

FRACTURE BEHAVIOUR OF FIBRE REINFORCED GEOPOLYMER CONCRETE

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ABSTRACT

The use of geopolymer concrete using fly ash and slag can reduce the emission of CO₂ in the atmosphere. This study analyses the impact of with and without steel fibres on compression, split tension, flexural strength and bond strength of hardened geopolymer concrete. The use of crimped steel fibres with aspect ratio of 60 with volume fraction of 0.75% was used in the mix. The effect of the geopolymer binder on fracture characteristics of concrete has been investigated by three point bending on notched beam specimens. The fracture energy was calculated by the method of work of fracture. The fracture behavior of GPC is mainly because of its higher tensile strength and bond strength.

Keywords : *Fly Ash, Ground Granulated Blast Furnace Slag, Geopolymer Concrete, Fracture Energy, Stress Intensity.*

I INTRODUCTION

Plain concrete suffers from various drawbacks like low tensile strength, brittleness, crack propagation and low fracture resistance. The addition of steel fibres in plain cement concrete improves its mechanical and elastic properties. Hence, steel fibre reinforced concrete has been proved as a reliable and promising composite construction material having superior performance characteristics compared to conventional concrete.

The rate of production of CO₂ is increasing day by day due to the huge production of Portland Cement. A tonne of Portland Cement produces 1tonne of CO₂ in the atmosphere causing green house effect. On the other side, fly ash is the waste material of coal based thermal power plant and ground granulated blast furnace slag a by product from iron smelting industry is available abundantly but this poses disposal problem. With silicon and aluminium as the main constituents in fly ash and slag has great potential as a cement replacing material in concrete. The concrete made with such industrial wastes is eco-friendly. Although the use of Portland cement is still unavoidable, many efforts are being made in order to reduce the use of Portland cement in concrete.

Urmil Dave et. al (2013) concluded that compressive strength increases with increase in the curing time, curing temperature, rest period, concentration of sodium hydroxide solution and decreases with increase in the ratio of water to geopolymer solids by mass & admixture dosage, respectively. **Subhash Patankar et. al(2013)** describes the effect of steel fibres on mechanical and elastic properties of geopolymer concrete from the experimental results that the wet and dry densities of geopolymer concrete composites increased continuously with increase in fibre content, whereas the workability of geopolymer concrete composites reduced with increase in fibre content. **Heah et. al (2013)** described kaolin based geopolymer showing higher stability in water with no disintegration and cracks and thereby exhibiting different rates of strength development. **Bharathi Murugan et. al (2012)** concluded that low calcium fly ash based geopolymer concrete has excellent compressive strength and is suitable for structural applications. The compressive strength of M₃₀ grade geopolymer concrete is 17.04% higher than OPC concrete and 5.1% higher than of OPC concrete for M₆₀ grade. **Lloyd et. al (2010)** concludes that geopolymer is applicable in aggressive marine environments, environments with high carbon dioxide or sulphate rich soils and acidic conditions. **Bharatkumar et. al (2005)** concluded that the The peak normalized moment and peak rotation decrease with increasing depth for a given reinforcement ratio, whereas the peak normalized moment and peak rotation increase with an increasing reinforcement ratio for a given depth. **Tian Sing et. al (2013)** concluded in the results that the shear strength increases significantly as the fibre content increases and that improvement in the cracking behaviour is achieved through the addition of fibres. **Silva et. al (2002)** concluded that the toughness strength difference between GPC and OPC with 0% fibres is 80% and for higher volume of fibres upto (3-5%) shows decrease in stress intensity factor due to increase in porosity. **F. Bencardino et. al (2010)** concluded that the addition of steel fibres upto 1-2% contributes the structural integrity, structural stability and increases its durable life service. In the present study geopolymer concrete of 3.5M is used. The constituents consist of 1:1 ratio of fly ash and slag, 1:2 ratio of NaOH and NaSiO₃, 10mm aggregates and river sand, and use of 0.75% crimped stainless steel and crimped mild steel fibres are used. In geopolymer mix the water content ratio is less as compared to OPC. The study of mechanical properties such as compressive strength test on cubes, split strength test on cylinder, flexure strength test on prisms and fracture behavior of fibre reinforced geopolymer on prisms are studied throughout.

II REACTION MECHANISM

Generally, OPC concrete develops strength through the formation of hydrates such as CSH (calcium silicate hydrate), which is produced by the hydration reaction of water and the ordinary Portland cement typically used as a binder. Moreover, the hardening of fly ash and slag based geopolymer is achieved by dissolving the Al and Si components by alkaline activator known as geopolymerization. The geopolymerization process, indicates a chemical reaction between Al-Si oxides which form the three-dimensional polymer chain Si-A-O-A-Al-A-O, was proposed by Davidovits in 1978. The hardening of the geopolymer is believed to be due to the polycondensation of hydrolyzed aluminate and silicate species. The alkaline activator, which is generally used are sodium hydroxide (NaOH), potassium hydroxide (KOH), sodium carbonate (NaCO₃) or sodium sulfate (Na₂SO₄) containing alkaline metal ions such as Na, K and Ca, serving as an accelerator in speeding up the activating Al and Si through a reaction with the binder. The dissolution of water which accelerates the geopolymerization which provides discontinuous gel

nanopores to the paste, resulting in a further improvement of the performance of the paste depicting the hardening mechanism.

III EXPERIMENTAL PROGRAMME

Experimental work is aimed to study the effect of steel fibres on mechanical and elastic properties on geopolymer concrete. The materials used for making geopolymer concrete composite specimens are low-calcium fly ash, ground granulated blast furnace slag, coarse and fine aggregates, steel fibers, alkaline solution, and water.

3.1 Fly Ash

Fly ash is the residue from the combustion of pulverized coal collected by mechanical or electrostatic separators from the flue gases of thermal power plants. The spherical shape of particle improves the flow ability and reduces the water demand. In this experimental work, the fly ash used is obtained from the silos of Ennore Thermal Power Station, Chennai, India, which is of low calcium, Class F. Low calcium fly ash makes substantial contributions to the workability, chemical resistance, and reduction in thermal cracking. Table 1 shows the chemical composition.

Table 1 : Chemical Composition of Fly Ash

Compound	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	Na ₂ O	K ₂ O	TiO ₂	Mn ₂ O ₃	SO ₃	P ₂ O ₅
Fly Ash	49.45	29.61	10.72	3.47	1.3	0.31	0.54	1.76	0.17	0.27	0.53

3.2 Ground Granulated Blast Furnace Slag

GGBS is a by-product from JSW Industries, Karnataka, India. Table 2 describes the composition of GGBS.

Table 2 : Chemical Composition of GGBS

Compound	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	Na ₂ O	K ₂ O	TiO ₂	Mn ₂ O ₃	SO ₃
GGBS	33.45	13.46	0.31	41.7	5.99	0.16	0.29	0.84	0.40	2.74

3.3 Alkaline Solution

Sodium hydroxide (NaOH) in the form of flakes and sodium silicate are used as alkaline activators to give a good binding solution for the geopolymeric mix.

3.4 Aggregates

Locally available river sand sieved through 4.75mm is used as fine aggregates and crushed stones of nominal size 10mm coarse aggregates is used.

3.5 Steel Fibres

Use of crimped stainless and crimped mild steel fibres of aspect ratio (a/d) 60 is used.

3.6 Mix Proportion of Geopolymer Mix

Fly ash, GGBS, coarse and fine aggregate and steel fibres are mixed thoroughly in a dry state and then alkaline solution is added to make the mix wet until it gains homogeneous state. Mix proportion and quantity of fibre content in each mix is explained below in table 3.

Table 3 : Geopolymer mix proportion

Mix	Fly Ash (kg/m ³)	GGBS (kg/m ³)	C.A. (kg/m ³)	F.A. (kg/m ³)	SH (kg/m ³)	SS (kg/m ³)	CSS (kg/m ³)	CMS (kg/m ³)	Water (kg/m ³)
CM	204	204	1113	635	24	48	-----	-----	175
GP-1	204	204	1113	635	24	48	59	-----	175
GP-2	204	204	1113	635	24	48	-----	59	175
GP-3	204	204	1113	635	24	48	29.5	29.5	175

3.7 Test Specimens and Testing

Standard cube specimens (100*100*100mm) were tested for compressive strength test, split tensile test were tested on cylinder specimens (100*200mm) and flexure test were conducted on prism (100*100*500mm) for each batch of mix. The fracture test specimens were 100 *100*500mm beams with a 25 mm deep notch in the middle of the beam. Different ratios of the notch depth to beam depth were used in fracture test specimens available in literature, though a ratio of 0.5 is recommended by RILEM. A ratio of 0.25 was used in the specimens of this study to make the ligament area sizable in order to enable the observation of the crack propagation in the concrete.

Three point bending tests were performed in deflection controlled mode by using a very stiff closed loop Instron Servo Control machine of 200 tonne capacity. The ends of the test specimen were placed on the supporting rollers at a span of 400 mm with the notch on tension side. The Instron machine had a built in digital data acquisition system. It was incorporated with a load cell to record the load with an accuracy of 0.001 kN and a digital strain gauge measuring the vertical displacement with an accuracy of 0.001 mm. The data acquisition system had the ability to record up to 1000 data per second. Clip gauge was fixed at the bottom of the notch opening to record the critical mouth opening deflection. Three identical specimens were tested for each mixture.

A loading rate of 0.1 mm/min was used in the tests of this study. A high rate of data scanning per second was used to capture the post-peak part of the load–deflection curve. The load–deflection data were plotted to calculate the area under the curve. The fracture energy (GF) was then calculated from the work of fracture.

$$G_f = \frac{W + mg\bar{e}}{A_{fig}} \quad \dots(1)$$

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where W_0 is the area under the load–deflection curve (N–m), m is the mass of the beam between the supports (kg), g is the acceleration due to gravity (m^2/s), d_0 is the deflection at final failure of the beam (m) and A_{lig} is the area of the ligament (m^2).



Figure 1 : Three point bending test on notched prisms

The term critical stress intensity factor (K_{Ic}) is used to indicate the magnitude of the stress concentration that exists in front of the crack tip when the crack starts to propagate. The most common method of calculation of the critical stress intensity factor is to use the peak load from the three point bending test of the notched beam and the dimensions of the specimen has been used in this study to calculate the critical stress intensity factor from the specimen geometry and the maximum value of load recorded in the test.

$$K_{Ic} = \frac{3Pl}{2bd^2} (\sqrt{a}) * (1.93 - 3.07A + 14.53A^2 - 25.11A^3 + 25.8A^4) \quad)$$

...(2)

where $A = (a/d)$, a is the depth of the notch (mm), d is the depth of the beam (mm), b is the width of the beam (mm), P is the maximum load (N) and l is the span length of the beam (mm).

IV TEST RESULTS AND DISCUSSION

4.1 Mechanical Test

The mechanical properties of the geopolymer concrete were tested as per the standard in 3rd, 7th, and 28th day. The compressive test of cubes were conducted in accordance with ASTM C109 with a load capacity of 1000kN. The split

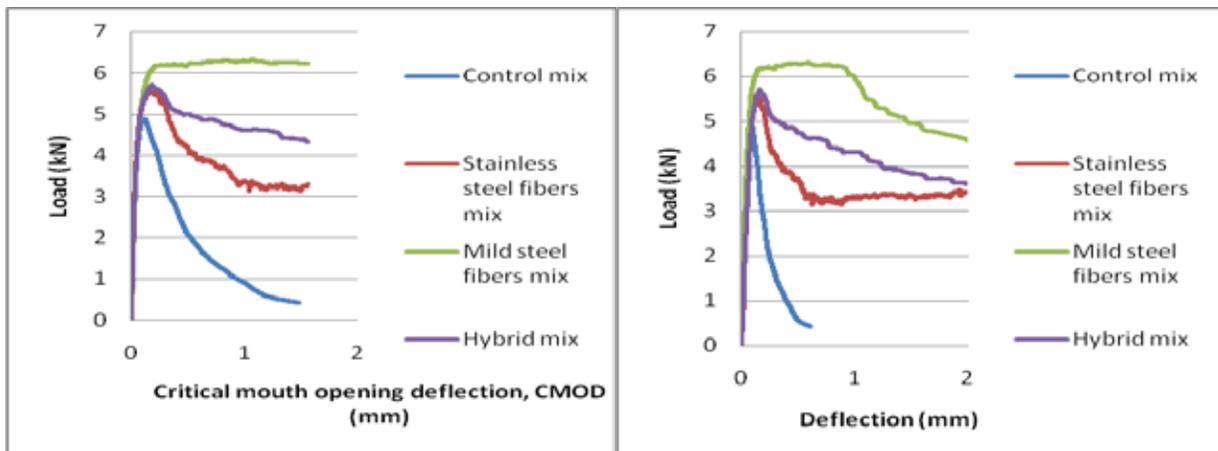
tension test were conducted on cylinder specimen after 28 days. The flexure test conducted on beam specimens showed higher results because of the addition of steel fibers and the high bondage strength. Table 4 briefly explains the test analysis values.

Table 4 : Test result on mechanical properties

Mix	Compressive Strength, MPa			Split Tensile Strength, MPa (28 days)	Flexure Strength Test, MPa (28 days)
	3 rd day	7 th day	28 th day		
GPCM	20.05	34.8	42.25	4.22	4.55
GPCS	35.98	36.4	51.78	5.17	5.03
GPCM	33.32	37.48	51.29	5.12	5.01
GPHY	31.97	37.01	49.01	4.90	4.90

4.2 Load-Deflection Behavior

As the load was applied slowly on the notched beam specimen (100*100*500mm), no cracks were formed until the peak load was attained. A crack started to propagate at the end of the notched part faster in the ligament when the load reached its peak value. Failure started to propagate by opening a single crack in the geopolymer concrete specimens. For calculating the fracture energy by the work of fracture method the load–deflection curves were corrected for the initial non-linearity due to deformation of the specimen at the supports, as recommended in the RILEM guidelines. The typical load–deflection diagrams of GPC concrete specimens are given. It is seen from these figures that the peak load of geopolymer concrete specimen was higher similar to its compressive strength.



a) Load vs CMOD curve for each batch

b) Load vs deflection curve for each batch

Figure 2: Load deflection curves for each batch



c) Crack formed in specimens without fibres



d) Crack formed in specimens with fibres

Figure 3 : Crack formation in tested geopolymer specimens

4.3 Fracture Energy

The area under the load–deflection curve for each notched beam specimen was calculated and used in Eq. (1) to obtain the fracture energy of each specimen. The mean value of the fracture energy for the specimens of each batch is also given in the table 5. The mean fracture energy values of the GPC concrete batches are plotted in Fig.5. It can be seen that the fracture energy of batch GPCM is slightly smaller than that of batch GPHY. The fracture energy tend to be higher for GPC concrete as the compressive strength increases. The fracture energy values of the specimens of each batch are plotted against compressive strength in Fig.4

Table 5 : Test and calculated values of GPC specimens

Batch	f_{ck} MPa	Specimen	Peak Load (kN)	Fracture Energy	Mean G_f (N-m)	K_{ic}	Mean K_{ic}
GPCM	42.25	1	4.36	145.90	196.57	23.30	24.56
		2	4.59	173.91		24.54	
		3	4.84	269.90		25.83	
GPCS	51.78	1	5.40	566.45	517.16	28.83	26.18
		2	4.55	444.27		24.28	
		3	4.20	532.52		22.41	
		4	5.47	525.42		29.19	
GPMS	51.29	1	6.28	817.02	645.79	33.55	29.33
		2	5.26	604.62		28.09	
		3	4.97	452.51		26.53	
		4	5.46	709.02		29.16	
GPHY	49.01	1	3.77	460.98	551.91	20.13	25.97

		2	4.56	604.62		24.37	
		3	5.70	629.02		30.46	
		4	5.35	513.02		28.90	

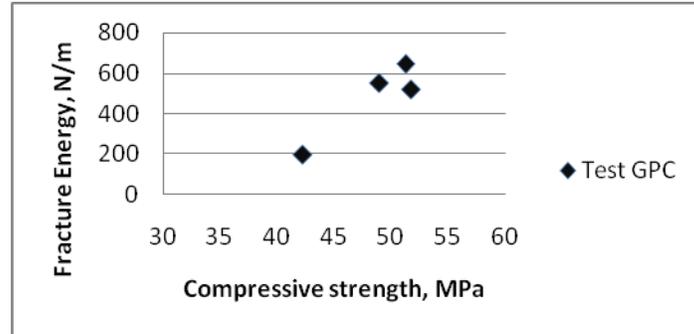


Figure 4: Variation of fracture energy of GPC concrete with compressive strength

4.4 Critical stress intensity factor

The value of stress intensity factor indicates the magnitude of the stress concentration in front of the crack tip when the crack starts to propagate. The critical stress intensity factors of the GPC concrete specimens were calculated by using Eq. (2). The value for each test specimen and the mean value for the specimens of each batch of concrete are given in Table 5. The mean values of the critical stress intensity factors for each batch are plotted in Fig.6. The critical stress intensity factors for all the specimens are plotted against compressive strength in Fig.5. It can be seen that critical stress intensity factor tends to increase with compressive strength in GPC. Therefore, the crack resistance of GPC is higher to that of the its compressive strength. This behavior is consistent with the previous findings that geopolymer concrete has higher tensile and bond strengths.

