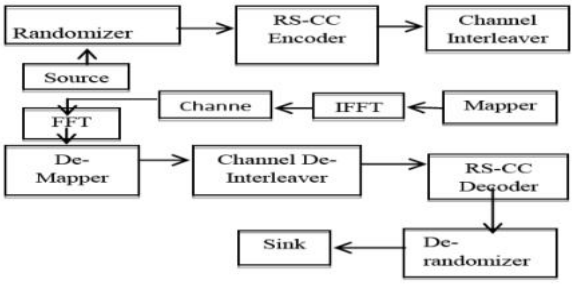
Figure-1: Block Diagram for Wimax Transreceiver



Sources: Authors Compilation

The block interleaver/deinterleaver exploits different depths Ncbps to incorporate various code rates and modulation schemes for IEEE 802.16e [7]. The data stream received from the RS-CC encoder is permuted by using the two-step processes described by (1) and (2). These steps ensure mapping of coded bits onto nonadjacent subcarriers and alternate less/more significant bits of the modulation constellation, respectively. Thus,

$$mk = \left(\frac{Ncbps}{d}\right).(k\%d) + \left\lfloor\frac{k}{d}\right\rfloor \quad (1)$$

$$jk = s.\left\lfloor\frac{Mk}{s}\right\rfloor + \left(mk + Ncbps - \left\lfloor\frac{d.mk}{Ncbps}\right\rfloor\right)\%s \quad (2)$$

Here, the number of columns is represented by d (=16/12 for WiMAX); mk and jk are the outputs after the first and second steps, respectively; and k varies from 0 toNcbps−1. S is a parameter defined as s=Ncpc/2, where Ncpc is the number of coded bits per subcarrier, i.e., 2, 4, or 6 for QPSK, 16-QAM, or 64-QAM, respectively [9]. Modulo and floor functions are signified by percent and, respectively. The deinterleaver, which performs the inverse operation, is also defined by two permutations, i.e., (3) and (4). Let mj and kj define the first and second level of permutations for the deinterleaver, where j is the index of received bits within a block of Ncbps bits. As per [10], (3) and (4) perform inverse operation of (2) and (1), respectively. Thus:

$$mj = s.\left\lfloor\frac{j}{s}\right\rfloor + \left(j + \left\lfloor\frac{d.j}{Ncbps}\right\rfloor\right)\%s \quad (3)$$

$$kj = d.mj - \left((Ncbps - 1).\left\lfloor\frac{d.mj}{Ncbps}\right\rfloor\right) \quad (4)$$

DEINTERLEAVER ADDRESS FOR MODULATION TYPE

The proposed algorithm for address generator of the WiMAX deinterleaver along with its mathematical background has been described. Due to the presence of a floor function in (3) and (4), their direct implementation on an FPGA chip is not feasible. Table 1 shows the deinterleaver addresses for the first four rows and five columns of each modulation type. As d=16 is chosen, the number of rows are fixed (=d) for all Ncbps, whereas the number of columns are given by Ncbps/d.

Table-1: First 4 Rows and First 5 Columns of Deinterleaver Sample Addresses for Modulation Types

Ncbps code rate and modulation type	Deinterleaver addresses				
Ncbps=96-bits, 1/2 code rate, QPSK	0	16	32	48	64
	1	17	33	49	65
	2	18	34	50	66
	3	19	35	51	67
Ncbps=192-bits,1/2 code rate, 16-QAM	0	16	32	48	64
	17	1	49	33	81
	2	18	34	50	66
	19	3	51	35	83
Ncbps=576-bits,1/2 code rate, 64-QAM	0	16	32	48	64
	17	33	1	65	81
	34	2	18	82	50
	3	19	35	51	67

Sources: Authors Compilation

Kn, QPSK={d* i+j for ∀j and ∀I (5)

$$Kn,16\text{-}QAM=\begin{cases} d*i+j & \text{for } j\%2=0 \text{ and for } \forall i \\ d*(i+1)+j & \text{for } j\%2=1 \text{ and for } i\%2=0 \\ d*(i-1)+j & \text{for } j\%2=1 \text{ and for } i\%2=1 \end{cases} \quad (6)$$

$$Kn,\ 64\text{-}QAM=\begin{cases} d*i+j & \text{for } j\%3=0 \text{ and for } \forall i \\ d*(i-2)+j & \text{for } j\%3=1 \text{ and for } i\%3=2 \\ d*(i+1)+j & \text{for } j\%3=1 \text{ and for } i\%3\neq 2 \\ d*(i+2)+j & \text{for } j\%3=2 \text{ and for } i\%3=0 \\ d*(i-1)+j & \text{for } j\%3=2 \text{ and for } i\%3\neq 0 \end{cases} \quad (7)$$

From the mathematical representation by (5)–(7), following three algorithms for the three modulation schemes are proposed. These algorithms eliminate the requirement of floor function while generating write addresses. The algorithms are as follows:

A. For QPSK:

```
Initialize Ncbps and d
    for j=0t o d−1, j++
        for i=0 to (Ncbps/d)−1, i++
        K_n =(d∗i)+j
      end for
  end for
```

B. For16QAM

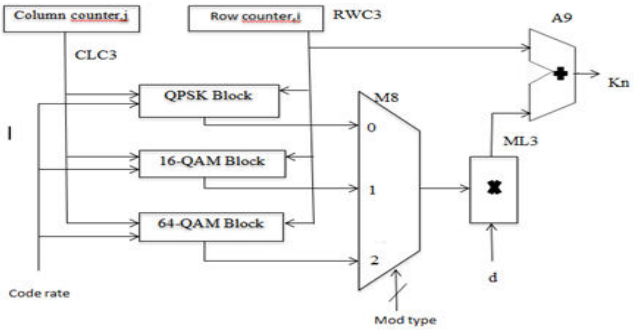
```
Initialize Ncbps and d
  for j=0tod−1, j++
    for i=0to(Ncbps/d)−1, i++
      if (j mod 2 = 0)
        K_n = (d∗i)+j
      else
        if (i mod 2 = 0)
        K_n =d∗ (i+1)+j
      else
        K_n =d∗(i−1) +j
      end if
    end if
  end for
end for
```

C.64-QAM

```
Initialize Ncbps and d
      for j=0tod−1, j++
      for i=0to (Ncbps/d)−1, i++
        if(j mod 3 = 0)
          K_n =(d∗i)+j
          elseif (j mod 3 = 1)
    if(i mod 3 = 2)
        K_n =d∗(i−2) +j
      else
        K_n =d∗(i+1)+j
    end if
      else
        if(i mod 3 = 0)
      K_n =d∗(i+2)+j
        else
          K_n =d∗(i−1) +j
        end if
      end if
  end for
end for
```