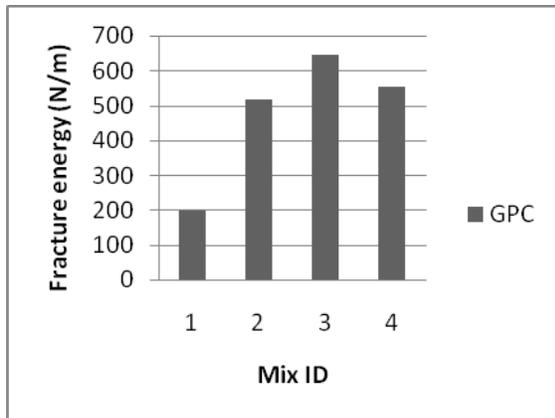


Figure 5 : Mean fracture energy of GPC batches

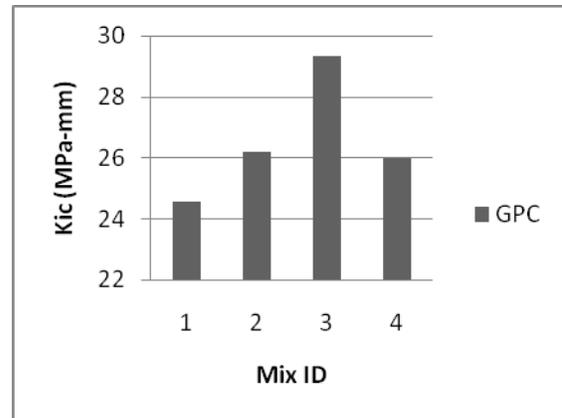


Figure 6: Mean stress intensity of GPC batches

V CONCLUSIONS

This study investigated the fracture behavior of geopolymer concrete with respect to its compressive strength. Three point bending test was conducted on notched beams for four batches of geopolymer concrete specimens. The

fracture energy is calculated using work of fracture method using the load deflection curve and the stress intensity is calculated using the peak load and the geometry of the specimen.

1. With the addition of steel fibres in geopolymer concrete reduced the workability of concrete mix.
2. The requirement of water content ratio is less as compared to other concrete.
3. The addition of fibers reduces the crack propagation in concrete and reaches higher peak value.
4. Fracture energy increased with compressive strength in geopolymer concrete.
5. The result of fracture properties indicate that geopolymer concrete can substitute with the traditional Portland cement in traditional application.

VI ACKNOWLEDGEMENT

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Biological Notes

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DETECTION AND PREVENTION OF TAUTOLOGY AND UNION QUERY BASED SQL INJECTION ATTACKS

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ABSTRACT

Web applications are pervasive and play a vital role as web applications are significant mode of communication. SQL injection is one of the most dangerous security vulnerability that is exploited in web application by attacker to get the access of databases. This paper proposes a method SQL idetection and algorithm to detect and prevent the tautology and union query based attacks at run time. To demonstrate efficiency of this method dataset is taken from NIST.

Keywords: *Detection, Input Validation, Prevention, SQL Injection Vulnerability, SQL Injection Attacks*

I INTRODUCTION

At present time the use of web applications is increasing rapidly. We are using web applications in daily life in the different ways such as shopping, mailing, downloading-uploading various videos and audios, virtual network (social networking sites) etc. Web applications store information in databases that is to be delivered to legitimate customer, supplier or other host. Since a number of dangerous security vulnerabilities are present in these web applications, these web applications become prone to attacks and an attacker in that way can make malicious attacks. One of these attacks is SQL injection attack that gives a chance to attackers to amend the behavior of system by exploiting these vulnerabilities. Therefore the requirement to identify these vulnerabilities is raised.

Many researchers and practitioners are working to detect SQL injection attacks from crucial web applications. For this purpose they are applying several input validation and sanitization methods in their approaches [1], [2], [3], [4], [5]. NTAGW ABIRA Lambert and KANG Song Lin have proposed a method [7] called queryParser method. This method tokenizes the original query and query with injection after tokenization the indices of tokens is stored in two arrays. Then the length of both array are compared if lengths are equal then there is no injection else there is injection. This method will produce false positives because if user enters invalid input which does not result in SQLIA for example for user input "CH01 ASE" this method will print there is an injection because the length of original query and query with injection is not same.

The proposed approach is able to detect and prevent the web applications from tautology and union query based SQL injection attack in a simple and manner without applying any sanitization and filtering.

The rest of this paper is outlined as follows. Section 2 describes SQL injection with tautology and union query based SQLI attacks, section 3 demonstrates our approach and section 4 presents empirical evaluation of our approach. At last section 5 talks about the conclusion and future work in this direction.

II SQL INJECTION

OWASP (Open Web Application Security Project) has reported that SQL injection is one of top10 vulnerabilities. SQL Injection (SQLI) attack is one in which an unauthorized user gets access to unprivileged data. Since the web applications suffer from improper input validation. This lack of proper user validation allows attacker to find injectable fields to exploit vulnerabilities. After succession in attack an attacker can manipulate the valid user's data without knowledge to that user.

2.1 Tautology Attack

In tautology-based attack attacker injects code in one or more conditional statements so that they always evaluate to true. Consider a website's page in which SQL query is dynamically created and includes user input fields. The following query is used for fetching information about books:

```
“SELECT * FROM books WHERE authorname= ‘ “ + authorname + “ ‘ “;
```

In a general way this web page having one user input field authorname which have the valid entries as stored in its database. But an attacker can enter the malicious inputs in user input field as authorname: anything' or `x`=x then resultant query will have following form:

```
“SELECT * FROM books WHERE authorname = 'anything' or `x`=x”
```

In this way resulting query will allow the attacker to access the complete table without actually knowing a valid authorname because in this WHERE CLAUSE is always true.

2.2 Union Query Based Attack

In this type of attack an attacker uses a vulnerable parameter to modify the data set returned for a given query. This is done by injecting a UNION SELECT statement. This additional query allows an attacker to fetch the data from a specified table by getting the rights and privileges of authorized user. For example let an attacker can inject the string “ UNION SELECT creditcardno, pinno FROM creditcard” into the newsid field. Therefore resultant query is:

```
SELECT newstitle, newsbody FROM news WHERE newsid = '340' UNION SELECT creditcardno, pinno FROM  
creditcard
```

In this dynamic illegitimate query statement the first part returns two attribute values of newstitle and newsbody corresponding to newsid 340 along with this the second query returns data from the “creditcard” table because the result that is returned is the union of both original and injected query statement.

III OUR APPROACH

This approach is able to detect and prevent the web applications from those SQL injection attacks that results in stealing the crucial data from database. When a web application is vulnerable to attacks, in such a manner that a malicious user can inserts some malicious input instead of original required input in user input field willing to fetch data from database for which that user is not authenticated. Then the SQL query statement formed by user input becomes an illegitimate SQL query statement and then the execution of this illegitimate statement will fetch data from database. Proposed approach will detect that there is an attack if the web application fetches data from database even if user entered wrong input or malicious input and then this approach will prevent these data from attacker's eye by not displaying the fetched data.

Our approach consists of implementation of a function called SQLIdet() to detect if there is an SQL injection or not. Major components of this approach are as in Fig.1.

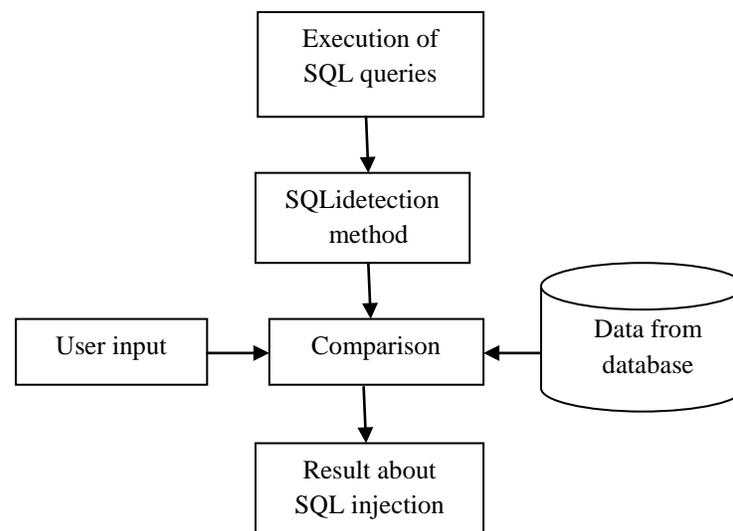


Fig.1: Block diagram of proposed method

This proposed technique follows following algorithm that has 3 basic steps which are as follows:

Inputs:

SQL_o: Original query

SQL_n: Query created for selecting user input fields

\$result_o: result variable of SQL_o

\$result_n: result variable of SQL_n

\$U_i: user inputs

\$index_i: user input field index of each U_i

Output:

Result of SQLI

Steps:

1. Execute SQL_o and Execute SQL_n

2. Call function SQLIdet() with parameters \$result_o, \$result_n, U_i and \$index_i
3. Execution of function
 - i. Compute no. of rows in \$result_n
 - ii. If no. of rows>0 then
 - a. Fetch first row of \$result_n from database
 - b. Compare fetched data of \$index_i column with U_i
 - c. If both matches
 - d. Then perform required action
 - e. Else print “injection”
 - iii. Else return
4. End

To understand how actually this technique works consider an example in which a legitimate user enters “Emile Zola” in user input field “author” or any other valid author name. Resultant query for this input is:

```
“SELECT * from books
WHERE author='Emile Zola'”
```

Then the query is executed and then proposed SQLIdet() function is called in which this query's result which is 3rd row of database and index of user input field that is author are passed. Then it fetches result in a variable and compares input entered by user with the fetched value of passed index. For taken example both the values input entered by user “Emile Zola” and row [author] = Emile Zola fetched from database matches. So there is no injection and required action is performed.

If user input is a crafted input then it performs the same process and when entered user input does not matches with database entry then it reports that there is an injection. For example an illegitimate user enters “anything' or 'x'='x” then after executing the resultant query it selects complete database as it is a form of tautology attack. But when this function is called it compares “anything' or 'x'='x” with each entry in author column fetched from database one by one and since this is an invalid user input it does not match and this function reports that there is an injection. In such a way this technique works at run time.

3.1 Empirical evaluation

To evaluate proposed approach consider one example of query present in test case 1940 of NIST benchmarks [6] the records and structure of table book of this test case is presented by Table 1 and Table 2 respectively. The original query is

```
“SELECT * FROM books WHERE Author = '$q'”;
```

Where 'q' is the user input 'author' when an illegitimate user enters *anything' or 'x'='x* an invalid input string willing to get unauthorized information. When SQLIdet() method discussed in section 3 is applied on this test case then the result produced after applying this attack will be same as shown in Fig.2.

Since taken example is a tautology type SQLIA. Similar to this when this approach is applied to union query based attack then also the attack will be detected and web application will be prevented.

Table 1

Structure of table book

BookID	Name	Author
1	A la recherche du temps perdu	Marcel Proust
2	Ulysses	James Joyce
3	Germinal	Emile Zola
4	L'etranger	Albert Camus

Table 2

Records of table book

	Field	Type	Collation	Attributes	Null	Default	Extra
	<u>BookID</u>	tinyint(4)			No	None	auto_increment
	Name	varchar(255)	latin1_general_ci		Yes	NULL	
	Author	varchar(127)	latin1_general_ci		Yes	NULL	



Result for [anything' or 'x'='x] injection

Fig.2: Result of proposed method

IV CONCLUSION AND FUTURE WORK

The method proposed in this paper is robust and more efficient as this method produces no false positive and no false negative. The proposed method is easy to understand and implement. This method requires no filtering and any sanitization approach to validate use input.

In future this technique can be enhanced to detect other SQL attacks and can also be extended to include different web applications attacks.

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A STUDY OF MULTINATIONAL CORPORATE: IMPACT OF LIBERALIZATION ON STRUCTURAL AND BEHAVIOURAL WORK CULTURAL PATTERN

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ABSTRACT

The objective of the study is to assess what changes have taken place in the liberalization era thereon and thereof in the environment and its impact on organization workculture, the study is carried on in the multinational corporate (prominent beverage multinational company)) to study various variables like work environment, effects of brand, leadership style, bureaucratic way of functioning and the changes brought in the corporate style functioning. .

This paper will ensure to study the relationship of liberalization changes, its dependence and uncertainty on organizational culture, ascertain the degree of autonomy for performing group tasks and its effect on interpersonal-relationships and group processes in organization.

The paper will analyze the impact of organizational culture on productivity and outcome and the ultimate growth of organization, the level of resistance for adoption to change, the degree to which identity and commitment exist in organization. To study organization's sensitivity to the needs of customers and employees and freedom to initiate new ideas, to ascertain system stability and its impact on collective commitment.

The study draw heavily from the views of internal workforce (managers and executives) and external clients (distributors) at Lucknow, Kanpur and Bareilly Divisions through schedules. Primary and secondary data is used during the research work.

I. INTRODUCTION

The study aims to reflect the present scenario of the impact of liberalization on the work culture in MNC and study of variables thereof, providing a relationship with the company's effectiveness and performance. The primary purpose of my research study was in discovering, interpreting and developing my knowledge in getting to know the work culture through structural and behavioral patterns present in a multinational company (food and beverage industry in India).

The methodology adopted for the study involves collection of primary as well as secondary data and inferences drawn therefrom. Primary investigations were carried out by taking random and purposive sampling through interview schedules and observation.

MNC operating in Indian market brought with it global perspectives on the principles and practices of management, claim to be universally valid and the blend of global perspective and the ethos of home culture incorporated in the Indian operations.

The organizational culture may be distinguished from the work culture and management culture, the organizational culture has a physical framework or artifacts just as societal culture has a geographical boundary. Work culture may be perceived as an activity, a set of values pertaining to an activity. Organization culture has its boundaries, goals and objectives, technology, managerial practice, material and human resources as well as constraints. Its employees have skills, knowledge, needs and expectations. These two sets of factors—**organizational and organic-interact** establish roles, norms, and values pertaining to work, it is this totality of the various levels of interacting factors around the focal concern for work which is labeled as work culture.¹

II MULTINATIONAL'S FORMS OF MANAGEMENT

Multinational companies adopted different ways of managing organizations. Those that entered the Indian market before liberalization, despite being managed largely by the parent companies, were smaller in number and restricted in their operations, they had an insignificant impact on domestic companies. Those that entered in the post liberalization phase (food and beverage) had far more freedom to adopt practices of management and their parent company had evolved over the years.

MNCs had a deep pocket to operate, advertise their brand, they had advanced technology, an established network in international market. They attracted the best graduates from B-schools and paid them much more than the best paying Indian companies, although the amount was far less than that paid to their counterparts in advanced countries.

III IMPACT OF LIBERALISATION

The impact of liberalization can be seen in the increase in inflow of foreign direct investment, the average number of foreign collaborations per annum increased by 9.33 times during the first year of gradual liberalization (1980-1990) and 47.23 times during the period of rapid liberalization (1991-2000). The increase from the phase of gradual liberalization to rapid liberalization was nearly five times, the increase in the value of foreign investment was also phenomenal.³

The concept of liberalization which includes privatization and globalization in Indian context has not only brought structural changes and changes in organization design but the impact is vast on how the management style is different with that prevailing in government sectors.

It has been observed that the changes brought by MNC were not only in competitive market and fierce marketing strategies, with wide variety of products and brands flooding the market but the changes were more on the study of behavioral and psychological patterns of customers, emphasizing to build the brand bond to be followed on the basis of relationship formed by the company with the prospective customers.

The changes brought about as seen through the literature review where study and researches by various scholars had thrown light on the behavior pattern of customers, employees and employers. I have chosen the topic of the study as I want to research the impact of liberalization on the employees of MNC in Indian context, the changes brought in the working pattern, how the employees perform at various levels and what they think about the development brought by MNC with respect to the work culture.

MNC brought with it its own working style, communication network which follows more upward and downward – a two way open communication network, the informal functioning, it earmarked a change on the style of leadership, management functions and the psychology of employees, there was more formalization, high complexity, decentralization and delegation of power⁴

Objectives of the study was to assess what changes have taken place in the liberalization era thereon and thereof in the environment and its impact on organization culture, the study is carried on in the multinational corporate to look into various variables like work environment, effects of brand, leadership style, bureaucratic way of functioning and the changes brought in the corporate style functioning.

IV. DEFINITION AND CHARACTERISTICS OF CULTURE

Many of the academics who have studied culture have often come up with narrow definitions, others have taken these definitions and combined them into new and more embracing definitions for instance Schein has created the following definition :-

“A pattern of basic assumptions – invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration – that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.”¹

A fundamentally different approach to conducting business, an attempt to alter the shared beliefs, expectations, and core values of people in the organization – a change in what is known as **organizational culture**.

Organizational culture is a cognitive framework consisting of attitudes, values, behavioral norms and expectations shared by organization members. Once established these beliefs, expectations and values tend to be relatively stable and exert strong influences on organizations and those working in them. At the root of any organization culture is a set of core characteristics that is valued collectively by members of an organization.²

Culture is to do with groups of people collectively (not individuals alone), who through their experiences together, day by day in the work environment, will build a picture of what the organization is all about and how it undertakes its purpose, and that this picture is built through learning how to behave for survival and progression.

The organization must at least accept the assumption and values of the culture, more recently culture has become an increasingly acceptable conversation topic among employees. Most cultures evolve directly from top management, who can have a powerful influence on their employees by what they say, however, managements action are even more important to watchful employees who can quickly detect when managers give only lip services but not support to certain ideals such as customer service and quality products.

A culture may exist across an entire organization or it may be made up of various subcultures – the environment within a single division, bench, plant or department.

Cultures have varying strengths – they can be characterized as relatively strong or weak, depending largely on the degree of their impact on employee behavior and how widely their underlying beliefs and values are held. There must be a positive relationship between original cultures and performance; agreement within an organization on a culture should result in a larger degree of cooperation, acceptance of decision making and control, communication and commitment to the employees.

If organizations are to consciously create and manage their cultures, they must be able to communicate them to employees, especially the newly hired ones. People are generally more willing to adapt when they want to please others, gain approval and learn about their new work environment.

It is clear that while organization culture is a cognitive constant, it is still built and demonstrated by **antecedent, behavior and consequences**. Hence, these three elements ought to be the main focus in understanding what culture is and how it is to be changed.

In order for management's desires to remain believable, management has to be consistent in its actions. That is why clear communication and demonstrations of policy or practice works help to increase the probability that individuals will have a better understanding of the process.

The complex nature of culture has shown the widely varying views of what cultures is. From the visible artefacts and behavior or patterns to invisible behaviour norms, values assumption and beliefs.

From basic tenants as to whether culture is a root metaphor embedded deep within an organizations beliefs and values, an external, almost uncontrollable, variable or as an independent variable that can be stipulated. These relate to whether researchers take an objective stance that see humans as a responding mechanism or a subjective stance that humans are transcendental being or some midpoint view.¹² There was disagreement about whether culture could be measured and if so what should be measured and how. Now the theory had moved from systems based.

V. AN ANALYSIS OF THE EFFECT OF MNCS ON INDIA SINCE LIBERALIZATION

Since 1991, India has experienced a dramatic increase in the presence of multinational corporations, and with it, a tremendous expansion in the amount of foreign direct investments inflows to the Indian economy.

Indian liberalization began before 1990s; most will agree that it was in 1991 that the Indian Government first began in earnest to adopt policies of liberalization. Before the process of reforms began in 1991, the Indian government attempted to close the economy to the outside world. The Indian currency, the rupee, was inconvertible and high tariffs and import licensing prevented foreign goods reaching the market. India also operated a system of central planning for the economy in which firms required licenses to invest and develop. The labyrinthine bureaucracy often led of absurd restrictions up to 80 agencies

The internal factor which directed India towards liberalization was the severe economic situation it was faced with at the time. The central problems were soaring inflation, a rising fiscal deficit, a widening trade deficit, and an enormous foreign debt. In fact, India was "on the verge of defaulting on its foreign loan"¹. Now, these economic problems were all rooted in one fundamental problem, namely, inefficiency. India was inefficient because of such things as "inadequate infrastructure, various bottlenecks, misallocation of resources, imbalanced² regional developments, and the present of parallel economy, the urban-rural development gap,

and the demand-supply gap³. India's dire economic situation forced its government to accept the fact that major structural changes were needed in India.

One of the external factors was "the success of export promotion (EP) industrialization along with the failure of import substitution (IS) industrialization⁴. EP industrialization is an economic path to development which came to prominence in the '70s and '80s, largely through the stunning performance of those countries which embraced such a policy. The greatest success stories were Southeast Asia's newly industrialized countries, many of which have averaged growth rates of more than 8% a year for part thirty years⁵.

Another external force which was challenging India's tradition of "centralized and inward – directed business policy⁶ is what is termed globalization that is internationalization of the world economy⁷. It became clear to developing countries, as India that, "with the world economy becoming increasingly interdependent", it was vital that they "devote greater efforts to linking their economies and development strategies to the world economy". Now, at the heart of globalization are the MNCs, which have brought about "global diffusion of production technology and worldwide homogenization of markets⁸. In fact, it can be argued that, "with the worldwide resources at their command", it is the MNCs which "have spavined an integrated international economic system". Consequently, India realized that, in order to link itself with the world economy, it was essential that it first link itself to the driving force behind globalization, namely, the multinational.

It was through its economic problems that India became open to the need for change, and it was through the changing patterns of the global economy that India came to realize what changes needed to be made. India concluded that liberalization was the solution. "The time had come to convert India from a regulated and control bound inward looking economy into a market friendly, outward looking one⁹". As well as changing its attitude towards EP industrialization, India also changed its attitude towards FDI, as MNCs were seen as legitimate and effective agents of change for India's economy.

One cause of India's changed attitude towards MNCs was that there was a positive change in the perception of the MNCs across the world. The most basic argument in favor of MNCs is the need for investment. Domestic savings are often inadequate to support the amount of investment that is required for development, and this is true for India¹⁰. When the economic crisis came to a head in 1991, the Central and State Government of India were forced to cut back on their torrid spending, which meant that they had to choose between public investment which is useful for patronage purposes and subsidies which are useful for reelection¹¹.

There occurred a shortage of investment, and "this necessarily meant turning to the private sector and foreign investors to take care of investment. In this way, MNCs are seen as a way of filling the gap in savings, by "bringing saving from abroad so that domestic investment can be larger than domestic saving¹¹".

The aggregate demand function,

$$Y = C + I + G + (X - M)$$

Where, Y is national income, C is consumption, I is investment, G is government expenditure, and (X – M) is net exports. There is a positive relationship between investment and national income, such that, increases in investment will lead to increases in national income.

The next major argument in favor of MNCs is the close connection between FDI and exports. There are many economic theories which support the growth of exports, and one of the oldest and most renowned theories is Adam Smith's theory of gains from trade. Smith argues that the narrowness of domestic markets does not permit of high degree of specialization, which serves to limit production possibilities. However trade opens a country's

economy to a more extensive market, which leads to a greater division of labor, increased efficiency and therefore a rise in production. India's domestic market is anything but narrow, so it can be argued that India's labor is sufficiently specialized, relative to the world market, India's market is small and thus greater specialization is possible. India is a case of an increasing focus on export production which leads to greater efficiency and increased GNP as a result. India has come to see the advantages of placing a 'greater emphasis on exports as part of their development strategies. MNC have unique advantages as management technology, skills linkages with world markets¹⁴. Through MNCs India gain better access to external markets, which increases their efficiency and therefore makes them more competitive internationally.

VI. IMPACT OF LIBERALIZATION ON STRUCTURAL AND BEHAVIOURAL PATTERNS OF WORK CULTURE: A STUDY OF MULTINATIONAL CORPORATE

The new economic policy adopted by India in 1991 had their central features: opening the economy to global markets, 'reducing import tariffs and state intervention in domestic policy decisions and stabilizing the economy through structural reforms¹⁵.

India "reduced restriction on equity, rinsed investment licensing controls raised limits on repatriation" altered import procedures and tariffs in favour of MNCs and modified labor laws to make the business environment more appealing; with the exception of a small list of strategic industries, all sectors previously reserved for public enterprises are now open to private investment¹⁶.

The effect of liberalization on India's economy has been overwhelming positive and the statistics confirm this. Due to the crisis of 1991 the growth rate that year was only 1.2%. Three years later a growth rate of 5.5% was reached and then the economy took off in 1995 and 1996, achieving growth of 7.1% and 7.5% respectfully. In fact since 1994 the Indian economy has grown at an average of 7% per year, placing India among the world's leader in economic growth. India's high growth has been large enough not only to balance the population growth but also to increase the standard of living.

The benefits and advantages which MNCs bring to host countries is been argued that MNC could have a significant impact on India's economy. It can be presumed that MNCs played a vital role in the economic development .An emerging trend of increased multinational presence in India is that "¹⁶about 2,000 Indians leave India annually to take up middle and senior management jobs elsewhere in Asia". Another emerging trend resulting from rising FDI is that instead of India's federal government "inviting foreign investment and then allocating inflows to the states, the initiatives now lies with the state themselves"¹⁷ and as a result, "attracting foreign capital has become top priority on every state government's agenda."

The result is that India's state are now competing with each other for FDI and among the few progressive states, this has led to a battle of incentives and the abolishment of many bureaucratic delays. Now, the benefits of this are not just the increased level of FDI which can be expected to result from these changes in state policies towards MNCs. The state governments are free to identify the industries in which they want private investment, although they must stay within the national objectives. Another benefit concerns India's growing middle class, estimate of the size of middle class are wide ranging.

The role for MNCs in India is obvious: to supply India with the international brand name and consumer goods it wants. The central economic benefit of this is that Indian consumption is now able to expand, rather than being limited as it was when only domestic producers were supplying consumer goods and this implies that Indian consumers gain utility or satisfaction. MNCs as PepsiCo rely on India as a source of inputs. India has a huge reservoir of trained, skilled and relatively inexpensive labor such as 'low cost engineering talent' as well as an ever larger supply of unskilled workers. In addition to supplying labor, India also provides MNCs with other inputs to production. MNC as PepsiCo is effective in stimulating India's domestic production which often leads to greater competition, increased efficiency and hence rise in production.

MNCs in India represents a diversified portfolio of company's representing different nations. It is well documented that American company account for around 37% of the turnover of the top 20 firms operating in India. The scenario for 'MNCs in India' has changed a lot in recent years, since more and more firms from European Unions like Britain, Italy, France, Germany etc has the second largest base in India. Since the emerging countries have increased their contribution to the world economy, more and more MNCs have started showing greater interest in them-with India on top, due to its large and attractive consumer base.

India's highly educated workforce, management talent, rule of law, transparency, cultural affinity and regulatory environment is favorable to MNCs as India leads IT, business processing, research and development investment. With globalization, trade barriers have come down and business giants have spilled across the world. Emerging economics have been their lucrative market, with flaring global interest in Indian economy and its huge consumer base; many MNCs have started foraying there to extract the maximum market share. Some viewed India as a high potential market, while others wanted to explore it as a low cost manufacturing base. The government also prevented firms from laying off workers or closing factories. The central pillar of the policy was import substitution, the belief that India needed to rely on internal markets for development, not international trade—a belief generated by a mixture of socialism and the experience of colonial exploitation.

VII. MULTINATIONAL CORPORATION

Multinational business operation emerges from mercantile philosophy. The post-second world war period has witnessed a changing hand in colonialization and there emerged a new thrust for industrial and technological development as well as the rise of USA as the largest industrial power.

Growth of techno economic power in countries like USA, UK, France and Germany simultaneously gave birth to large business houses which extended their operations from the parent countries to various host countries. In post independence India, many multinational corporations have gained ground. Though they have brought in the largest technology to make their operations successful, they preferred to keep the secrets of their technology with themselves.

Companies which operate through their subsidiaries prefer to guard the technical know-how as their monopoly even if they have minority shareholdings.

MNCs from USA have the largest share of foreign direct investment in India followed by those from the UK, Germany, Japan, Switzerland, France and Canada. Over 50% of the subsidiaries operating in India with 100% ownership during 1960–64 declined their ownership to 36%, during 1964–70.²⁰ According to Running & Stopford report, the share of foreign direct investment (FDI) in the developing countries marked a decline from 31% in 1971 to 27% in 1980.

VIII. DOMINANCE OF MNCs OVER INDIAN ECONOMY

At present MNCs have a stronghold over the Indian economy. Even during 1970's about 52.7% of the total assets of the giant sector were controlled by the MNCs. As per the estimates of the Industrial Licensing Policy Inquiry Committee, in 1966 there were about 112 MNCs operating in India with assets worth Rs 10 Crore or more. Of these 48 were either foreign branches or Indian subsidiaries of foreign companies.²⁴

Besides, there were 14 other companies, having heavy loans and equity capital which was almost controlled by foreign companies, 62 companies had nearly Rs 1,370 crore worth of assets which jointly constituted about 54% of the total asset of the giant sector operating in India. During the mid 1960s, Western foreign capital mostly dominated the big business of the country and thereby controlled the apex of India's industrial pyramid.

One of the important features of MNCs in India is that they have been raising a major part of investment resources within the boundaries of the Indian economy.

IX ROLE AND PATTERN OF WORK CULTURE IN MULTINATIONAL CORPORATE

The term liberalization refers to growing international economic integration based significantly on the activities of multinational corporations, India have become more closely integrated to the global economy although the process remains at the initiation level.

Culture performs a number of functions within an organization; it has a boundary defining role which creates a distinction between one organization and others. Work culture in food and Beverage MNC has a direct impact on its functioning which is increasing the brand name in bilateral and multilateral trade blocks in the upcoming scenario of liberalization in Indian context.

The changes brought in PepsiCo structure and design in the way of complexities, formalization, differentiation and centralization has created an atmosphere which has drifted the functioning of corporate and there style in developing countries from the traditional one.

Liberalization is radically transforming the working style and culture in India to match the international standards, not only satisfying the external customers but also emphasizing the needs, desires and creating a suitable working environment for the internal workforce.

The role of MNC culture is in influencing employee behavior in context to the roles, duties, responsibilities of their work profile and to enhance employee competencies through human resource development programs which is aimed and scheduled at various level of hierarchies. The role of culture in influencing employee behavior appears to be increasingly important in today's workplace.

Multinational corporate has widened span of control, flattened structures, introduced team work and group initiatives, reduced formalization and has empowered its workforce at different levels. The shared meaning provided by a strong culture ensures that everyone is aimed at certain role and objectives.

MNC has created a core set of assumptions, understandings and implicit rules that govern day to day behavior. Culture in PepsiCo has enhanced organizational commitment and increased the consistencies of employee behavior (at managerial and executive level) which is a clear indicator of the benefit to an organization.

Work culture is valuable as it has reduced ambiguity and is helping the company's workers of how things are done and what is important of being successful not only at the individual growth level but also to widen their vision and horizon of overall development and image building of the organization.

The clarification of the individual role and organizational role is helping PepsiCo in evolving itself in various dimensions of leadership, effectiveness, and excellence and employee job satisfaction.

The culture has helped MNC to be ready for the competitive environment and to take plunge in global rivalries and take advantage of market opportunities.

X WORK CULTURE & WORK STYLE

The implication of liberalization for organizational behavior is profound and direct. As, the head of Brunswick Corporation declared "Financial resources are not the problem. We have the money, product and position to be dominant global player. What we lack are the human resources. We just don't have enough people with needed global leadership capabilities"

Culture can be defined as the acquired knowledge that people use to interpret experience and generate social behavior, it is important to recognize that culture is learned and helps people in their efforts to interact and communicate with others in society.

Work culture is complex. It has a number of important characteristics:-

- 1) Observed behavioral regularities: When organizational participants interact, they use common language, terminology & rituals related to deference and demeanor.
- 1) Norms : Standards of behavior exist on how much work to do.
- 2) Dominant Values: High product quality, low absenteeism and high efficiency.
- 3) Philosophy: There are policies that set forth the organization's belief about how employees and/or customers are to be treated.
- 4) Rules: There are strict guidelines related to getting along in organization.
- 5) Organizational Climate: An overall "feeling" that is conveyed by the physical layout, the way participants interact and the way members of the organization conduct themselves with customers or other outsiders.

A review of the research literature determined factors that seem to play the major role in determining group effectiveness:-

- a) Task interdependence (how closely group members work together)
- b) Outcome Interdependence (Whether & how group performance is)

XI MNC WORK CULTURE AND WORK STYLE

- The employees are of the opinion that committed team work is important to translate the vision & strategy into realities, involvement of people is important for the endeavors to succeed or fail; there is more encouragement towards participation management, change is towards participation management.
- There is a clear association of employees when the organization is sharing the organization perception & values; there is encouragement towards new ideas and developing creative work environment.
- MNC has emerged as an integrated and information Incentive Company, the company is change adept.

- There exist flexibility where the working of hierarchal structures is concerned, information is shared freely, and ideas are shared at session.
- Transparent & sincere communication plays a very important role in the working of employees.
- Informal working environment is appreciated by majority of employees.
- The employees feel more affiliated when they are provided with better incentives.
- The organizational culture is like – “we do things around here in order to succeed”.

XII FINDING AND ANALYSIS OF THE STUDY

12.1 Analysis of Employees

In the study, information to know the impact of liberalization on the work force and the changes in organization (Private Holding Limited) is sought from three stratified levels, namely:-.

1Managers

2Executives

3 Distributors

A separate analysis of these three levels is done by the researcher. Separate interview questionnaires were administered to 20 respondents in the managerial level,40 respondents in executive level and 100 respondents in the distributors level.

12.2 Demographic Analysis

The demographic characteristics is shown below .The figure have been derived based on the data-base maintained in the organization departments.

The researcher randomly selected a highly diversified group for study on the work culture and its changes therein. The executives and managers are selected from various departments of PepsiCo, the demographic area consist Bareilly, Kanpur and Luck now divisions. The questionnaire is also given to distributors who are company’s authorize dealers and there basis function is to serve the market.