DEINTERLEAVER ADDRESS GENERATOR

Figure-2: Complete Structure for Deinterleaver Address Generator



Sources: Authors Compilation

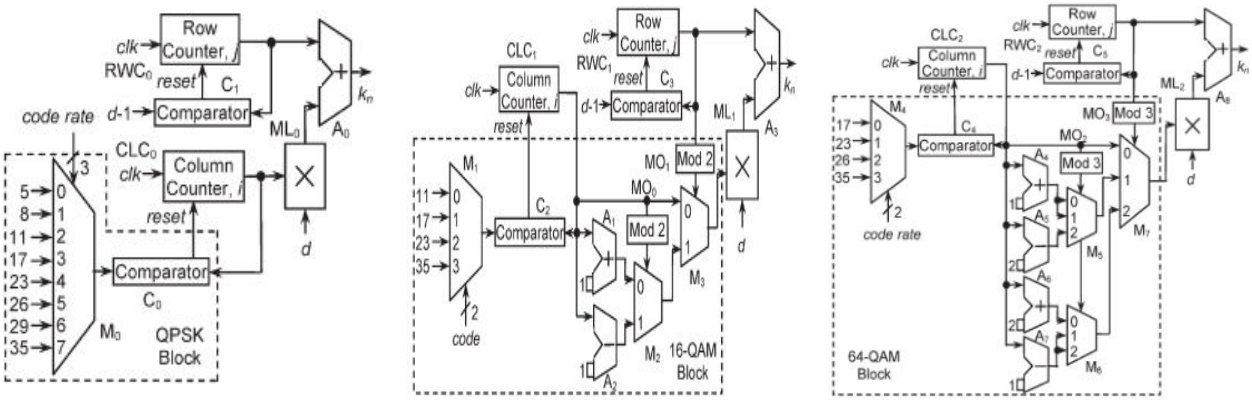
The top-level structure of deinterleaver address generator is shown in Fig. 2. Logic circuits shown inside the dashed line in Fig. 3(a)–(c) are presented here as QPSK block, 16-QAM block, and 64-QAM block, respectively. Our design is optimized in the sense that common logic circuits such as multiplier, adder, row counter, and column counter are shared while generating addresses for any modulation type. In addition, the design also shares the incrementer and decrementer required in 16-QAM and 64-QAM blocks.

Hardware Structure of the Address Generator

In order to test the proposed algorithms for the address generator of the WiMAX deinterleaver with all modulation schemes, transformations of these algorithms into digital circuits are made and are shown in Fig. 3(a)–(c). The QPSK hardware shown in Fig. 3(a) has a row counter RWC0 to generate row numbers between 0 and d−1. A column counter CLC0with multiplexer M0and comparator C0generate the variable column numbers to implement permissible Ncbps. A multiplier ML0 and an adder A0 perform the desired operations to implement (5). The address generator for 16 QAM follows a similar structure, such as that of QPSK with few additional modules. These modules are designed with an incrementer, a decrementer, two modulo-2 blocks, and two multiplexers, as shown in Fig. 3(b). Table I, in the 16-QAM modulation scheme, the address generator has to implement three different progressive patterns for the column numbers. The design procedure used in 16-QAM is extended in 64-QAM to meet this requirement with the use of additional hardware and is shown in Fig. 3(c). A simple up counter generates the read addresses for the 2-D deinterleaver. This hardware structure explains the individual function of deinterleaver structure. When the common resources are combining, the area will be reduced and the structure became compact.

Figure-3: Hardware Structure of Address Generator for (a) QPSK (b) 16 QAM (c) 64-QAM

Figure-3 (a) **Figure-3 (b)** **Figure-3 (c)**



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SIMULATION RESULT

The VHDL program developed for the proposed WiMAX deinterleaver address generator is downloaded on the Xilinx Spartan-3 (Device XC3S400) FPGA [11]. The two blocks, namely, MO0and MO1 of Fig. 3(b), are implemented using the mod 2n function of VHDL. The requirement of i mod 3 (MO2) and j mod 3 (MO3) functions in 64-QAM circuit are fulfilled by designing two

small ROMs of dimension 16×3-bit and 64×3-bit, respectively, as the MOD 3 function is not supported in VHDL. In this brief results in a significant reduction in occupancy of FPGA slices (by 80.24%), flip flops (by 35.9%), and four input LUTs (by 80.47%). This comparison clearly proves the low complexity and hardware efficiency of this design over the conventional technique. Furthermore, to make the design more hardware efficient, embedded multiplier of the Xilinx Spartan-3 FPGA is used to implement the ML3 block of Fig.2. In addition, the address generator using the proposed technique can work 48.69% faster than the latter. The shared hardware design and the use of FPGA embedded multiplier, which, in turn, reduces interconnection delay inside FPGA.

Figure-4: Simulation Result

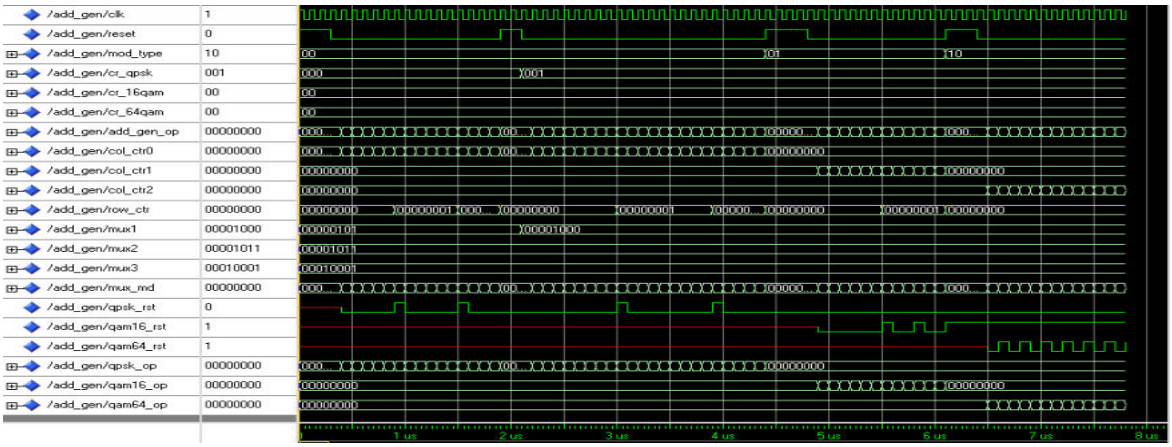

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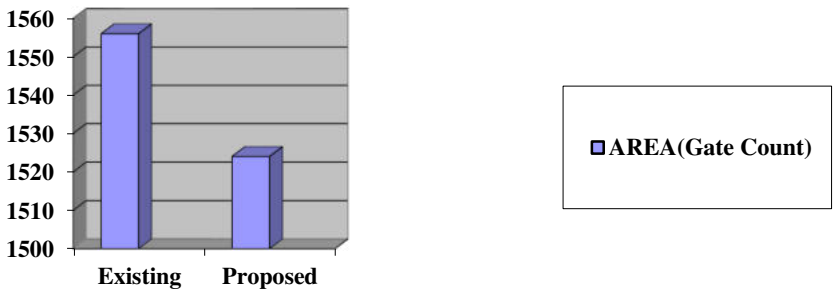
Figure-5: Area Comparision



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CONCLUSION AND FUTURE WORK

The address generation circuitry of the WiMax channel deinterleaver supporting all possible code rates and modulation patterns as per IEEE802.16e. The VHDL coding has been developed to evaluate the area utilization. The conventional Look Up Table (LUT) based method shows the minimum period as 7.283ns and the maximum frequency was 137.30MHz.

In a work the minimum period of 4.953ns is obtained, which is better than the conventional method and the corresponding maximum frequency obtained is 201.898MHz. The maximum operating frequency of the address generator is improved by approximately 49% when compared with the conventional method. By combining the common resources of QPSK, 16-QAM, 64-QAM techniques, a significant reduction in the area of the address generation circuit can be achieved.

The area utilization of a technique can be represented in terms of number of gate counts. The conventional method required a gate count of 1,556 logic gates and in this work, the gate count is reduced to 1,524 gates. The future enhancement can be used for other wireless application such as WLAN in addition to the BPSk modulation technique.