12.3 Composition: Managers and Executives Level

Serial Number	Designation Profile	Level
1	UNIT MANAGERS	LEVEL 10
2	TERRITORY DEVELOPMENT MANAGERS	LEVEL 6,7
3	ASSISTANT MANAGERS	LEVEL 4,5
4	EXECUTIVES	LEVEL 1,2,3

5	TRAINEES	
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12.4 FINDINGS BASE ON VARIABLES

- **Managerial level**
- **Executive level**
- **Distributor level**

FINDINGS

12.4.1 MANAGERIAL LEVEL

1. EFFECT OF LIBERALISATION

- Majority of managers feel that globalization is not inducing greater collaboration and convergence despite of their working in MNC .It can be because of unawareness and lack of information as the convergence are the prerogative of the top level authorities and the researcher has taken middle level management respondents in her study
- There is a strong feeling that the concept of nation state is getting obscure due to increase in bilateral and multilateral trading blocks, the shift is towards the acceptance of liberalization, as the whole world is becoming one global village and the boundaries are not confine to the trade which was an impediment before the liberalization in Indian context .
- The trend of MNC to build global workforce has come up well as majority of managers in the three divisions under study are of the view, but some respondents gave the reason it is not so .The reason of such a response cold be that some managers are only expose to their own territories and have no cue how the work is been done in the other countries where the work force is highly diversified .

2. BUREAUCRATIC VIEW

Bureaucratic model seen as structure of administrative functioning of various public sectors and governmental undertakings in India in the pre and post liberalized arena have shown certain limitations in the form of formal structuring, narrow span of control, red tapism , bribery, high level of formalization ,high complexity etc. Majority of managers are of the view that such culture is not present in MNC but few believe that such bureaucratic culture is present, but in disguise.It may be due to the long association of bureaucratic way of functioning in Indian sectors, as well as people are coming to private concern having their association with such culture that is why people resort to this feeling though PepsiCo has reverted to wider span of control, low formalization ,decentralization and low complexity.

3 TEAM WORK AND LEADERSHIP STYLE

- Managers facilitate individuals and are responsible for collective success, managers are of the view that passionate and committed team is very important to translate company's vision.

- Majority of managers think that they become leaders when they encourage and invite individuals to be owners and executer of vision
- There is a collective working relation and involvement of people at every level which is necessary for the success of any endeavor in the organization.
- Association of managers towards organization mission is because of organization's shared perception and values.

4. ORGANISATION CULTURE

Majority of managerial respondents feel that-

- The company should provide a work culture that will reinforce and clarifies standard of behavior.
- A greater sense of identity is to be provided by the company. There is a mixed response where managers are divided on the view point. Organization has to find ways to provide a sense of identity to motivate them to work.
- Job ambiguity and job dissatisfaction are found to be major stressors in the company which basically results in higher level of absenteeism and low performance .The Company has to take major steps to find measures to cope up with these stressors.
- At the root of any organization's culture is a set of core characteristic that is valued collectively by members of organization. Majority respondents are of the view that organization culture is the framework which says 'we do things around here in order to succeed' whereas few don't carry this view.
- The company boasts of strong ethics, values and management practices. This believe results in trust for management, pride in work and a cordial relation among members of different hierarchies contributing to an overall organization development and healthy culture

5. WORKING ENVIRONMENT

- Work environment should be more informal and congenial. Informal and congenial working environment is appreciated by all the respondents as it results into better interpersonal relationship among people at various level, lesser communication gap and a higher level of interaction.
- There is a greater priority on interdisciplinary learning which comes within an organization whereas respondents also believe that learning capacity can be developed from observing the ways other organization work.

- All respondents are of the view that values lend stickness which helps them in identifying the organization emotionally and intellectually.
- Encouraging worker participation in management and welcoming employee involvement for organizational accomplishment is very important and is welcomed by majority respondents.
- The most important result of work stress comes in the form of absenteeism and low performance.
- Managers feel more affiliated toward organization when they are provided higher incentives when compared to advancements and autonomy. Financial motivators plays important factor than non financial motivators.

12.4.2 EXECUTIVE LEVEL

1. EFFECT OF LIBERALISATION

- The executives believe that MNC has emerged as an integrated and information incentive transnational company which has brought with it international cross cultural values
- Majority respondents feel that the company has brought with it its own brand of international cross cultural values and philosophy.

2. BUREAUCRATIC VIEW

- Bureaucratic model seen as structure of administrative functioning of various public sectors and governmental undertakings in India in the pre and post liberalized arena have shown certain limitations in the form of formal structuring, narrow span of control, red tapism , bribery, high level of formalization ,high complexity .Majority (75%) of executives are of the view that such culture is not present but 25% managers believe that such bureaucratic culture is present ,but in disguise
- The results is assumed to be due to the functioning of PepsiCo as a MNC bringing with it low formalization, low complexity and decentralization concept, reverting to wider span of control, more communication and lesser paper work.

3. TEAM WORK AND LEADERSHIP STYLE

- There is a clear indication that seniors ensures process of awareness, encouragement and treat them with respect as professional deserves.

- The executives and the coworkers adheres flexible working of hierarchal structure within organization Hierarchy of authority is a configuration of the reporting relationship and majority of executives said that the working of hierarchy structure is flexible.
- The ideas of executives are shared at sessions with seniors

There is a relative encouragement by coworkers and seniors when suggestion are offered by any executive It is a healthy sign where suggestions are given weightage by seniors and coworkers which ultimately help in enhancing interpersonal relationship across department and in various levels making the work relation cordial.

- Leadership style adopted by seniors is a mix of various style .Participative and consultative style is appreciated whereas respondents have also said that autocratic and democratic style is sometime preferred by seniors .Actually the variation would have occurred because the leadership style depends from one situation to other where the leader had to assume various style whichever is suitable at the particular time frame (i.e. contingency approach) and thus the variation in the alternatives give the significant result.
- Morale is a sense of belonging to a group, majority of respondents said that seniors do praise them in front of others for their work.

4. ORGANISATION CULTURE

- Majority of respondents feel that organizational culture of the company does not help them in clarifying and reinforcing standards of behavior, but they have indicated that the company is change adept and as such it is evolving progress with changing times, their ideas are shared at sessions and suggestions are encouraged
- Executives had indicated that MNC is change adept and as such it is evolving progress with changing times, their ideas are shared at sessions and suggestions are encouraged.
- Emergence of present culture can be entrusted to top level management who has embraced innovation and commitment as well as dynamic personality and clear vision of top level of management.
- Executives believe that for vibrant and dynamic culture there should be cooperation, employee should strive for work and loyalty should be shown.
- Openness and disclosure of personal matters among colleagues has given way to socializing and formation of informal groups, friendship also exists laterally among various departments and hierarchies.

5. WORKING ENVIRONMENT

- Process of evaluation should be made more transparent as majority of executives do not have any communication with the HR department (dissatisfaction is more from the sales executives).
- There is always a comparison of the present organization's work environment with other MNC (finding through interviews)
- Stress in the organization is attributed more towards quantitative overload and because of information anxiety.
- Majority of respondents are satisfied while working , as they want to recommend the company for others to work.
- The organization emphasize social gathering as one of the important way of informal gathering.

12.4.3 DISTRIBUTOR LEVEL

- Majority of distributors are of the view that they are provided with training programs which are beneficial for them.
- There is a system of rewarding distributors for their good work.
- Style of functioning is more participative but sometimes it becomes directive also.
- There is a mixed response where the level of future association with PepsiCo is concerned.

The relationship as reviewed by distributors with the company employee/employee directly associated with the company is a mixed response where some opines it's a good working relationship while few rate it as satisfactory and others as unsatisfactory.

XIII SEGGESTIONS AND CONCLUSIONS

13.1 SUGGESTIONS

1. MNC(Food and Beverage) has to provide awareness and information regarding global collaboration and convergence to its workforce.
2. Employees at the managerial level are of the view that more staff should be added to the existing manpower as they are overburdened.
3. The involvement of Human Resource department should be more, as the interaction is minimum to managerial and executive level, HR department is confined interacting to the top level authorities only.

4. The working hours are tedious as reported by majority of employees. (Employees have to work on Sunday/holiday). They preferred five day week of work..

5. Time schedules are long and tiring, which requires some amendments. Employees are of the view that flexi time should be enforced.

6. Company should come up with measures to cope up with the stressors present in the working environment. The top management must accord top priority to establish long term HR strategies as work modification; stress management should be planned and implemented soon.

7. As the researcher found , there is an excellent teamwork and culture present in the organization. To make it more concrete, group functioning at all levels in the organization should be encouraged.

8. Task- analysis of every present working incumbent holding position in the organization is suggested so that more role clarity may be ensured at all levels and more inter role dependencies may clearly be established which will foster team work and group dynamism in the organization.

9. Non-financial motivators must be encouraged more than financial motivators. Innovating policies regarding recognition, advancement, achievement. Rewards should be adopted by the organization to motivate and retain good employees.

13.2 CONCLUSION

The researcher after the study, is of the opinion that there is a relationship between the climate and work culture of the organization and that of the performance and effectiveness of the employees as shown in the data interpretation and its analysis of three different hierarchical level in Food and Beverage MNC. The top management formulates the policy and frameworks which become guidelines for the employees. It is the vision and involvement of the company that is maintained by the workforce.

Today, everything has changed. Liberalization and privatization of markets has changed the way modern corporations do business. The companies are thinking and dealing with a global worldwide market instead of a national market.

The corporate has its own working style which has moved towards less formalization, organization is more structured in the span of management and area of specialization is decentralized in functioning, management and employees resort to open and two way communications.

The focus is toward a humanistic approach .The company survives on its best practices in human resource which has reduced the attrition rate and enhanced overall production and productivity of the employees. The work culture thus has a profound effect on efficiency of employees

The working brought by the multinational corporate has immensely changed the way people perform in the corporate world and is different in its functioning than that of bureaucratic structure of public sectors.

The views provided by the respondents have been interpreted which require that corporate should go in for more involvement of human resource department in various means and to be present more often where the non-financial motivators are concerned.

Performance requires more dedication and effort on the part of each and every employee, which sometimes creates a stressful situation. MNC (Food and Beverage) is doing its best in coping with these stressors on and off, great camaraderie has been observed, the company can boast of cordial and a harmonious relationship. The management – employee relation is also good with mutual understanding and a progressive attitude.

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APPLICATION OF MICROWAVE RADIATION TECHNIQUE IN PRODUCTION OF BIODIESEL TO ENHANCE THE PROPERTIES AND ECONOMIZATION OF BIODIESEL

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ABSTRACT

Since the last few years biodiesel has been showing challenging properties in comparison with petro diesel. It is both environmental friendly and can replace petro diesel, in which the later is a major source of environmental pollution. The major hindrance in the commercialization of biodiesel is its high production cost. So it is necessary to reduce the cost of production of biodiesel by reducing the power consumption level for its production from various sources. In the present paper the use of Microwave radiating technique was used which reduced the production cost and time. Also the extracted biodiesel shown good results in practical engine tests. Hence we can say that Microwave radiation technique not only saves power, but it also saves money and environment.

Keywords: Biodiesel, Cost, Carbon Dioxide Emission, Environment Friendly, Microwave Radiation.

I INTRODUCTION

Bio-Diesel is considered as one of the most promising alternative fuel as it is ecofriendly [2-4]. But the primary hindrance to the commercialization of biodiesel is its high of production [5-8]. The transesterification reaction which is the only reaction through which a vegetable oil can be converted to bio diesel undergoes at a temperature of 60° C to 80° C. This temperature has to be maintained for about 2 to 3 hours in normal heating conditions which consumes lot of energy and increases the cost of biodiesel. In the present work the same transesterification process was done in a microwave heating conditions, by which the time of heating and the cost of production was reduced as compared to traditional process.

1.1 Materials and Experimental Set-up

1.1.1 Waste cooking oil

Waste cooking oil was collected from an hotel for 20 rupees per liter. Before alkali – catalyzed transesterification the oil is subjected to pretreatment. The oil obtained was filtered and water washed [9]. The removal of impurities

such as water, free fatty acid and polymers prior to alkali catalyzed transesterification improves the yield and quality of the esters [12].

1.2 Reactor

The experimental set up consists of a mechanical stirrer and condenser. The stirrer was operated at 600rpm with a motor. The catalyst used was NaOH with 5 minutes heating [14]. A microwave heater, stirrer and a condenser were used for the microwave heating method. The appropriate power dissipation control will result in effective use of microwave energy and reduces the energy requirement [15]. The complete experimental set-up is shown in schematic diagram Fig.1.

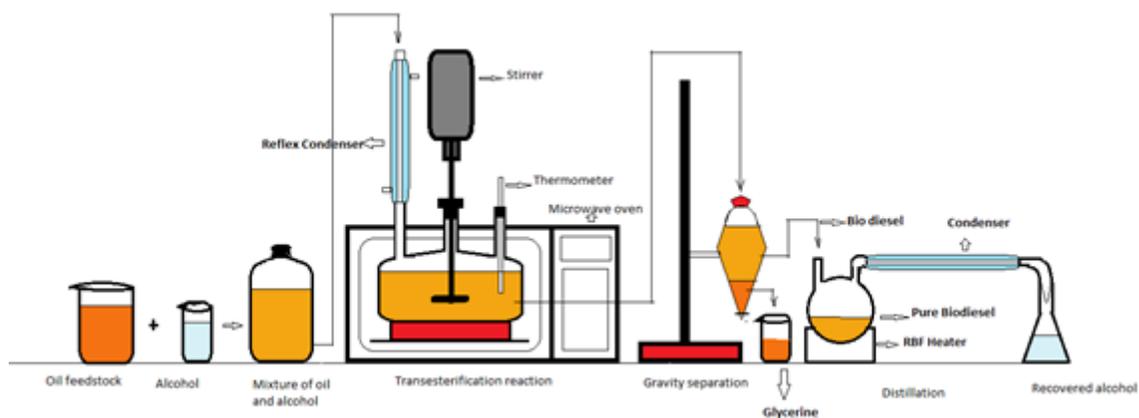


Fig. 1: Schematic Diagram of bio diesel production from waste cooking oil.

1.3 Methodology

1.3.1 Alkali Catalyzed Transesterification

The waste cooking oils are subjected to Tran's esterification; a chemical reaction, involving triglycerides and an alcohol of lower molecular weights using homogeneous or heterogeneous substance as catalyst to yield bio-diesel and glycerol using a fabricated micro-oven reactor. A catalyst is usually used to improve the reaction rate and yield. The sodium methoxide (CH_3ONa) is used as catalyst in our present work. The oil and the alcohol ratio used here is 1:6, because the reaction is reversible, excess alcohol is used to shift the equilibrium to the products side [10-11]. The reaction is shown in Fig. 2.

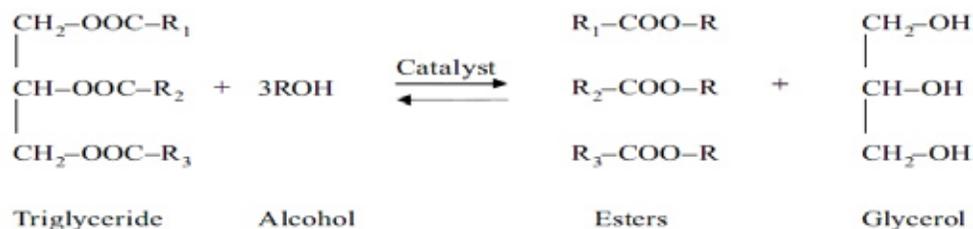


Fig.2: Transesterification Reaction

1.3.2 Downstream processing of Bio-Diesel

Once the reaction is completed biodiesel needs to be processed from the reaction mixture for which separation and purification processes are carried out.

1.3.3 Separation of Bio-diesel

After the transesterification reaction, bio-diesel is a mixture of excess methanol catalyst and glycerol. As a rule, difference in specific gravity of 0.1 in a mixture of compounds will result in phase separation by gravity. Gravity separation is suitable to recover bio-diesel from the process by products.

1.3.4 Purification of bio-diesel

This process is meant to remove impurities from bio-diesel after it is separated from the glycerol layer. These include alcohol, catalyst, entrained glycerol, soap and other impurities [16]. In order to obtain a final bio-diesel product adhering to specification, distillation has been used as the final purification step for bio-diesel production to remove the impurities and unpleasant odor.

II RESULTS AND DISCUSSIONS

The heating was carried out at 65°C with a methanol to oil molar ratio of 6 and 0.75 wt% NaOH. The maximum yield of bio-diesel made from Waste cooking oil under conventional heating was 85% but by microwave heating is 90%. Gas chromatography analysis (Fig.3) precisely measures the percent of free glycerin, mono, di and tri glycerides. Average conversion factors are applied to the mono di and triglycerides to calculate the bonded glycerin content of the sample retention time changes indicate instrument states.

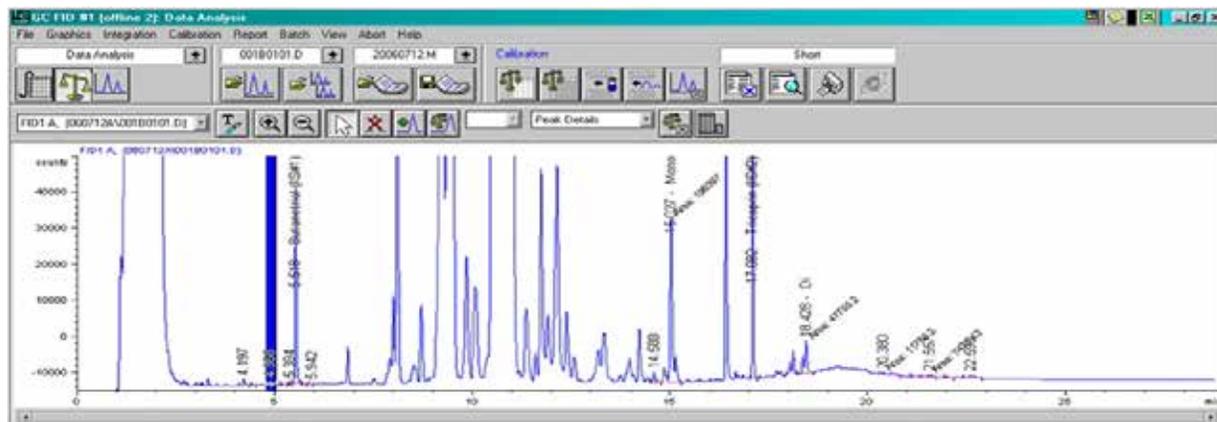


Fig.3: Analysis of Chromatogram

The economic feasibility of biodiesel depends on the price of crude oil and the cost of transporting diesel long distances to remote markets [4]. Cost was analyzed for the production of 1 liter of biodiesel from the waste cooking oil and the expected cost of Biodiesel if extracted from Waste cooking Oil on small scale will be approximately Rs. 50/- per liter. But if the production is taken at a large scale the catalyst and the alcohol can be recovered and reused for several times and thus the cost of production of bio diesel can be further reduces. The properties of Biodiesel

extracted from the waste cooking are mentioned in Table 1 and compared to Petro-diesel and the complete process shown in Fig.4.

Table 1: Comparison of Fuel Properties of Extracted Biodiesel with Petro-diesel

Property	Petro-diesel	Bio-diesel
Carbon, Wt. %	86.8	76.2
Hydrogen, wt. %	13.2	12.6
Oxygen, wt. %	0.0	11.2
Sulphur, wt. %	0.0015	0.0
Specific Gravity 0.85 0.88	0.85	0.88
Viscosity, mm ² /s @	2-3	4-5
Energy content	43	39
Flash Point in °C	60-80	130-170
Cetane No	40-55	47-65
Lubricity	2000 grams	>7000 grams
Carbon residue	0.2%	0.7%

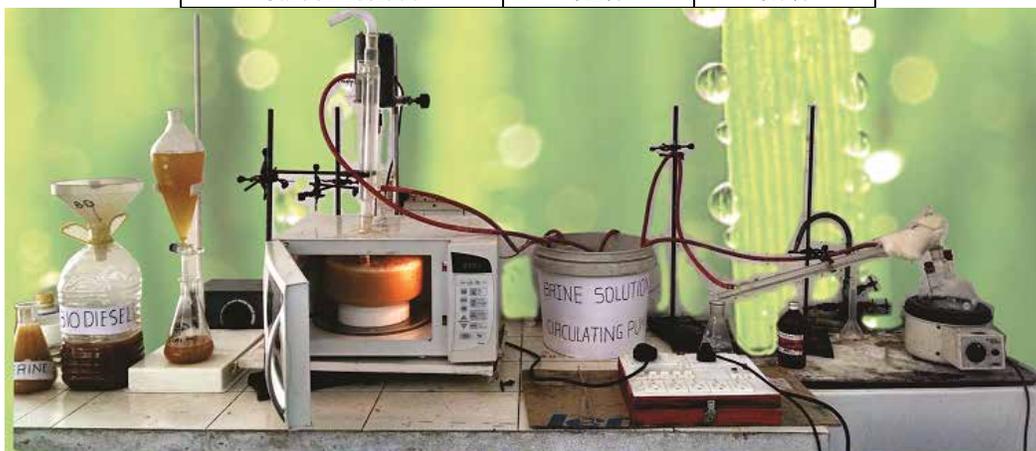


Fig.4: Experimental Process for bio diesel production from waste cooking oil.

III MECHANISM OF MICROWAVE TRANS ESTERIFICATION

The highly effective trans esterification by the microwave heating system is attributed to the direct adsorption of the radiation by the OH group of the reactant. Microwave heating can be more energy efficient than conventional heating because the alcohol and oil mixture gets heated faster and the energy heats only the mixture, not the whole oven compartment. Microwave heating does not reduce the nutritional value of the mixture more than conventional heating. In fact, alcohol and oil mixture heated in a microwave heater may keep more of their nutritional values, because microwave heater can heat more quickly and without adding any solvent. Microwaves are produced inside the oven by an electron tube called a magnetron. The microwaves are reflected within the metal interior of the oven where they are absorbed by solution in the container. Microwaves cause liquid molecules present in the solution to vibrate, which heats the solution. The microwave energy is changed to heat as it is absorbed by solution, and does not make solution "radioactive" or "contaminated."

IV CONCLUSION

Bio-diesel as an alternate fuel for diesel engines has become increasingly important due to environmental consequences of petroleum resources. The main challenges are its cost and availability of raw material. By using the waste cooking oil and converting it to bio-diesel, its cost can be significantly lowered and the negative impact of disposing used cooking oil to environment reduce. The maximum yield of bio-diesel made from Waste cooking oil under conventional heating was 85% but by microwave heating is 90%.

The quality of bio-diesel is most important for engine parts. Hence various downstream processing - separation of bio-diesel from glycerol, purification to recover alcohol, bio-diesel washing, drying and where specified distillation are carried out.

To check the quality of bio-diesel various standards have been specified. As per the analytical methods reported in literature, gas chromatography method has been widely used. The bio-diesel was characterized by determining its density, viscosity, calorific value, cetane number, flash point, cloud and pour points. The characteristic properties of bio-diesel are same as that produced from virgin oil and are generally similar to those of petroleum diesel fuel. The fuel properties of bio-diesel derived from used cooking oil all met the various rational bio-diesel standards.

The bio-diesel produced from used cooking oil can be used in diesel engine without any engine modification. Hence the cost of production of the biodiesel which was the major hindrance for the commercialization of the biodiesel can be reduced by the use of microwave heating technique and increasing the yield of biodiesel production from 85% to 90% and by reducing the power consumption cost.

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A MULTI-SVM BASED DIABETIC RETINOPATHY SCREENING SYSTEM

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ABSTRACT

Diabetic Retinopathy (DR) is an abnormality of the eye in which the human retina is affected due to an increasing amount of insulin in the blood. The early detection and diagnosis of DR is vital to save the vision of diabetic patients. The early signs of DR which appear on the surface of the retina are microaneurysms, haemorrhages, and exudates. This paper presents an automated screening system for Diabetic Retinopathy using Kirsch's edge detection algorithm. Kirsch template technique is used for the extraction blood vessels from retinal images. The Kirsch edge detection algorithm uses a single mask of size 3x3 and rotates it in 45 degree increments. Since the retinal blood vessels can be considered as required foreground information from fundus images, Kirsch algorithm can be effectively applied. The proposed multi-Support Vector Machine (SVM) based system detects new vessel formations in retinal images following preprocessing, vessel extraction, feature extraction, and classification of retinal fundus images.

Keywords : *Fundus Images, Haemorrhages, Lesions, Microaneurysms, Neovascularization, Vasculature.*

I INTRODUCTION

Diabetes is a disease caused when the pancreas does not secrete enough insulin or the body is unable to process it properly. Diabetic Retinopathy (DR) is an indication of diabetes leading to the deterioration in the level of eyesight of the patient due to the unusual growth of retinal lesions, viz. exudates, haemorrhages and microaneurysms. The blood vessels in the retina swell and leak fluid or even close off completely. In some cases, neovascularization occurs which is the abnormal or excessive growth of blood vessels in the retina.

Diabetic retinopathy usually affects either or both the eyes, damaging the tiny blood vessels inside the retina. People with DR does not usually notice the changes in vision in the initial stages. The symptoms of DR include :

- Blurry vision.
- Rings or blank spots.
- Pain or pressure in one or both the eyes.
- Vision through the corners of the eyes are affected.

DR is analyzed by the abnormal growth of retinal lesions. Microaneurysms are tiny swellings in the walls of the blood vessels which appear as small, round, red spots. They arise due to the rapid growth of weakened capillaries attempting to revascularize the affected retina. Microaneurysms are not permanent features appearing on the retina due to retinopathy, they may even disappear. Sudden appearance of numerous microaneurysms is an indication of worsening of the disease. Exudates are fluids that have been slowly discharged out of the tissues due to rupturing of the walls of blood vessels. Hard exudates consist of lipoproteins and other proteins leaking through abnormal retinal vessels. They appear as yellow organic deposits which may include fats, oils, waxes etc. Haemorrhages occur due to the bursting of weakened capillaries. They appear as small dots, or larger blot haemorrhages present within the densely packed deeper layers of the retina. Microinfarcts or soft exudates appear in the advanced stages of the disease due to vascular occlusion and they appear as white lesions with vague margins and forms a depressed area when healed, due to tissue loss.

Diabetic retinopathy is divided into several stages such as mild, moderate, severe and proliferative DR as explained below :

- (a) Mild non-proliferative retinopathy: Microaneurysms, i.e., small swellings in the tiny blood vessels of the retina will be formed in this stage.
- (b) Moderate non-proliferative retinopathy: As the disease progresses, some blood vessels that nourish the retina are blocked.
- (c) Severe non-proliferative retinopathy: Many more blood vessels are blocked, depriving several areas of the retina of their blood supply. The affected areas of the retina begin to show sign of ischemia (lack of oxygen) such as blot hemorrhages, bleeding of the veins and intra-retinal micro-vascular abnormalities.
- (d) Proliferative diabetic retinopathy (PDR): At this advanced stage, the vasoproliferative factors produced by the retina begin to trigger the growth of new blood vessels. These new blood vessels are abnormal and fragile.

The disease/no disease automated grading system do provide benefits, but an additional objective is to develop a system capable of triaging images. This should include the ability to detect and prioritize DR images to ensure immediate attention and treatment. The automatic detection of DR has received a lot of research attention, with studies investigating microaneurysms and haemorrhages and exudate detection [1-12].

Zhang[13] proposed a modified matched filter that used double sided thresholding. The main emphasis was not on the increased segmentation of new vessels, but instead the reduction of the false response to exudates which can cause large local densities on the segmented map and therefore can be mistaken for new vessels. B.Zhang [14] applied the matched filter with the first-order derivative of the Gaussian to reduce the false response to exudates. Ramlugun [15] described a small vessel extraction technique, the main contribution was the varying of the clip limit for contrast limited adaptive histogram equalization (CLAHE) to allow more contrast for small vessels. The following new vessel detection methods applied vessel segmentation prior to the described analysis methods.

Daxer[16] and Karperien [17] both described the retinal vasculature as a fractal and used the fractal dimension to quantify its complexity to indicate the presence of new vessel growth. Jelinek[18] extracted morphological features based on data obtained from the application of the derivatives of Gaussian wavelets to the vessel skeleton. Goatman [19] developed a comprehensive set of 15 features including the number of vessel segments, the mean vessel wall gradient and various tortuosity measures to detect new vessels on the optic disc. Akram

[20] proposed a Gaussian mixture model based classifier with a 5 dimensional feature set based on intensity and gradient values. Hassan[21] used just two local features, the number of vessels and the area of vessels within a small scanning sub-window to indicate new vessels.

R.A. Welikala, V. Tah, T.H. Williamson [22] proposed a method in which the majority of normal vasculature was removed from the vessel map to simplify new vessel detection. Statistical texture measures calculated using the grey level co-occurrence matrix (GLCM) were applied by Frame [23] to identify irregular distributions of pixel intensities associated with neovascularization. Acharya [24] calculated texture features from the GLCM and the run length matrix to identify the stage of DR. Agurto [25] utilized multi-scale amplitude modulation frequency modulation (AM-FM) methods for spectral texture analysis to characterize different retinal structures, including new vessels. However, later work by Agurto [26] involved AM-FM along with granulometry and vessel segmentation to detect new vessels on the optic disc.

M.Usman Akram, Shehzad Khalid, Anam Tariq and M.Younus Javed [27] proposed a new method for detection of abnormal blood vessels and grading of proliferative diabetic retinopathy using multivariate m-Medoids based classifier. The system extracts the vascular pattern and optic disc using a multilayered thresholding technique and Hough transform respectively. It grades the fundus image in different categories of proliferative diabetic retinopathy using classification and optic disc coordinates.

True comparisons on the results are difficult to make in some of the above papers as no standard datasets have been used for testing. Also, the testing becomes too slow as the number of hidden layers increases in the back-propagation algorithm used and the algorithm diverges unless the covariance values are regularized.

II PROBLEM DESCRIPTION

Diabetic Retinopathy is a complication of diabetes which causes vision impairment on patients with diabetes for 10 years and above. The disease affects the circulatory system of the human body, including that of the retina. Thus oxygen supply to the visual system is reduced to a bigger extent and it causes swellings on the retinal vessels. Also retinal lesions are formed which includes haemorrhages, microaneurysms and exudates. These are the symptoms for the disease, which will not be visible in the initial stages of the disease. Therefore, unless the patient takes regular examination of the disease, it cannot be identified and thus not cured.

This paper puts forward a system with which the severity of the disease can be identified by examining the retinal photograph of the patient. The retinal photograph of the patient is examined by this automated system and by studying the retinal features of the patient from this retinal photograph, the disease classification will be done by this system.

For this purpose, the authors have implemented a technique called Kirsch's edge detection algorithm which automatically detects the newly formed edges in the retina. The method also sets and resets new threshold values by itself which helps in this automated detection technique.

Retinal features are extracted to analyze the changes in each stage of the disease. So by using these feature values, the threshold can be set such that the proposed multi-SVM based system automatically classifies the stages of the disease by analyzing the particular range of feature values.

III METHODOLOGY

As the number of diabetes affected people are increasing worldwide, the need for automated detection methods of diabetic retinopathy is very much significant. In order to have an automated system to automatically detect diabetic retinopathy, a computer has to interpret and analyze digital images of the retina. Fig.1 shows the flow chart of the proposed system.

As said in the flowchart, the steps followed include preprocessing, vessel extraction, feature extraction and classification. The preprocessing is done to enhance the data images prior to computational preprocessing. Preprocessing commonly involves removing low-frequency background noise, normalizing the intensity of the individual particles in images, removing reflections and masking portions of images. Preprocessing of the fundus image can significantly increase the reliability of an optical inspection.

Vessel extraction step extracts the blood vessels from the retinal images and helps for extracting the features from them. The classification process categorizes the disease into the corresponding severity stages by the feature values obtained by performing feature extraction. This paper presents a multiple-Support Vector Machine (SVM) learning technique by which the weakness of simple SVM classifier of just clustering into two data-sets has been overcome.

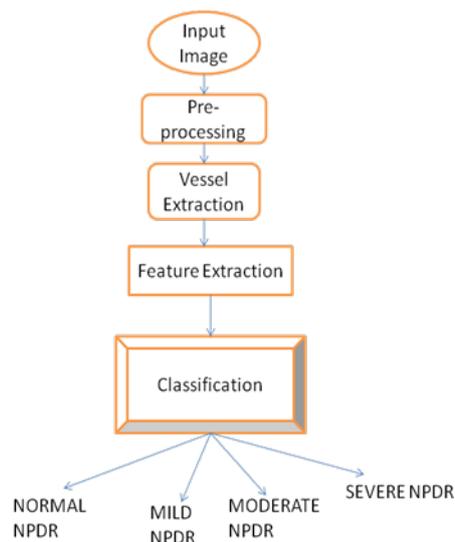


Figure 1: Flow-chart of the proposed system.

3.1 Vessel Extraction

The extraction of retinal blood vessel is an essential step for the diagnosis of various eye diseases. Retinal images of humans play a crucial role in the detection and diagnosis of several eye diseases by the ophthalmologists. The information about blood vessels, such as length, width, diameter and branching pattern, can help to diagnose the symptom of diseases. With the help of computer aided diagnosis (CAD), the success rate of the treatment of these diseases may increase significantly.

3.1.1 Kirsch's Method of Edge Detection

Edge detection is a process of identifying the pixel values in order to get frequent and abrupt changes. Kirsch templates of size 3x3 are used for the extraction of blood vessels from retinal image. Edge information of a

particular and target pixel is checked by determining the brightness level of the neighboring pixels. If there is no major difference in the brightness levels then there is no possibility of edge in the image.

In this paper Kirsch template technique is used for the extraction blood vessels from retinal images. The Kirsch edge detection algorithm uses a single mask of size 3x3 and rotates it in 45 degree increments through all 8 directions.