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A LOW POWER SUCCESSIVE APPROXIMATION REGISTER USING ADC ARCHITECTURE

Shincy C. V.[43] Sivasankari K.[44]

ABSTRACT

The Switchback switching method has proved to be a relevant method in reducing the voltage variations as well as the power consumption. In the previous works, the SAR ADC architecture has resulted in increased delay and clock cycle. Therefore, it has become an important issue in considering these factors. As an outcome, switchback-switching method was put forward with certain modifications in the architecture. Here universal gates are used to perform, compare and shift operations, thereby providing reduced delay and clock cycle if the power consumed is minimum. Based on a literature review of SAR ADC design, the proposed SAR ADC combines a capacitive DAC with S/H circuit, uses a binary-weighted capacitor array for the DAC and utilizes a dynamic latch comparator. Evaluation results show that at a supply voltage of 1.2V and an output rate of 1kS/s, the SAR ADC performs a total power consumption of 103nW and a signal-to-noise-and-distortion ratio of 54.4dB. Proper performance is achieved down to a supply voltage of 0.45V, with a power consumption of 16nW.

KEYWORDS

Successive Approximation Register (SAR), Analog to Digital (DAC), Comparator (CMP), Sampling Capacitors etc.

INTRODUCTION

Propagation delay of logic circuit decreases when size of CMOS devices is scaled down. Successive approximation register (SAR) analog to digital converters (ADCs) have achieved several tens of MS/s to low GS/s sampling rates with 5 to 10 bit resolutions recently. The comparator and sampling switches are the only analog components of the SAR ADCs, and blocks do not consume any static power except the preamplifier block. Therefore, SAR ADCs are power and area efficient architecture. For higher conversion rate applications, power and area efficient SAR ADCs are possible to replace by pipelined ADCs. The last few years the various power efficient switching sequences for the capacitive digital to analog converter (DAC) have been proposed.

Comparator to the conventional switching sequences, the energy saving, monotonic and V_{cm} (comparator voltage) based switching sequences reduce 60%, 81% and 90% switching energy respectively. The V_{cm} reduces the power consumption; it needs large number of switches and reference voltages compared with monotonic method, which increases the power consumption and complexity of the digital control circuits. The monotonic switching sequence consist few number of switches and reference voltages .During the conversion process common mode voltage of the input terminal in the comparator changes from V_{cm} and V_{refn} (n-channel reference voltage). It includes dynamic offset and the parasitic capacitance variation of the comparator to affect the ADC linearity.

Figure-1 (a): Waveform of monotonic switching method

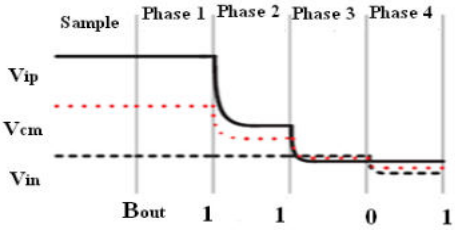
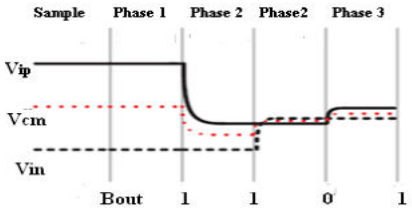


Figure-1 (b): Waveform of switchback switching method



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In addition to lower supply voltage, the analog signal suffers from the increased as most significant bit a conversion phase comparator shows that either V_{ip}(p-channel input voltage) is greater than Vin or not at the initial stage of the conversion phase. In the above figure-1(a) shows that the monotonic switching procedure has the fewest switches and reference voltage during the conversion process, common mode voltage of comparator input terminal varies from V_{cm} to V_{refn}.

The proposed a SAR ADC using a switchback switching sequence decreases 50% of the common mode voltage variations and decreases the power consumption fig.1 (b) shows because it does not use any power at the initial stage of the DAC switching energy. Based on a literature review of SAR ADC design, the proposed SAR ADC combines a capacitive DAC with S/H circuit,

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uses a binary-weighted capacitor array for the DAC and utilizes a dynamic latch comparator. Evaluation results show that at a supply voltage of 1.2V and an output rate of 1kS/s, the SAR ADC performs a total power consumption of 103nW and a signal-to-noise-and-distortion ratio of 54.4dB. Proper performance is achieved down to a supply voltage of 0.45V, with a power consumption of 16nW.

RELATED WORK

C.C. Liu, S. J. Chang, G. Y. Huang, and Y. Z. Lin[9] They proposed that the compared to converters it use the conventional procedure, the average switching energy and total capacitance are reduced by about 81% and 50%, respectively. In the switching procedure, the input common-mode voltage gradually converges to ground. An improved comparator diminishes the signal-dependent offset caused by the input common-mode voltage variation. T At a1.2V supply and 50MS/s, the ADC achieves an SNDR of 57.0dB and consumes 0.826mW, resulting in a figure of merit (FOM) of 29fJ/conversion-step. The ADC core occupies an active area of only 195x 265 mw.

Y. Zhu, C-H. Chan, U-F. Chio, S-W.S [12]:-They implemented high-speed and low-power operation thanks to the reference-free technique that avoids the static power dissipation of an on-chip reference generator. Moreover, the use of a common-mode based charge recovery switching method reduces the switching energy and improves the conversion linearity. A variable self-timed loop optimizes there set time of the preamplifier to improve the conversion speed. Measurement results on a 90nm CMOS prototype operated at 1.2V supply show 3mW total power consumption with a peak SNDR of 56.6 dB and a FOM of 77fJ/conv step.

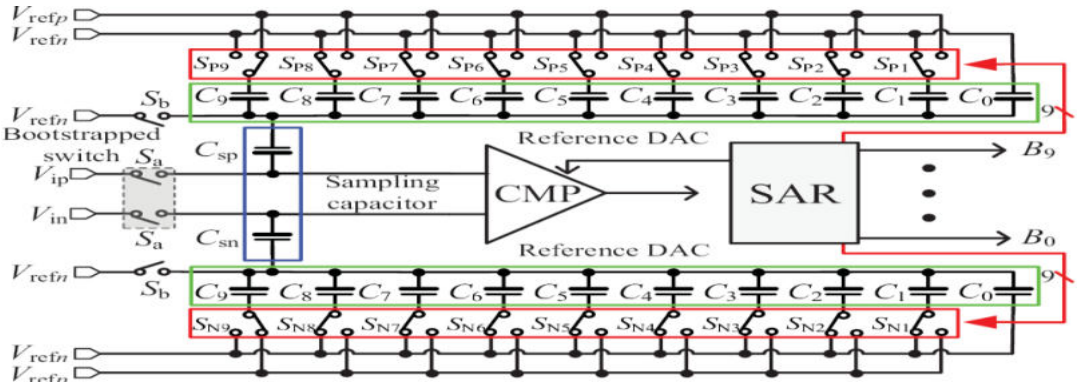
Guan-Ying Huang, Soon-Jyh Chang, Chun-Cheng Liu and Ying-Zu Lin[1]:- A 10-bit 30-MS/s successive approximation register analog-to-digital converter (ADC) that uses a power efficient switchback switching method. With respect to the monotonic switching method, the input common-mode voltage variation reduces which improves the dynamic offset and the parasitic capacitance variation of the comparator. The proposed switchback switching method does not consume any power at the first digital-to-analog converter switching, which can reduce the power consumption and design effort of the reference buffer. The prototype was fabricated in a 90-nm 1P9MCMOS technology. At 1-V supply and 30 MS/s, the ADC achieves an sequenced neighbor double reservation of 56.89 dB and consumes 0.98mW, resulting in a figure-of-merit (FOM) of 57 fJ/conversion-step. The ADC core occupies an active area of only 190 × 525 μm2.