The edge magnitude of the Kirsch operator is calculated as the maximum magnitude across all directions. The matrix contains the information of a pixel and its neighbors. The Kirsch algorithm detects direction of the edge as well as an edge. Accordingly, there are eight possible directions : South, East, North, West, North-East, South-East, South-West and North-West. Out of the several templates the biggest one is considered for the output value and later the edges are extracted. Kirsch template can set and reset the threshold values to obtain most suitable edge of images. Kirsch template works well for images having clear distinction between the foreground and background. Since the retinal blood vessels can be considered as required foreground information from fundus images, Kirsch algorithm can be effectively applied.

3.2 Feature Extraction & Classification

Features are the individual measurable properties which help for classification. A good feature should be consistent over several images of the same scene. Features should be invariant towards certain transformations and should also be insensitive to noise. Feature extraction is the process of generating features to be used in the selection and classification tasks which constructs a set of application-dependant features.

Classification is a process in which individual items are grouped based on the similarity between the item and the description of the group. The classification task determines which parts of the image belong to the object of interest. This paper presents a multi-SVM based diabetic retinopathy screening system. SVM normally classifies data into two clusters. The main advantage of this multi-SVM based system is that it can be used to classify the object of interest into two or more clusters by which the normal, mild, moderate, severe and proliferative stages of the disease can be distinctly classified.

IV RESULTS & DISCUSSIONS

In this section, the simulation results are presented. The fundus images has been collected from the Diabetic Retinopathy Database, DRIVE Database and from **Vasan Eye Care Hospital, Chaithanya Institute of Ophthalmology and Visual Sciences, Trivandrum.**

The input retinal image is in the RGB format, which is shown in Fig.2. The image in Fig.2 is converted into the grayscale range as shown in Fig.3.

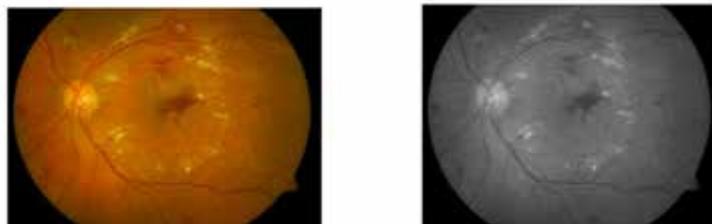


Figure 2 : Input fundus image. Figure 3 : Gray-scale Image.

The RGB to Grayscale conversion is done to increase the dynamic range of the image. Also, the retinal features can be analyzed much easily using the grayscale form of the image.

Fig.4a) shows the histogram of the grayscale image shown in Fig.3. The histogram of the image is taken to represent the intensity values of the image graphically. Histogram equalization is performed to represent the scattered average values in the original histogram. Fig.4b) shows the equalized histogram of the input image.

The grayscale image is adjusted such that it becomes considerably sharp and retinal features are displayed more clearly, which is shown in Fig.5a). Contour mapping of the adjusted input is showed in Fig.5b) which clearly depicts the retinal lesions.

Fig.6 shows the 8 possible vessel extracts of the input retinal image, obtained by using the Kirsch's Template or Kirsch's edge detection algorithm.

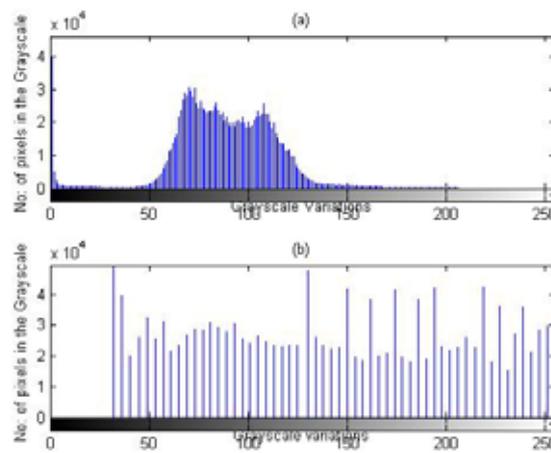


Figure 4 : a) Histogram of the grayscale image, b) Equalized histogram of 5 a).

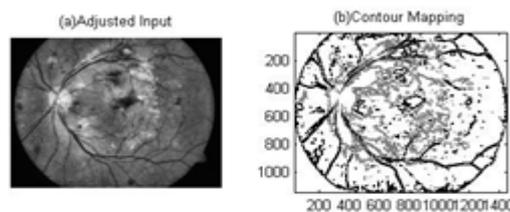


Figure 5 a) Adjusted input. b) Contour Mapping of the adjusted image.

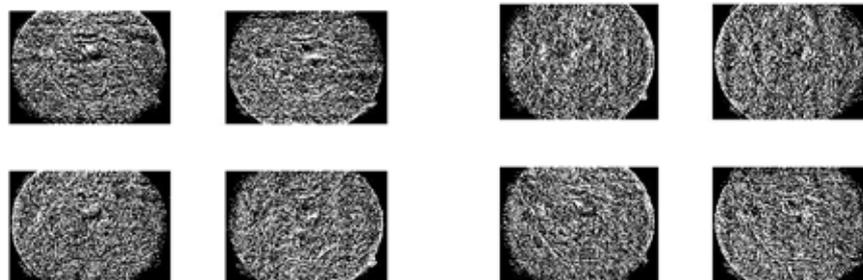


Figure 6 : Eight Possible Vessel Extracts of the input image using Kirsch's Template.

The difference in the major stages of the disease can be figuratively represented as in Figures 7-11 along with their graphical histogram and equalized histogram representations. The changes in the histogram are due to the variations in the texture and feature values of the different images used. Fig.12 represents the outcome of the multi-SVM based classification process.

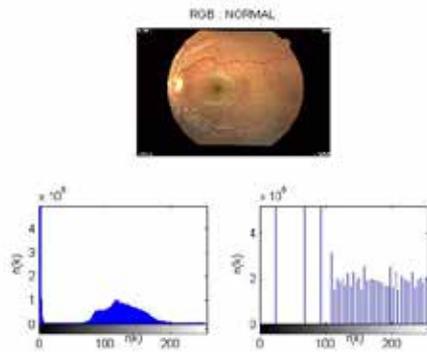


Fig 7 : Representation of the Normal stage of DR.

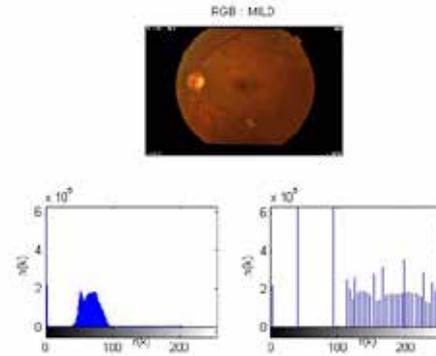


Fig 8 : Representation of the Mild stage of DR.

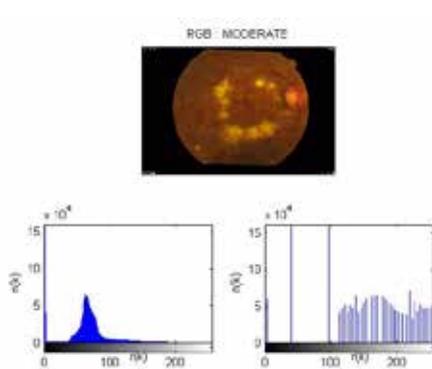


Fig 9 : Representation of the Moderate stage of DR.

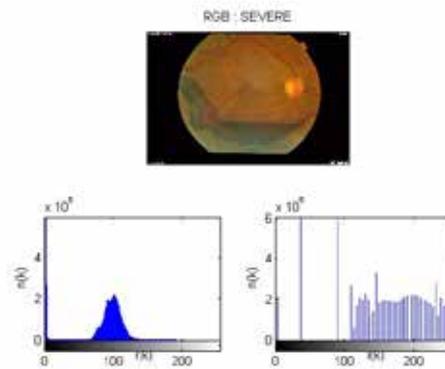


Fig 10 : Representation of the Severe stage of DR.

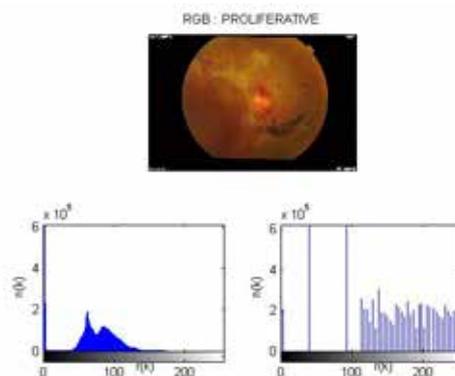


Figure 11 : Representation of the Proliferative stage of DR.



Figure 12 : Result of the classification task.

V CONCLUSION

In this paper, a system for the reliable grading of fundus images has been presented for different stages of DR. A four stage model, comprising preprocessing, vessel extraction, feature extraction and classification, has been proposed. The preprocessing phase extracts background pixels to enable the processing of the further stages on the foreground pixels only. The main components, such as the vascular pattern and optic disc, are also extracted in the first phase to facilitate the later steps. The second phase performs the blood vessel extraction from the retinal images. Feature extraction phase extracts the available features from the retinal images for the purpose of grading of the disease in the final phase. The structural-SVM based classifier classifies the severity of diabetic retinopathy based on the features obtained from the retinal photographs.

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DESIGN MOSFET BASED TRANSMITTER FOR ONCHIP INTERCONNECTS

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ABSTRACT

The growing demand for wide bandwidth communication in a serial link transceiver within the integrated circuits calls for large number of high speed inputs and outputs per chip. In serial link transceiver propose various techniques to achieve low swing signals. These techniques are used to transmit the signals through interconnects using different types of drivers and receivers. Objective of this work is design a driver circuit in transmitter using MOSFET. The proposed transmitter achieves less delay compare to repeater insertion method. In driver circuit both current mode and voltage mode multiplexers are used to drive on-chip global interconnects. In voltage mode multiplexer consumes less power than current mode. But current mode has less delay, low swing and achieves wide bandwidth. In this work illustrates current mode driver and to implement some low swing techniques to compare the results such as power, delay, energy, swing, bandwidth. The low swing techniques are Conventional Level Converter (CLC) and Symmetric Source Follower Driver with Level Converter (SSDLC). The proposed transmitter implemented using 180nm technology through simulation with Synopsys HSPICE.

Keywords: Low Swing, Voltage Mode Driver, Current Mode Driver

I. INTRODUCTION

In transmitter circuit both voltage and current mode techniques are used to transmit the signals. In order to achieve low swing and propagation delay we propose pseudo NMOS multiplexing based current mode driver and also to implement some low swing techniques. The low swing techniques are conventional level converter and symmetric source follower with level converter. In that proposed techniques driven by a factor of two compare to that using repeater insertion techniques. Transmitter circuit implemented by Hspice simulator using 180nm technology.

II. SIGNALLING TECHNIQUES

Depending upon the physical arrangement of the wire channels of data links, electrical signaling schemes for data transmission over wire channels can be classified into single ended, fully differential. In an effort to reduce the intrusion of repeater logic, reduce power dissipation, and potentially drive longer distances, differential low swing signaling may be employed. They can also be categorized into voltage mode and current mode signaling schemes on the basis of the carriers of data links.

2.1 Voltage Mode Signaling

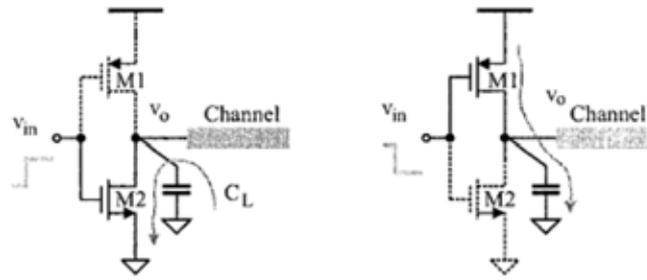


Fig 2.1 Voltage Mode Signaling.

The signal conveyed to the channel by the driver is the output voltage of the inverter. It is determined from

$$C_L \frac{dv_o(t)}{dt} + \frac{dv_o(t) - V_{DD}}{R_p} - C_L V_{OL} \delta(t) = 0 \quad (\text{Rising edge}) \quad (2.1)$$

$$C_L \frac{dv_o(t)}{dt} - C_L V_{OH} \delta(t) + \frac{dv_o(t)}{R_n} = 0 \quad (\text{Falling edge}) \quad (2.2)$$

where R_n and R_p are the channel resistance of the NMOS and PMOS transistors in the triode, respectively, C_L is the load capacitance of the driver, V_{OL} and V_{OH} are the voltage of Logic-0 and Logic-1 states, respectively, $C_L V_{OL} \delta(t)$ and $C_L V_{OH} \delta(t)$ quantify the effect of the initial voltage of the load capacitor at the onset of charging and discharging.

2.2 Current Mode Signaling

Current mode signaling offers the advantages of low supply voltage requirement, a small propagation delay, superior signal integrity, low switching noise, and low power consumption. The single-ended signaling scheme cannot reject the noise coupled to the channels. In addition, the channels of data links with single ended signaling have a large inductance and are sensitive to inductive interferences from other sources.

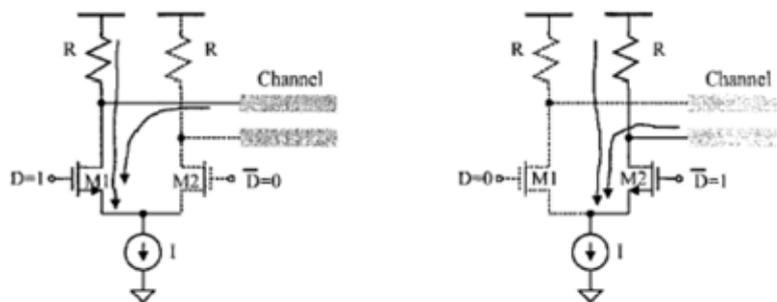


Fig 2.2 Current Mode Signaling.

Fully differential signaling effectively rejects the noise coupled to the channels at the cost of two conductors per channel. Data links with fully differential signaling have a small channel inductance and a low electromagnetic emission. At the receiver side, together with the drawback of voltage-mode signaling, limit data rates. Current

mode incremental signaling, on the other hand, achieves high data rates by utilizing the advantages of the fully differential and current mode signaling schemes. Data links with current mode incremental signaling have a small channel inductance and a low level of electromagnetic emission.

III. DRIVER (TRANSMITTER) CIRCUITS

A transmitter circuit encodes a symbol in to current or voltage for transmission over a line. A good transmitter for driving interconnects has output impedance optimized for selected transmission mode.

3.1 Voltage Mode Driver

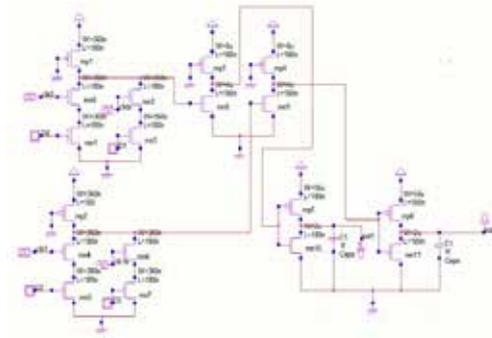


Fig.3.1 Voltage Mode Driver

Transmitter consists of multiplexer, predriver, output driver. The transmitter multiplexes parallel data (D0-D3) generates differential serial data output and drives it to interconnect segment. Pseudo NMOS voltage mode multiplexer requires only one driver for all the inputs. Input data and depending on the selected line the output to be high. The signal is driven by the predriver. Predriver nothing but static inverter used to reduce the output delay and convert full swing signal into limited signal. Finally Output Driver to reduce the swing and reducing power consumption. In Voltage mode driver the capacitor is charging and discharging the signal value is 1F. Similarly the complement signal is generated using the complemented data inputs to output.

3.2 Current Mode Driver

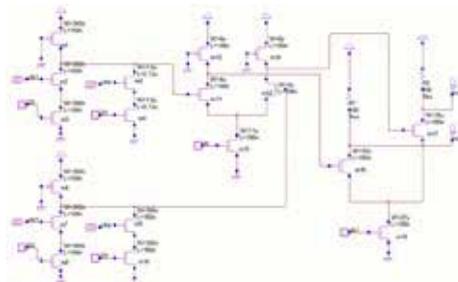


Fig. 3.2 Current Mode Driver

The large size of MOS voltage mode drivers and the large amount of delay and energy consumed by the required predrivers are a significant disadvantage of voltage mode signalling. The current mode drivers are significantly faster and more power efficient than low impedance voltage mode driver. So to reduce output

delay, current steering driver should be used with limited swing predriver. It consists of a 4 : 1 multiplexer, a preamplifier, and an output driver. The transmitter employs dual pseudo NMOS multiplexers at its input, one for the signal and one for its complement. Each multiplexer input is switched by two series NMOS that are gated by two adjacent clock phases in the same manner that the driver pull downs are gated by adjacent clock phases.