PROPOSED METHOD

In the earlier method, the delay time is wasted by finding the impossible combination. To avoid that find out the normal SAR that can be replaceable by using the universal gate in the SAR. However, as the number of clock cycle increase the delay time will increase. In order to avoid that certain approaches are used. In the proposed method first one bit shift operation is perform then compare the values with the output values for the given input value this process is going on to produce the final output value. The switchback switching method has proved to be a relevant method in reducing the voltage variations as well as the power consumption. In the previous works, the SAR ADC architecture has resulted in increased delay and clock cycle. Therefore, it has become an important issue in considering these factors. As an outcome, switchback-switching method was put forward with certain modifications in the architecture. Here universal gates are used to perform, compare and shift operations, thereby providing reduced delay and clock cycle if the power consumed is optimize in ADC architecture.

The Figure-1 shows the block diagram of ADC architecture. It consists of sampling capacitors, capacitive reference DAC's, dynamic latched comparator and SAR control logic. The capacitive reference DAC is classified into two types. They are sampling capacitor and reference ADC. The sampling capacitor captures the input signal and the reference DAC provides the reference signal. The reference DAC is a binary weighted capacitor array, which has better linearity than the capacitor array with a bridged capacitor.

Figure-1: Block Diagram of Proposed ADC Architecture



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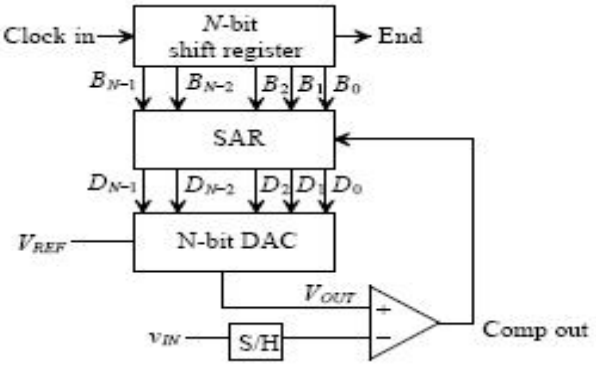
Sampling phase functioning is consisting of two steps:

- Step1: The initial stage is switches S_a and S_b (Bootstrapped Switches a and b) are in ON condition the input signals is sampled onto the sampling capacitors, C_{sp} (p channel sampling capacitor) and C_{sn} (n channel sampling capacitor). The most significant bit of the bottom plate capacitor in the references DAC is switched to V_{refp} and those of the least significant bits are switched to V_{refn} at a time, but reference digital to analog comparator is in the reset stage.

- Step2: If the switches Sa and Sb are in off condition, then SAR ADC act be 0. The MSB triggers the SAR logic to control the reference switching than Vin then MSB set to be as 1.If V_{ip}(p channel input voltage) is less than V_{in} (n channel input voltage) then MSB set to be in DAC by the switchback switching step as a conversion phase comparator shows that either V_{ip} is greater than Vin or not at the initial stage of the conversion phase. If V_{ip} is higher than V_{in}, the MSB will be set to 1. the sampling switches are in turn on off condition the comparator directly performed the first stage of the comparison, but no capacitors are connected based on the condition the loop is continue till the condition is satisfy. After most significant bit value determined then one capacitors switched to $v_{refn.}$

- In the monotonic switching procedure, the switchback switching procedure only switches a capacitor in each bit cycle, which reduces both charge transfer in the capacitive DAC network and the transitions of the control circuit and switch buffer, resulting in smaller power dissipation. Moreover, the common-mode voltage of the switchback switching procedure would be downward just for the first switching and then upward for the remainder. Hence, the maximum variation of the common-mode voltage is 1/4 V_{ref} and the common-mode voltage will gradually approach the common-mode voltage of the input signal V_{cm}. It reduces the dynamic offset and the parasitic capacitance variation of the comparator. SAR ADC is known for its simple structure, thus consuming less power and saving more die size. However, with increase of its resolution, the linearity problem of DAC becomes more severe, which directly causes non-linearity of ADC. Therefore, SAR ADC is not suitable for high resolution.

Figure-2: Block Diagram of SARADC



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Successive approximation register (SAR) ADC is designed based on a binary search algorithm. It consists of a successive approximation register (SAR), a digital-to-analog converter, a comparator and a sample and hold circuit, which is illustrated in Figure2. First, input voltage (V_{IN}) is sampled and the registers are reset to zero. Secondly, the conversion starts through an approximation of MSB (set MSB as one) by SAR; DAC converts the digital information to a voltage V_{OUT} (half of the reference voltage V_{REF}); Comparator compares V_{OUT} with V_{IN}. If V_{IN} is larger than V_{OUT}, it outputs one, otherwise, it outputs zero; SAR loads the comparator result, registers the value of MSB and generates its next approximation; the conversion continues until the LSB is decided. Therefore, an N-bit SAR ADC needs N clock cycles per conversion.

Figure-3: SAR Logic of Existing Method

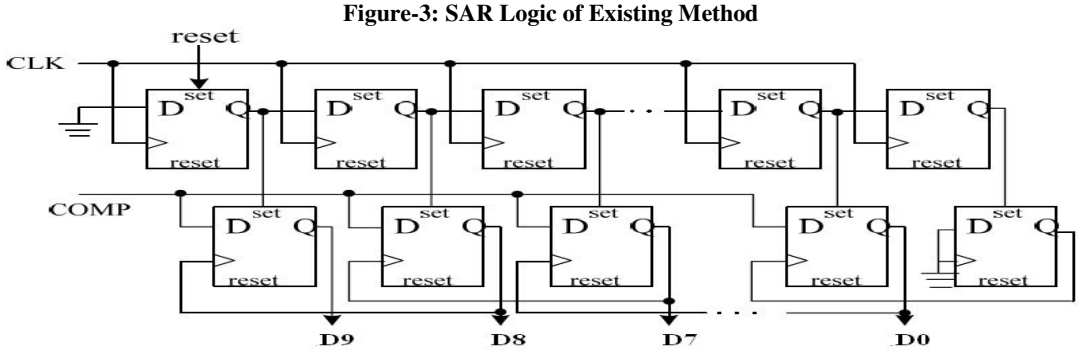

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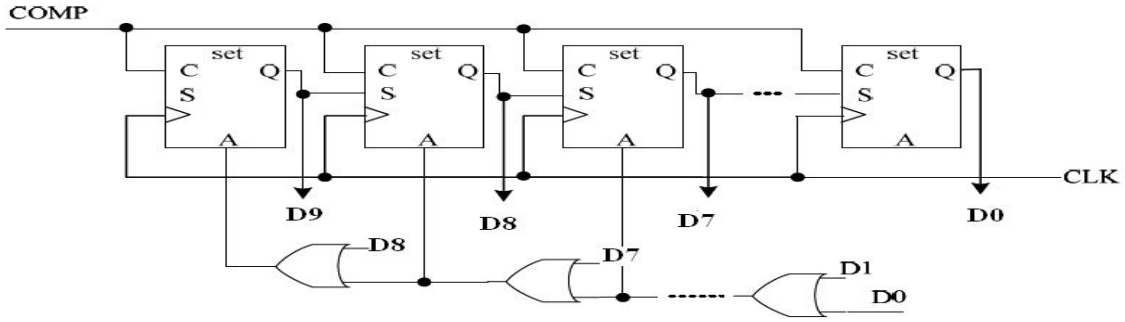
Figure-4: SAR Logic of Proposed Method



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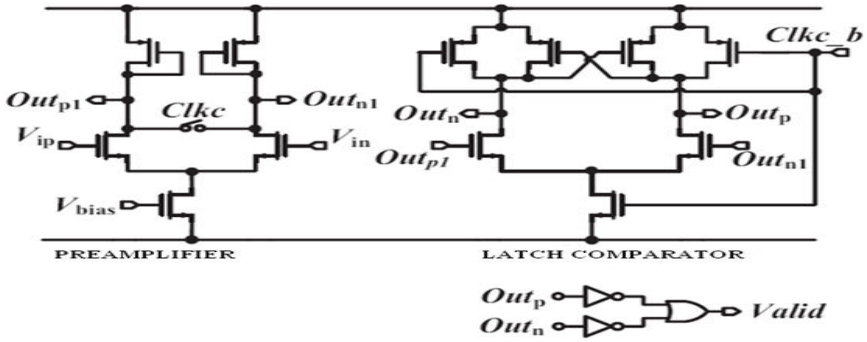
SAR supports three main operations:-1) initially it shifts the initial value as '1' to the right by single bit.2) after shifting operation then it performs the comparator results by the next neighboring bit.3) finally, it holds the determined bits. After 10 clocks of SAR outputs a pulse, it means single whole conversion process is completed.

DYNAMIC COMPARATOR WITH PREAMPLIFIER

Figure 6 shows the schematic of the comparator, which consist of a pre-amplifier, and a dynamic latch comparator. With a less sampling capacitance, the noise generated from the latch comparator becomes more critical. The bottom plate of the sampling capacitors .C_{sp} and C_{sn} are floating and they are more sensitive to noise than the conventional case. Therefore, the present comparator approaches a pre-amplifier to block the noise and improve the comparison speed. The Valid signal is pulled to high to enable the asynchronous control clock.

Figure-5: Dynamic Comparator with Preamplifier



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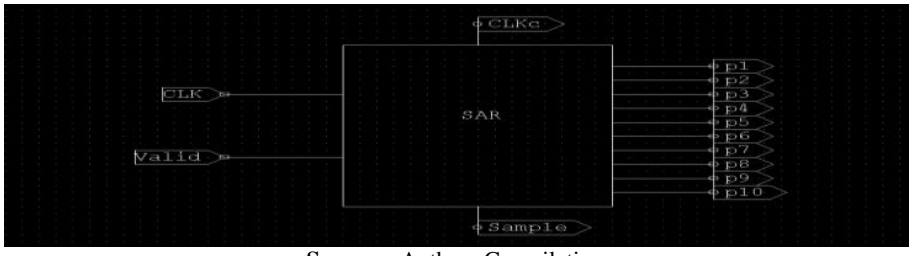
The comparator size can be enlarged, which results in larger power consumption. The effective voltage of the input pair can be reduced, but this decreases the comparison speed.

Experimental Results

This section shows the experimental results. The experiment is carried out in the proposed circuit. The experiment is carried out using tanner software stimulation output waveform based on power and time .The block diagrammatic representation based on SAR is given below.

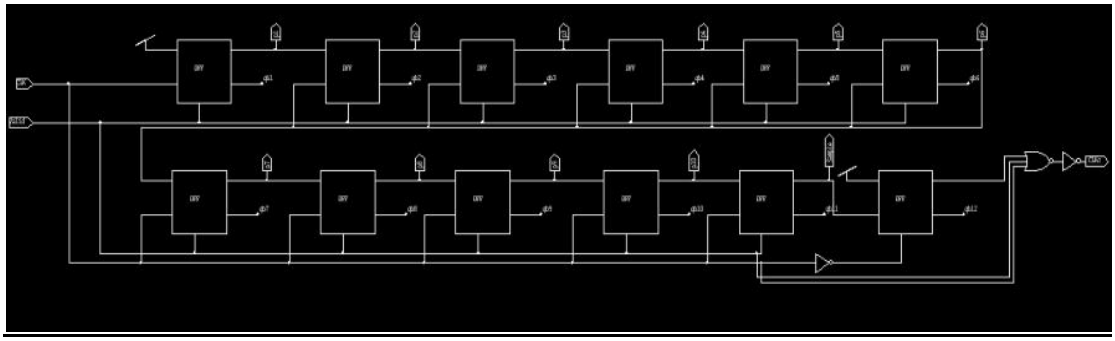
Figure-6: Block Diagrammatic Representation for SAR



Sources: Authors Compilation

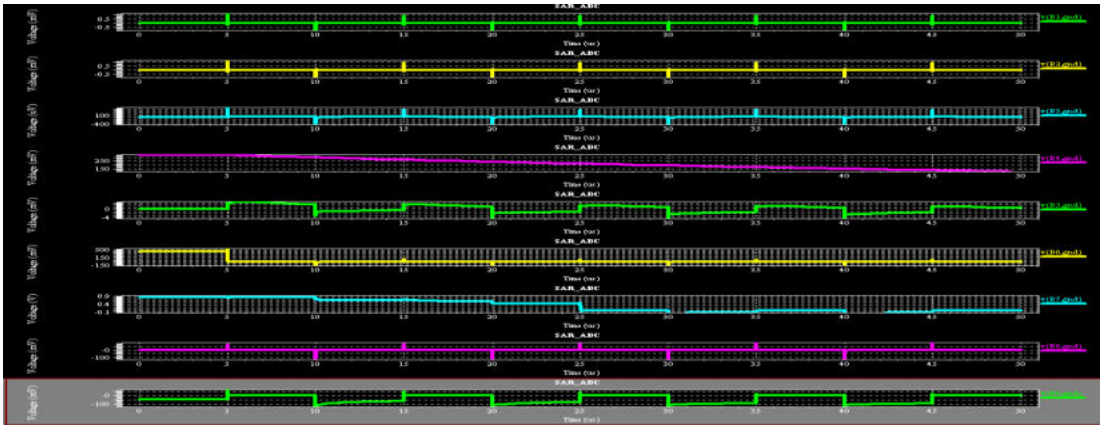
Figure 7 shows the block diagram of successive approximation register (SAR) whose inputs are a clock signal and valid signals. The input signals are processing and produce the output signals.P1 to P2 are the sample the digital output codes of the comparator and serve as control signals for the capacitor arrays to perform the switchback switching procedure. The layout design of the successive approximate register (SAR) based on the block diagram is shown below Figure 8.

Figure-7: Layout Design of the Successive Approximate Register (SAR)



Sources: Authors Compilation

Figure-8: Wave Form Representation SARADC Architecture



Sources: Authors Compilation

The waveform representation SAR ADC architecture based on the simulation result produced based on the given input voltage is shown in above. This simulation result shows the usage of average power, maximum power required and its time and minimum power required and its time based on these parameters the waveform representation.

CONCLUSIONS

The below table explains that 1.0-V supply and 30 MS/s, the analog part, including the S/H circuit and dynamic comparator, power consumes 0.98mW, resolution is 10 bit, sampling capacitance 0.4pf.