3.3 Conventional Level Converter (CLC)

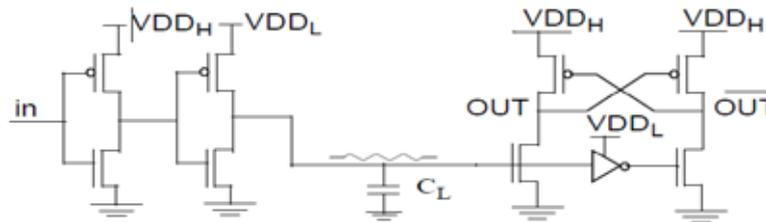


Fig. 3.3 Conventional Level Converter

The driver uses an extra supply with lower voltage to drive the interconnect from 0 to V_{DDL} . The receiver is actually a differential amplifier, with an internal inverter to generate a complementary input signal. This circuit achieves a quadratic energy saving on the interconnect, proportional to V_{DDL}^2 . Moreover, V_{DDL} should be large enough to ensure a reasonable noise margin. With $V_{DDH}=2.0V$, the optimal V_{DDL} for minimum energy delay product is 1.1V, which reduces the overall energy to 40% of that of full swing circuit.

3.4 Symmetric Source Follower with Level Converter (Ssdlc)

The circuit of SSDLC scheme is shown in Fig.3.4. The driver drives the interconnect with an output swing from V_{tn} to $V_{dd} - V_{tn}$, shown as node $in2$ in Fig.3.4. The threshold voltages are subject to the body effects. The basic idea of the symmetric level converter is similar to the one in Hitachi circuit.

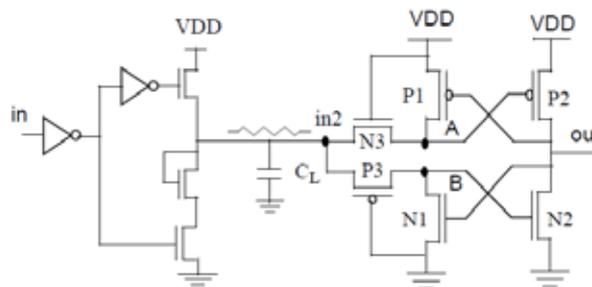


Fig.3.4 Symmetric Source Follower Driver with Level Converter

IV. PERFORMANCE CHARACTERISTICS

Table 4.1 Performance Characteristics in avg, peak power, delay

SCHEME	AVG POWER	PEAK POWER	DELAY
VOLTAGE MODE	1.0922E-02	1.4507E-02	2.7351E-10
CML	2.3155E-02	2.4911E-02	1.872E-10
CLC	2.8255E-04	2.1975E-03	5.9459E-10
SSDLC	9.9197E-04	3.7262E-03	1.1097E-10

Table 4.1 shows that comparison of average, peak power, and delay. Compare to voltage mode, the current mode logic consume more power but delay reduced. In order to reduce the power CLC and SSDLC techniques to be used.

Table 4.2 Performance characteristics in swing, energy, and rise time fall time

SCHEME	SWING	ENERGY	RISE & FALL TIME
VOLTAGE MODE	1.8037	1.0803E-10	2.0102E-10 & 1.8173E-10
CML	1.0914	2.2922E-10	1.6737E-10 & 1.6737E-10
CLC	1.9003	1.7443E-12	8.8059E-11 & 2.9731E-10
SSDLC	7.3711E-01	5.8785E-12	-

Table 4.2 shows that comparison of Swing, energy, rise and fall time. Compare to CLC, voltage mode, CML, SSDLC achieve less swing. Less energy achieved by CLC and SSDLC. In SSDLC technique cannot measure rise and fall time because of output goes to low state.

V. CONCLUSION

In this work, the differential current mode transmitter for on-chip serial interconnect using pseudo NMOS logic based multiplexer has been proposed. To implement current mode to achieve low swing and delay can be reduced but consumed more power than to voltage mode. So in order to reduce the power, two low swing techniques has been proposed. In summary reducing the swing on interconnect is an effective & powerfull tool for the minimization of energy dissipation but requires a judicious optimization with respect to robustness, design complexity and energy dissipation. As a future, MOSFET has high leakage current due to scaling of transistor at below 32nm technology. So to reduce the leakage current propose CNTFET based transmitter for both voltage mode, current mode driver and to compare the results.

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A GREEN IT STAR MODEL APPROACH FOR SOFTWARE DEVELOPMENT LIFE CYCLE

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ABSTRACT

Green software engineering is a principal software engineering process in the 21st century. In the Last few years there is a lot of research going on which is based on Green Information Technology and Sustainable Software Engineering. However till now there no is clear idea about how to achieve the Green and Sustainability in SDLC phases (Software Development Life Cycle) .To fill this gap this work proposes a new software model called as SDLC Energy Star Model in each phases of the life cycle of Software Engineering In this paper it is proposed to implement the star values and tried to achieve the Green and Sustainability in SDLC.

Keywords: *Information and Communication Technology (ICT), Environmental protection Agency(EPA), Management Information System (MIS), Software Development Life Cycle(SDLC), Small Business Administration (SBA), Enterprise Resource Planning (ERP), Customer Relation Management (CRM), Non Function Requirements (NFR), Capability Maturity Mode (CMM).*

I INTRODUCTION

Now a days creating eco friendly software and IT products are very important concepts in software and hardware industries. In both developing and developed countries the software engineers are giving more importance only for eco friendly products. [1] The objective of eco friendly principles are mainly focused on reducing carbon consumptions, hazardous wastes and saving energy. If these companies concentrate on reducing carbon consumptions, hazardous wastes and to save energy they may lose the concentration on performance quality and sustainability of the product. It is a major issue of the product based and the production based software development and hardware manufacturing companies. [1] Technology integration to eco friendly principles can induce an organization to achieve maximum performance without giving bad impact to the environment. These efforts are popularly called as Green IT. To fill this gap this paper proposed a following methodology (i.e.) In SDLC (Software Development Life Cycle) phases, requirement, design, coding, testing and implementation. This paper implement the energy star for each of the phases like electronics appliances in developing countries.

The remainder of this paper is organized as follows. In Section I introduction to the problem domain was presented. Section II gives an overview of the literary review in the field of Green Software Engineering. The section III

describes about the proposed work used for finding Green and Sustainable Software Engineering methods. The section IV gives the conclusion about the new model and future research in this model.

II. LITERATURE SURVEY

The study of Green and Sustainable development was first introduced at the World Convention on Environment and Development in 1987[4]. It defined the Green software process as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It soon becomes a paradigm for software organizations. The research started with the software safety and security in the initial stages and currently focus was shifted to reduce waste or raw materials and save the environment, the concept of Green software becomes increasingly complex [5].

The hardware aspects are covered by Green IT concepts where many publications on sustainability of data centers were published. For instance, the code of conduct for data center efficiency [6]. There is no execution model and software tools to identify the estimation of energy consumption in these early design stages[7]. This mixed role puts technology organizations under tremendous conflicting pressures, internally they are eco friendly and externally they are expected to design new products that improve the sustainability of the society at large[8]. In the quality aspect the commoditization has resulted in the software industry coming under increasing pressure to develop and to deliver greater volumes of high quality products and services within cost and schedule constraints that are tighter than ever before[9].

This paper [10] pointed out lot of aspects related to quality. The quality is one of the aspects in testing of software where codes written by an automatic interpreter have less efficiency than codes written by an experienced developer. The paper [11] shows how the power reduction can be achieved through improved software design. It also pointed out the role of software engineers in reducing the power consumption of the application. This work [12] outlined about the importance of classification for Green quality factors and defines about the Green metrics. The work [13] discussed about the approaches which lead to identify challenges based on quality, requirement and design.

How does the sustainability differ from other approaches?

- 1) What are the types of requirement gathering method that lead to sustainable s/w solutions?
- 2) How do they differ from traditional Non Function Requirements (NFR) on requirement perspective?

The author [5] proposed software security considerations from 1980 to 2010 era, in which the developers focuses mainly on requirement and process, secure computations, verification of systems, software piracy protection ,architecture and design of secure systems, and trusting components are the secured development factors. In the year 1990 to 2010 the developers were focused designing for safety, testing at different levels for reliability and safety, certification and standard resources available on software safety requirements and analysis and hazard analysis are the above factors that comes under the software safety considerations.

In the year 2010 software sustainability considerations safety is an emergent property that arises when the system components interact within an environment [14].The supporting sustainability requires knowing the stakeholders as the key challenge and success factor for all the projects also for the sustainable and Green software. There is a lot of effort trying to combat pollution issues especially the European Union (EU) cap is the limited amount of emission from each country and it can be traded in the form of emission permit. Installations are able to hold credit but it will not be allowed to exceed the cap. However if the installations would like to emit more gas they have to pay in order to obtain credit, therefore not only carbon foot print or hazardous substance but also environment foot print has to be monitored closely by manufacturers. This method has to be set for software development industries[15]. Reducing the energy consumption and overall environmental impacts of data centers have become an important research area in future [16].The European commission's Europe 2020 strategy has targeted three key areas for sustainable growth. They are

- 1) 20% increase in energy efficiency
- 2) 20% reduction of green house gas emissions and
- 3) Increase the share of renewable energy by 20%.

So more concentration is required in these areas in both developed and developing countries. [17]

Software development plays a specific role in creating rebound effects. The usual response of software engineers is to increase the processing power and storage capacity available at a given price is to capture more of the same [18].This paper focuses on the Green potential of clouds such as:

- 1) How they have to be deployed for different user levels highlighting the related environmental risks?
- 2) Giving the growing importance of cloud computing the question is not whether it is green as it is now but how it can became really green?
- 3) Awareness and responsible behaviors are background condition to achieve sustainable and Green cloud computing.

One of the pillars of the information society strategy of the European Union is the application of ICT(Information and Communication Technology) to improve the quality of life and to foster environmental care and sustainable development [28]. Over a third of organizations in Europe do not implement Green IT practices the most prominent reason given is that there is no official legislation in their countries in enforcing Green IT practices. Less than one fifth of the organizations actually monitor how employees reduce their energy consumption [19]. The paper empirically analyzed the energy consumption induced by comparable MIS(Management Information System) applications namely, ERP(Enterprise Resource Planning) CRM(Customer Relation Management) and DBMS(Data Base Management System) and found out that:(i) not only infrastructural layers, but also the MIS application layer does impact energy consumption up to70% (ii)different MIS applications are satisfying the same functional requirements to consume significantly different amounts of energy (differences up to 145%), and (iii) in some scenarios energy efficiency cannot be increased simply by improving time performance.[38]In this proposed model

they try to cover the five sustainability dimensions and propose generic aspects for each one. For each generic aspect one can associate more detailed and quantifiable properties.

2.1 Requirement Engineering Perspective

Requirement engineering involves eliciting, analyzing, documenting and maintaining the complex set of requirements for a software system. [35] In this paper [35] the author raised the 3 types of research related questions about support of environmental sustainability by requirement engineering such as:

- 1) How to make environmental sustainability a first –class quality objective for development?
- 2) How does the necessity can be implemented in a requirement approach?
- 3) How can one assess the impacts of a given software system for environmental sustainability, including both direct and indirect effects and considering different groups of stakeholders?

[40] Applying the principles of system thinking, sustainability can be defined as preserving the function of a system over a time span.

2.2 Design Perspective

In software engineering, a design pattern is a general reusable solution to a commonly occurring problem in the software design process [20]. The work [21] pointed out the considerations on Green and sustainability in the design process. This paper focused on a lot of ideas about how to promote Green software values. Energy efficiency should be given more important when it comes down to general algorithm efficiency where there is a need to make thing runs fast with less hardware. But this is amplified and driven by pricing schemas of cloud resources and cost saving: that needs to write efficient software that can do more with limited resources. This will translate into power efficiency when there is an increase in the amount of work done per CPU Cycle.

There is a myth on Green software engineering which denotes that if the software is built more efficiently then it will consume less energy. So there is a need of global standard which should be bigger than any practitioner who promotes it. Otherwise it will be really hard to raise the awareness. The work [22] describes the best examples for studies published on the average electricity consumption of a single Google search query. In 2007 EPA (Environmental Protection Agency) data center reported to the US congress that by 2011 the peak load will be generated on the grid by data centers in US alone. It would be close to 12 GW which is equivalent to the output from 25 base load power plants where research community need to focus on this area.

In terms of chip manufacturing, a study [22] shows that the amount of resources and energy consumed are measured as a ratio against the weight of the final product (chip) which is one of the highest amongst all manufacturing industries. Thus the environmental impacts of these associated manufacturing industries should also be considered when analyzing the ecological impact of a computer. Many developing countries do not have efficient recycling facilities for packaging and shipping of computers. In the point of disposal many developed countries have introduced laws for e-waste recycling but owing to the high operational costs, most e-waste ends up in developing

countries where appropriate recycling facilities and stringent environmental laws do not exist. The author proposed a solution for these environmental issues with the use of virtualization with Green. But again that the use of virtualization with Green also raises many research oriented questions for future investigation. [23]

Designers of software technology are responsible for the long term consequences of software designs. There is a perception that sustainability is a distinct discipline of research and practice with few defined connections to software where as sustainability is a pervasive concern that translates into discipline-specific questions in each area it applies [24]. Programmers should write efficient algorithms via writing a compact design of codes and data structures based upon the application, programming language, and the architecture of the hardware but optimization comes from only through experience.[25] (Re-)Designing business models and business processes according to the principles of sufficiency (instead of maximizing port) and decoupling of resources from economic growth.

2.3 Coding (or) Development Perspective

The coding methodology will differ from experienced developer to fresh developer, the experienced developer will develop or write a code in optimized style, but fresher will write in their own style which is not proper optimization of coding approach. So one have to consider this aspect also for developing the coding and the style. [36] This process is described in three aspects like system, function, and time horizon. System is a software development company, function with minimized environment impact and sufficient economic balance and time horizon depends on the company size and the general duration of the projects. In development process the company needs to concentrate about energy efficiency, energy consumption and performance based suitability of development of coding. [37] The increasing usage of computers and other electronic devices (for example smart phones, sensors) are continuously impacting ones overall energy consumption. By raising energy costs in computers and in mobile devices which implies the optimization and the adaptation of computer system with this point of view both the companies and the developers implement the sustainability then one will give the 3rd star for that companies,

2.4 Green Metrics

There are different approaches that are related to Green metrics of the software [26]. This paper pointed out the Green software metrics that are defined in the software engineering literature and also raised two research related questions on Green software engineering and Green metrics such as

1. What Green metrics have been proposed in software engineering literature?
2. How Green metrics can be classified?

This paper also pointed out many Green software metrics which are used in the software engineering literature. A Green factor defines the Green software must fulfill the properties. It needs one or more Green metrics which measures the factor fulfillment in software for instance if one Green factor stillness. [10] This paper additionally pointed out how to obtain Green quality which is determined. The work presented [32] the quality assurance techniques corresponding to the requirements which are needed; it necessitates future research in establishing sustainability metrics as well as assessment techniques. In [7] Green soft model it has the ability to represent three

categories of sustainability criteria and metrics for software products they are (I) common quality criteria and metrics (II) directly related criteria and metrics and (III) indirectly related criteria and metrics. Depending up on the classification the quality properties “Modifiability” and Reusability” take effect in the development phase, where as the properties “portability, supportability, performance, dependability, usability, and accessibility” take effect in the usage phase. In [27] a Green model for sustainable software engineering energy awareness in systems can be obtained and calculated through Green metrics such as the Green Performance Indicators(GPIs) found in[28,29,30,31]here GPIs are classified into four classes here GPIs are classified into four classes: IT Resource Usage GPIs that compute resource usage, the Application Life cycle KPIs(Key Performance Indicators) that define efforts required to develop or redesign applications and reconfigure IT-infrastructure, the Energy Impact GPIs that represent the environmental impact of data centers, and the Organizational GPIs that describe organizational factors..[32] Green IT will happen only when all the stakeholders involved in delivering and consuming IT services are aware of the functionality of the service delivers and of the relationships between the associated Quality of service levels and environmental-impacts metrics. The work [33] presented that Information Technology (IT) can be regarded as a special resource for business processes. On one hand, IT is useful for collecting, processing and providing information in order to determine and to improve ecological indicators for business processes from the perspective of “IT for Green”. On the other hand, IT itself requires natural resources for the design, manufacturing, use, and disposal of the required hardware and software (perspective “Green for IT”).In the work [22] Green metrics are used as a tool to measure the actual carbon footprint of SBAs(Small Business Administration). This makes measure ones an eligible keyword for one’s search strategy. The work [34] presented a generic metric to measure software and a method to apply it in a software engineering process. All the metrics related approach will help in tuning and in defining the quality of the application developed by the company, the quality control and the quality assurance will derived only with help of testing

2.5 Implementation or Maintenance

It is important to concentrate these approaches in two point of view (36) (i) whether that company produced a new application for the new customer.(37) (ii) whether that customer already used an application for that customer the company is providing a new technologies It is like that one need to think about the old system and about the disposal[37] sustainability of the software system during its maintenance period until replacement by a new system includes continuous monitoring of quality and knowledge management. [39] Green IT shows that information technology can also help to create a sustainable environment through the following

1. Modifying supply chain , production activities and organization flow
2. Creating more efficient business operators, buildings and system.
3. Helping the decision making process by analyzing modeling, and simulating of environmental impacts that may occur
4. Auditing and reporting the organization’s energy consumption and savings

III. PROPOSED WORK

From the literature survey the following research challenges are identified for the use of SDLC (Software Development Life Cycle) technique in the area of sustainable software using Green technologies. In the previous study of the work there is no high importance for the requirement analysis related to Green. If much concentration given to this phase throughout the life cycle it becomes Green. In this analysis phase one have to raise a question in the aspect of sustainable software engineering using Green technologies. Based on this problem a new model was proposed in this research work. Figure 1 shows the how the CMM(Capability Maturity Model) model is working equivalent to the SDLC approach ,and also shows the star values for each phases.