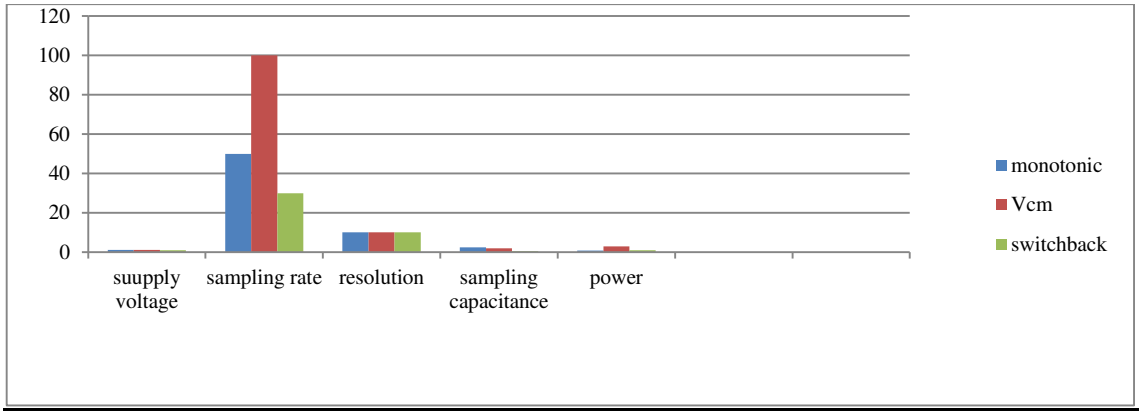
Table-1

Specifications (Unit)	**Monotonic Switching Method**	**V_{cm} based switching Method**	**Switchback Switching Method**
Architecture	SAR	SAR	SAR
Supply voltage(v)	1.2	1.2	1
Sampling rate(MS/s)	50	100	30
Resolution(bit)	10	10	10
Sampling capacitance(pF)	2.5	2	0.4
Power (mW)	0.826	3	0.98

Sources: Authors Compilation

The graphical representation based on the comparison of existing methods with proposed method according to Table is shown below:

Graph-1



Sources: Authors Compilation

The above graph explains the supply voltage, sampling rate, resolution, sampling capacitance and power compare with monotonic switching method, voltage comparator method (existing methods) and switchback switching method (proposed method). The supply voltage, sampling rate, resolution and power consumption required for the process compared with monotonic and Vcm based method, to the switchback, method is low.

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LINGUISTIC LOCALIZATION OF OPINION MINING FROM AMHARIC BLOGS

Tulu Tilahun[45]

ABSTRACT

With the growing popularity of sophisticated and advanced technologies like the web, the world has become a single village. Before the introduction of web, organizations used to conduct surveys and people ask their family, friends and neighbors for the information (factual or opinion) in order to make a wise and effective decision. It is possible to get documents expressing opinions that are generated, propagated, exchanged, stored and accessed via the Internet. The accumulation of vast and unstructured opinions over the web has been made information acquisition difficult. In the context, opinion mining is the preliminary technique towards tackling this obstacle. It can be performed in one of the three different levels i.e. sentence, document and feature level. Among the three levels, feature level opinion mining extracts the opinion in detailed and is a complex technique. However, it facilitates several other details to meet customers and organization need. Although there are so many feature level opinion mining models those were developed for different languages. After having a thorough review of literature, it is found that no feature level opinion mining scheme for Amharic language has been introduced. Therefore, this study proposes a feature level opinion mining model specifically for linguistic localization i.e. Amharic language by employing manually crafted rules and lexicons. The proposed model in this research consists of the five major components that can extract features, determine opinion words regarding identified features with their semantic orientation and generate a summary.

KEYWORDS

Opinion Mining, Blog, Semantic Orientation, Sentence Level, Document Level, Linguistic, Localization, Feature Level, Classification, Extraction, Determination etc.

INTRODUCTION

Opinion Mining (OM) is a recent discipline at the crossroads of information retrieval (IR), text mining and computational linguistics which tries to detect the opinions expressed in the natural language texts [1]. Opinion mining, which is also called sentiment analysis, involves building a system to collect and examine opinions about the product made in blog posts or comments or reviews. It can be useful in several ways. If one is in marketing, for example, it can help him/her to judge the success of an advertisement campaign or a new product launch, determine which versions of a product or service are popular and even identify which demographics like or dislike particular features. For example, a review might be broadly positive about a digital camera, but be specifically negative about how heavy it is. Being able to identify this kind of information in a systematic way gives the vendors a much clearer picture of public opinions than surveys or focus groups, because what praises or criticisms are from wide range of their customers via website.

According to Dave et al. [2], the ideal opinion mining tool would process a set of search results for a given item, generating a list of product attributes (quality, features, etc.) and aggregating opinions about each of them (poor, mixed, good). Much of the research, self-identified as opinion mining, fits this description in its emphasis on extracting and analysing judgments on various aspects of given items. However, the term has recently also been interpreted more broadly to include many different types of analysis of evaluative text [3].

The field of OM is recent; as a result there are a lot of challenges to be met. People can express their opinions in different ways; some give general information while others provide detail. And also some bounce from one product feature to another with only a brief description while others elaborate on certain features. These factors have a particular importance during classification of the text orientation, positive or negative. Two or more sentences may refer to the same or different features. Similarly, depending on the user interest one sentence can express many opinions within it. Accordingly, there are three levels of opinion mining: sentence level, document level and feature level opinion mining.

Sentence level opinion mining polarity determination is at the sentence level towards the target object. There are two main tasks in sentence level opinion mining. The first is subjectivity classification which classifies the given sentence either as subjective or objective and the second is sentiment determination which determines the polarity of subjective sentence if it is positive or negative or neutral. For instant, "ይህ ጥሩ አምባር ነው / This is a beautiful bracelet". This sentence is classified as subjective, and its sentiment is determined as positive.

Document level sentiment classification is concerned with classifying the document based on the overall opinion expressed by the user or customer. All the user's review sentences are considered. For instant, "ቆንጆ ካሜራ ናት:: ነገር ግን ፎቶዎቿ ጥራት ዬላቸውም:: /It is a beautiful camera. However, its images' quality is poor". The first sentence is positive while the second one is negative whereas the resultant polarity is neutral.

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Feature level opinion mining first discovers the detailed targets on which opinions have been expressed in a sentence, and then determines whether the opinions are positive, negative or neutral. The targets are objects, and their components, attributes and parts. An object can be a product, service, individual, organization, event, topic, etc. For instance, in a product review sentence, it identifies product features that have been commented on by the reviewer and determines whether the comments are positive or negative. For example, ጥሩ አገልግሎት ያለዉ ሆቴል ነዉ /The hotel has good service. The target in this sentence is አገልግሎት (Service) of the ሆቴል (Hotel) object and the opinion is positive, ጥሩ (Good). Many real life applications require this like detailed analysis in order to improve quality of products and services. One needs to know what components and/or features of the product are liked and disliked by consumers or users. Such information is not discovered by both document and sentence level sentiment classification.

In this paper, we describe a way of: identifying features and opinion words along these features; determining polarity of these opinion words towards identified features and generating summary in a tabular form.

RELATED WORK

Feature level opinion mining has a better advantage than that of both sentence and document level sentiment analyses. But, it is more complex and difficult when compared to the others due to the nature of problems in feature level opinion mining.

The idea of sentiment analysis at different level was discussed by Bing Liu [4]. The researcher elaborated main points of feature level opinion mining. According to the researcher, feature level opinion analysis first discovers the targets on which opinions have been expressed in a sentence, and then determines whether the opinions are positive, negative or neutral. The researcher noted that many real life applications require this level of detailed analysis in order to make product improvements.

Other task in feature level opinion mining is opinion summarization. Work of Hu et al [5] can be considered as the pioneer work on feature-level opinion summarization. For feature level opinion summarization they used their previous work, Hu et al [6]. Hu et al [6] could extract features and opinion words toward these features. Their feature extraction algorithm is based on heuristics that depend on feature terms' respective occurrence counts. Their method does not need corpus to perform tasks. They used association rule mining based on the Apriori algorithm to extract frequent item sets as explicit product features (only in the form of noun phrases). Two measures have been developed to evaluate association rules, which are support and confidence. According to them, item sets that have support at least equal to minimum support are called frequent item sets. In Hu et al work, each resulting frequent item set is a possible feature. They defined an item set as frequent if it appears in more than 1% minimum support of the review sentences. In this approach, the algorithm does not consider the position of the words in a sentence. In order to remove incorrect frequent features, they used feature pruning that consists of compactness pruning and redundancy pruning. To evaluate the proposed methods, the researchers conducted the experiment by using the customer reviews of five electronics products.

Hu et al [6] work was improved by Liu et al [7] by proposing a technique based on language pattern mining to identify product features from pros and cons in reviews in the form of short sentences. The researches have proposed this method to compare features of different objects. According to the researchers this is the first work that helps to choose features of different objects by looking at the difference. They also made an effort to extract implicit features. They used to extract features from the reviews that written positive and negative opinions separately which is easier for the extraction when compared to extracting features from the reviews in free format. They implemented a prototype system called Opinion Observer.

Carenini et al work [8] extended Hu et al [6] work by extracting features for capturing knowledge from product reviews. In their method, the output of Hu's et al [6] system was used as the input to their system, and the input was mapped to the user-defined taxonomy features hierarchy thereby eliminating redundancy and providing conceptual organization. Hu et al [6] used shallow parsing and association rule for features extraction. And also they have identified the expressions of opinions associated with features; they used adjacent adjectives as opinion words that are associated with features.

Shu Zhang et al [9] and Qi Su et al [10] were some of feature level opinion mining works for Chinese language. Shu Zhang et al have proposed supervised method for product features extraction and unsupervised method to group the product features. The researchers are mainly focused on the first step; extracting product features in Chinese customer reviews while others remain as their future work. Morphemes and opinion words were proved to be the important components to capture the semantic similarity among product features in process of product features categorization. The experimental results show that their method was effective and promising.

DESIGN OF FEATURE LEVEL OPINION MINING FROM AMHARIC BLOGS

Identifying and extracting features, determining opinions regarding identified features, organizing and summarizing unstructured subjective text are the most common activities in the feature level opinion mining.

Some characteristics of the Amharic language are taken into consideration for the intended feature level opinion mining. Among these characteristics: The first one is, devising a means of identifying and extracting nouns as features by analysing basic nature of Amharic nouns and the second one is, designing the way of determining adjectives that modify the nouns as opinions by

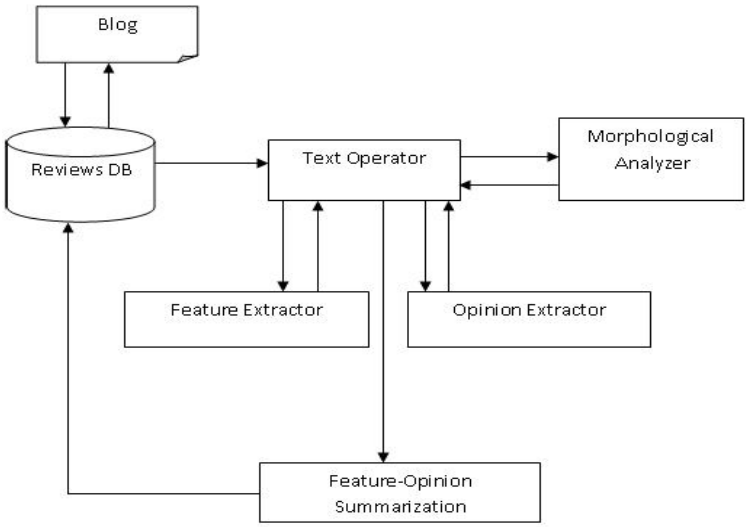
investigating major nature of Amharic adjective words. Moreover, the way of summarizing reviews depending on the features and opinions along these features will be elaborated in this paper. We have adopted the work of Michael Gasser [11] for the first characteristic and we have created the lexicon for the second characteristic.

Apart from the language characteristics there was a simple user friendly interface or blog by which a user feeds his/her reviews to a database and an interface through which results will be displayed in a tabular form so that the users easily get information they need. We have created this blog and reviews database to meet the goal of this study.

Approaches and Techniques

The process of feature level opinion mining from Amharic blog takes a review as input via a blog, extracts the features, determines the opinions, and produces a summary as an output, see Figure-1

Figure-1: General Architecture of Feature Level Opinion Mining from Amharic Blog



Sources: Authors Compilation

Features and Opinion words Identification and Extraction

In this context the word features are nouns and all opinion words are adjectives.

Examples:

- **ጥሩ ምግብ ይሰረሱ።። ጥሩ** is adjective in Amharic language, which is going to be an opinion while **ምግብ** is a noun in Amharic language hence, it is a feature.
- **ባለጌ አስተናጋጅ ነዉ።። ባለጌ** is adjective in Amharic language, which is going to be an opinion while **አስተናጋጅ** is a feature.

In this research, HornMorpho modified for noun and adjective determination according to the needs.

Polarity Determination and Summarization of Feature - Opinions

This research has developed a lexicon of Amharic opinion words. These words are general opinion words for service domains. Employed lexicon, consists of 578 negative and 423 positive opinion words. Among 1001 opinion words more than half are from Selama's [12] work and the remaining are ours. We have used this lexicon to check whether the words around the features are opinion words or not and also to determine the polarity of words around the features.

Opinion holders write their ideas by using opinion words, features and words that can change previous polarity. From collected reviews, we realized that opinion holders have used these words by putting them in different places in the sentences. We elaborate the idea by declaring three variables as the following:

- 'F' to represent feature.
- 'O' to represent opinion word and
- 'CP' to represent words that changes previous polarity of the opinion word.

Opinion holders mostly use one or two of the following patterns while writing their opinions regarding some thing. Let "i" be a counter in which i=0 indicates a place where the first feature is located. Then the possible places of O and CP are:

Pattern 1: Reviews with O at i-1 and no CP. Example, **አሪፍ ምግብ ነው።።** The word at i=0 is F which is **ምግብ** while the word at i-1 is O which is **አሪፍ**.

Pattern 2: Reviews with O at i-1 and CP at i+1. Example, **አሪፍ ምግብ አይደለም።።** The word at i=0 is F which is **ምግብ** while the word at i-1 is O which is **አሪፍ** and the word at i+1 is CP which is **አይደለም**.

Pattern 3: Reviews with O at i+1 and no CP. Example, **ምግቡ ጥሩ ነው።።** The word at i=0 is F which is **ምግቡ** while the word at i+1 is O which is **ጥሩ**.

Pattern 4: Reviews with O at i+1 and with CP at i+2. Example, **ምግቡ አሪፍ አይደለም።።** The word at i=0 is F which is **ምግቡ** while the word at i+1 is O which is **አሪፍ** and the word at i+2 is CP which is **አይደለም**.

Pattern 1 and 2 are written according to the linguistic general rule; adjective is a word that comes before a noun to modify it. On the otherhand, adjectives of Amharic language can come after the definite Amharic nouns. Accordingly, pattern 3 and 4 are created. Polarity changer word comes after a noun as in pattern 2 and after an adjective as in pattern 4. If adjacent words exist in the lexicon, these words will be determined as opinion words and then looking for their semantic orientation. Positivity or negativity of a word implies the polarity of opinion holder on that feature. Incorporating all possible opinion words in the lexicon has a positive effect on the performance of the system. In real world, this is difficult but not impossible.

Experiments and Performance Analysis

Every system is developed to meet some functionalities. These functionalities are evaluated to make sure that the systems are performing effectively and efficiently. Efficiency is the amount of time and space a system uses to perform its task. Whereas effectiveness refers to the extent a system fulfills its objective. In the case of our prototype system, the exactness of extracting relevant features and the exactness of determining polarity of opinion words are evaluated. Testing environment, manual data collection, evaluation metrics such as: precision, recall and F-measure and expermental results will be discussed in the subsequent paragraphs.

The testing has been done on a laptop computer with windows 7 ultimate operating system, 2.17 GHz Intel Pentium Dual CPU, 2 GB RAM and 150 GB hard disk. Python 3.0 was installed and HornMorpho, amharic text analyzer, was configured for the testing of the proposed model. Every text file has been saved with UTF-8 encoding system for unicode characters processing.

Feature level opinion mining and summarization techniques, are evaluated on 484 reviews manually collected from hotel, university and hospital domains. Features have been manually extracted from these reviews and the opinion words along these features were also manually determined and classified. Afterwards feature level opinion mining was evaluated and summarized the model from two perspectives: effectiveness of feature extraction and polarity determination of adjacent words. Nouns in each review are extracted as features. And the adjacent adjectives have been considered as opinion words during manual extraction.

The term feature throughout this paper is the prominent attribute or aspect or component or part of the hotel, university and hospital. We have collected features manually in order to know how many of these features can be identified by the system, table 1. It was some times challenging to identify a word as a feature. But this problem was solved by using an adjective, **ጥሩ,** before the word and if the phrase is linguistically acceptable, the word that was tested by this adjective is a feature. For instance, **ጥሩ አመራር.** This phrase is linguistically acceptable. Therefore, the word **አመራር** could be taken as a feature. In contrast to this, lets take the phrase **ጥሩ ህዝባዊ.** This phrase is linguistically unacceptable. So, we could not take the word **ህዝባዊ** as a feature.

Table-1: Number of Features Extracted Manually from Different Domains

Domain	Number of Reviews	Total Number of different Features
Hotel	204	46
University	180	48
Hospital	100	44

Sources: Authors Compilation

it means that the adjacent adjective, either to the left or to the right, of the identified features, table 2. during manual collection, we have considered only adjacent words that means not all adjectives were collected. these adjacent words were determined as opinion words along with their polarity by using linguistic knowledge. the number of manually determined opinion words have been checked against the number of opinion words that were determined by the system in order to see performance of our model in the determination of opinion words.

Proposed system have been consulting the lexicon in order to classify adjacent words along identified features under አዎንታ or አሉታ or ያልተለዩ. adjacent words can be opinion words that exist in the lexicon or opinion words that do not exist in the lexicon or not opinion words. the system classifies both opinion words which do not exist in the lexicon and are not opinion words under ያልተለዩ field whereas positive opinionwords under አዎንታ and negative opinion words under አሉታ , figure 2.

Table-2: Manually Collected Opinion Words Adjacent to Identified Features

Domain	Number different Features	Number of Adjacent Words		
		Total	Left / Right side opinion words	Both sides which are not opinion words
Hotel	46	275	193	82
University	48	170	105	65
Hospital	44	108	59	49

Sources: Authors Compilation

In this Precision, Recall and F-measure metrics were used to evaluate the effectiveness of this approach. Experiment one is based on the first method, pattern 1 and 2 of Section 3.3. From the experment we could observe performance of 95.2% precision and 26.1% recall in features extraction and 78.1% precision and 66.8% recall in the determination of opinion words. From the result, we can say features displayed to the users are almost correct, 95.2% precision. This means, from 484 collected reviews 38 features were identified by the basic system in which 36 of them are correctly identified. In contrast to this, the recall of the first method in features extraction is low. This is because of the adjectives that come after the nouns were not considered. Around 138 features were manually identified from 484 reviews. Among these, only 36 of them were correctly identified which means around 102 features were not identified by the proposed method. Precision of opinion words determination is less by 17.1% when compared to the precision of features extraction in the basic system.

On the other hand, experiment two shows the performance of second method, pattern 3 and 4 of Section 3.3. In the second method adjectives that come after and before nouns were considered. Polarity changer words are also considered. From the result, the recall in the first method, pattern 1 and 2, becomes higher due to the features and opinion words that were ignored by the basic system could be considered by the full system. That means in the first method there were some features that did not extracted due to lacking left side adjective. However, in the second method some of these features were extracted because of having adjective at their right side, these features concurred two or more than two times throughout the reviews. Accordingly, recall of features extraction in the first method, 26.1%, is raised to 34% in the second method. In fact, precision of the second method in feature extraction is 79.8%, which is down by 15.4% when compared to the first method. This is because of the system that we have used, HornMorpho, which tags both adjective and noun as a noun class. As a result, some adjectives that are followed by an adjective two or more than two times could be extracted as being features, which decreases precision of the first method in the extraction of the features. Actually, this problem also existed in the first method but the probability of extracting not real features in the second method is higher. Precision of opinion words determination increased by 1.9% and recall of opinion words determination by the first method, 66.8%, is raised to 92.7% by the second method.

Generally, precisions of the first method in features and opinion words determination were found higher when compared to its recalls. Precision of feature extraction in the second method was found lower when compared to the first method whereas precision of opinion determination and recalls of both features extraction and opinion determination were raised in the second method. The experimental results show that we can identify features and opinion words from amharic text via a blog and generate suammry in a tabular format under positive and negative category.

Figure-2: Generated Sample Feature Opinion Summary

አስተያየት የተሰጠበት Feature	ጠቅላላ አስተያየቶች	አምንታ	አሉታ	ያልተለዩ
አገልግሎት	37	28	5	4
መኝታ	10	5	1	4
ጋርዳን	2	2	0	0
ምግብ	48	34	4	10
ሰረተኞች	3	2	1	0
ሆቴል	19	12	5	2
ሬስቱራንት	24	17	4	3
ቁርስ	2	2	0	0

Sources: Authors Compilation

CONCLUSIONS

Feature level opinion mining is the process of extracting aspects or attributes of the target object, identifying opinions along with the extracted aspects and determine their orientation and finally summarize the reviews by grouping multiple opinions along features. This research work cocncluded with a design and prototype of feature level opinion mining from Amharic blog which mainly consists of five components viz Text Operator, Morphological analyzer, Feature extractor, Opinion extractor and Feature opinion summarization. By using precision, recall and F-measure metrics, two experiments were conducted for the features extraction and opinion words determination. In the experimentation, different level of performances were obtained. Its is observed that the second method performed better than the first. From the two experiments, feature level opinion mining from opinionated amharic blog was found performing in the best possible & promising manner.

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