SDLC Energy Star Model.

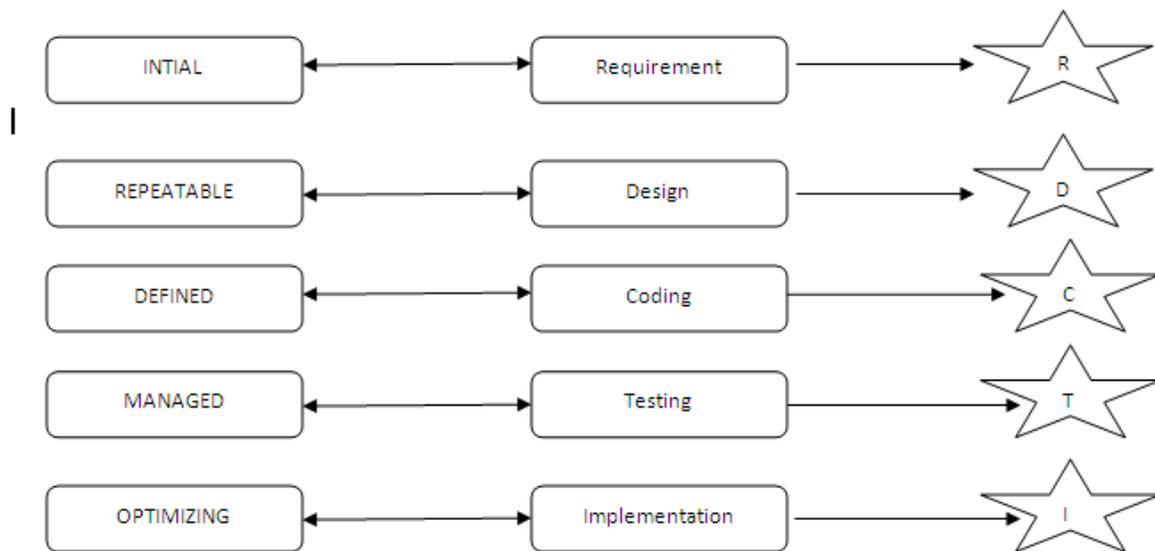


Fig :1

3.1 Requirement

In software development process the requirement collection is a very important aspect for software development companies. In this process anything may go wrong or requirement may not be collected as per user specification, this it will create a serious problem in future, this may affect the economy, social, technical and environment .Collection of requirement is a very important role, when one collecting the requirement that time itself one have to ensure about sustainability of software, whether it is functional requirement or non functional requirement .If one collected the requirement as per Green and Sustainability based then one can give a star for that process of activity. This process is equivalent to the CMM (Capability Maturity Model) level process of the first stage Initial.

3.2 Design

It is a second important aspect in SDLC phase based on the requirement collected from the customer companies' one have to create a mock design to show the customer. Here also one has to implement the sustainable methodology with Green IT. If a design is created as per the satisfied level of sustainability then one have to give the 2nd star for that companies .This process is equivalent to the CMM level process of the second stage Repeatable. It is equivalent to the repeatable process through the design of the forms, database, architecture the developer, data base administrator, and architect they need to work for this process have to meet the customer satisfaction level .If they satisfied in the point of Green and Sustainability condition here the designer, Data base administrator and architect need to give more concentration for performance of the data base, energy efficiency of the application, and server speed.

3.3 Development (or) coding

The most important aspect in SDLC is development or coding .The coding style will vary from developer to developer if the code is written in optimized level and also it will considers about the Green and Sustainability approach then one will provide the 3rd star for that company, for maintaining the complete coding as clean code .The new comer for that company also needs to follow the defined code. This process is equivalent to the defined process of CMM level here the developer needs to define the coding style in the sustainability approach.

3.4 Testing

After design and development of activities got over in the sustainable based SDLC phase, Testing is playing the next important role. Testing almost determines the quality of the product, testing the company released the product with as per the software quality and then one will give the 4th star for that company. It is equivalent to the process of CMM level Managed because after releasing the software the company needs to maintain and to manage the application as per Green and Sustainability approach.

3.5 Implementation

It is the last stage of the Sustainable SDLC phase, in this phase of activity the company will be implementing the new application, or updated version will be releasing for maintaining the existing application. For that reason they may release a new user manuals, DVD (Digital Versatile Disk), CD (Compact Disk) in explaining how to use the application .Once another updating version will be released the company needs to ensure what they are going to do with the old one and for that what are the precaution measures will be implemented to maintain that sustainability .If we follow the sustainability methodology in implementation area then one can give the final star for that company.

The following figure shows how to implement the sustainability in SDLC phases in software engineering .Depending up on the implementation one will consider the Green and Sustainability rating of the company. Figure: 2 shows the star values for the company when it will get certification for Sustainability model.



Fig:2

IV.CONCLUSION

The main challenges of the 21st century are the global impacts of the environment. The environment impacts may be in any form like noise, heat, radiations and power consumption. The above set of factors affects the environment [1] directly or indirectly which gives negative impacts on economy, society, human beings and environment that resulted from development, deployment and usage of the software. In the development of a software application, there exists many life cycle models, where each model has its own sustainability and environment threats. But most of the research activities focus only on energy efficiency and energy consumption. This work proposes a new software model called SDLC Energy Star model in each phases of the life cycle of software engineering where one tried to implement the star values and tried to achieve the Green and Sustainability in SDLC in software developing companies. In future research what are all the green metrics we need to provide for getting star values in each phases of the SDLC.

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CLUSTERING WITH SIDE INFORMATION FOR MINING TEXT DATA

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ABSTRACT

Side information is available along with text document in several text mining application. They are the different kind of side information such as document provenance information, the link in the document, other non textual attributes which are contained into the document or user access behavior from web logs. Some attributes may contain extremely large amount of information for clustering purpose. Sometimes clustering is more difficult when some of the information is noisy. To design a combination of classical partitioning algorithm with probabilistic model technique to create an effective clustering approach. Then the clustering approach will extend to classification approach for real data set which shows the advantages of previous result.

Keywords: Text Mining, Clustering, Classification.

I INTRODUCTION

Side information is also called meta data which is more available along with text document in several text mining application. Document provenance information, the link in the document, other non textual attributes which are contained onto the document or user access behavior from web logs these are the different kind of side information. When text clustering a problem can comes in some type of application such as web, social networks and also some other digital data. The web contain tremendous amount of text collection in order to create efficient and more scalable algorithms for text mining approach. Web contains meta data for origin of the document. The user access behavior is computing in the formation of web logs. Links in the documents may contain more information for mining process.

Clustering is the task of grouping a set of objects in such a way that objects in the same group, are more similar to each other than to those in other groups called clusters. It is a main task of exploratory data mining, and a common technique for statistical data analysis, used in many fields, including machine learning, pattern recognition, image analysis, information retrieval, and bioinformatics. Types of clustering models: Connectivity models for example hierarchical clustering builds models based on distance connectivity. Centroid models for example the k-means algorithm represents each cluster by a single mean vector. Distribution models clusters are modeled using statistical distributions, such as multivariate normal distributions used by the Expectation- maximization algorithm. Density

models for example DBSCAN and OPTICS defines clusters as connected dense regions in the data space. Subspace models in Biclustering (also known as Co-clustering or two-mode-clustering), clusters are modeled with both cluster members and relevant attributes. Group models: some algorithms do not provide a refined model for their results and just provide the grouping information. Graph-based models: a clique, i.e., a subset of nodes in a graph such that every two nodes in the subset are connected by an edge can be considered as a prototypical form of cluster. Relaxations of the complete connectivity requirement (a fraction of the edges can be missing) are known as quasi-cliques.

Text mining, also referred to as text data mining, roughly equivalent to text analytics, refers to the process of deriving high-quality information from text. High-quality information is typically derived through the devising of patterns and trends through means such as statistical pattern learning. Text mining usually involves the process of structuring the input text (usually parsing, along with the addition of some derived linguistic features and the removal of others, and subsequent insertion into a database), deriving patterns within the structured data, and finally evaluation and interpretation of the output. 'High quality' in text mining usually refers to some combination of relevance, novelty, and interestingness. Typical text mining tasks include text categorization, text clustering, concept/entity extraction, production of granular taxonomies, sentiment analysis, document summarization, and entity relation modeling.

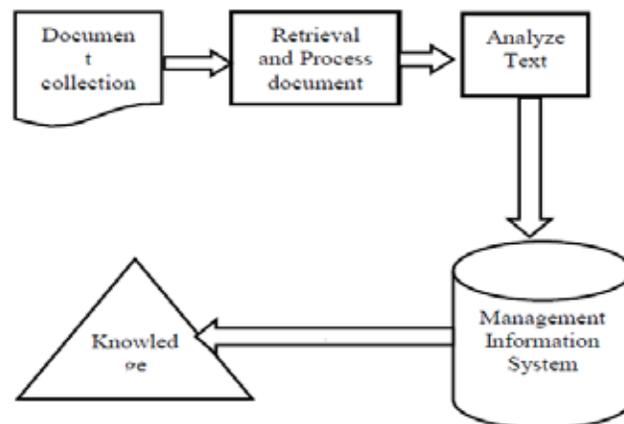


Figure 1: An Example of Text Mining

Classification may refer to categorization, the process in which ideas and objects are recognized, differentiated, and understood. Classification is a data mining (machine learning) technique used to predict group membership for data instances. For example, you may wish to use classification to predict whether the weather on a particular day will be “sunny”, “rainy” or “cloudy”. Popular classification techniques include decision trees and neural networks. There are different types of techniques for classification of the data such as Probabilistic, Naïve Bayes Classifiers, Decision Tree Classifiers and SVM classifiers. The main goal of this paper is to show that the advantages of using side-information extend under a pure clustering process.

II RELATED WORKS

The problem of text clustering was studied in [5][13]. There is a problem in many application such as text crawling, news group filtering and document organization which are requires real time clustering and segmentation of text data records. Using statistical summarization methodology, the problem of text clustering and categorical data streams was solved efficiently. In [37] there is an issue on clustering high dimensional streaming text data. By using combination of an OSKM (online spherical k-means) algorithm with scalable clustering strategy to obtain fast and adaptive clustering of text streams.

Text clustering algorithm for text document is studied in [3][9]. There are many types of algorithm used for text clustering, such as distance based clustering algorithm (like agglomerative), distance based partitioning algorithms (like k-means), Hierarchical Clustering Algorithm and A Hybrid Approach for clustering like scatter/gather technique.

The concept of agglomerative clustering is to successively merge documents into clusters based on their similarities. Virtually the hierarchical clustering algorithms successively merge groups based on the best pairwise similarities between these groups of documents. In a Conceptual manner, the process of agglomerating documents into successively higher levels of clusters creates a cluster hierarchy for which the leaf nodes correspond to their individual documents, and the internal nodes correspond to the merged groups of clusters. A new node is created in this tree corresponding to this larger merged group when two groups are merged.

In [11] Presents the hierarchical data clustering method Balanced Iterative Reducing and Clustering using Hierarchies (BIRCH) and it demonstrates that it is especially suitable for large databases. The next method of document clustering is Distance based Partitioning algorithm. Partitioning algorithms are widely used in the database literature in order to efficiently create clusters of objects. K-means clustering algorithm is a partitioning algorithm [3]. It uses a set of k representatives, around which the clusters are built.

In particularly, K-means uses the notion of a centroid, which is the mean or median point of a group. A centroid almost never corresponds to an actual data point. The simplest form of the k-means approach is to start off with a set of k point from the original corpus, and assign documents to these point on the basis of closest similarity. The next iteration, the centroid of the assigned points to each group is used to replace the group in the last iteration. In other words, the new term is defined, so that it is a better central point for this cluster. This approach is continued until convergence. Continuous Clustering and Dynamic Keyword Weighting for Text Documents takes place in [6]. This use the approach to extend K-means algorithm and addition to partitioning the dataset into a given number of clusters, also finds the optimal set of feature weights for each and every clusters. In [13] combination of an efficient online spherical k-means (OSKM) algorithm with an existing scalable clustering strategy to achieved fast and adaptive clustering of text streams.

The online spherical k-means algorithm modifies the spherical k-means algorithm (SPKM), using online update (for cluster centroids) based on the well-known Winner-Take- All competitive learning. The third type of document clustering is the Hybrid Technique (Scatter-gather technique is the hybrid clustering technique) [5]. An example of the the Scatter/Gather method, which provides a systematic browsing technique with the use of clustered document

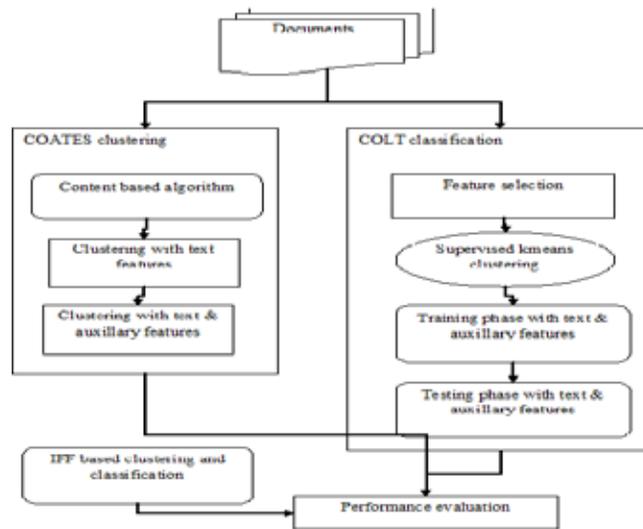
collection of the document organization. Initially the system scatters the collection of document into a small number of several document groups, or clusters, and presents short summaries of documents to the users. The user selects one or more of the groups for further study based on these summaries. The selected groups are gathered together to form a sub collection documents. Then applies clustering again to scatter the new sub collection into a small number of document groups, which are again presented to the users.

The scatter-gather approach can be used for organized browsing of tremendous amount of document collections, because it creates a natural hierarchy of similar documents. However, these methods are designed for the pure text data clustering, and do not work for in which the text-data is combined with other forms of data. They have some limited work has been done on clustering text in the context of network-based linkage information (like graph mining and algorithms of graph mining in) [2] [10]. A wide variety of techniques have been designed for text classification approaches in [4].

There are different techniques for classification of the data such as Probabilistic and Naïve Bayes Classifiers. Probabilistic classifiers are used to designed an implicit mixture model for generation of the underlying documents. This mixture model is typically assumes that each class is a component of the mixture. Each mixture component is actually a generative model, which provides the probability of sampling to a particular term for that component. Another type of classifier is Decision Tree Classifiers which is actually a hierarchical decomposition of the (training data) data space, in which a condition on the attribute value is used in order to divide the data space (training data) hierarchically. The division of the data space is performed recursively in the decision tree until the leaf nodes contain a certain minimum number of records, or some condition on class purity. The most possible class labeling leaf node is used for the purposes of classification [14].

Another type of classifier is SVM classifiers, the main principle of this classifier is to determine separators in the search space which can best separate the different classes. SVM training algorithm builds a model that assigns new examples into one category or other category, making it a non probabilistic binary linear classifier. SVM can efficiently perform a non-linear classification using kernel trick, implicitly mapping their inputs into high dimensional feature spaces. All the work is not applicable to the case of side information attributes. [14] will provide a first approach to using other kinds of attributes in conjunction with text clustering. It show the advantages of using an approach over pure text-based clustering. An approach is especially useful, when the auxiliary information is highly informative and provide an effective guidance in creating coherent clusters. It will also extend the method to the approach of text classification.

III SYSTEM ARCHITECTURE



System Architecture Design text are process under COATES algorithm. It has two phases. First phase is content based algorithm used to create cluster of the documents. Second phase is cosine similarity which is used to form centroid of the documents. Gini index used to compute each auxiliary attribute with respect cluster. In COLT algorithm. It have two phases. First phase is Feature selection on text and auxiliary attribute with the use of class labels and gini index the documents. Second phase is cosine similarity which is used to determine the closest cluster of each documents. Gini index used to compute each auxiliary attribute with respect cluster. Then it extend to classification process using COLT classify algorithm which determine the majority class label of the labeled cluster.

IV CLUSTERING TECHNIQUE FOR THE SIDE INFORMATION

In the proposed system, is to show the advantages of using side-information for mining text data extend under a pure clustering process which provides advantages for a wider variety of problems. The COATES Algorithm used for clustering of side information is(COnent and Auxiliary attribute based TExt cluStering algorithm). They has two phases .

1. Initialization

This phase is a lightweight initialization phase in which a Standard text clustering approach is used without any side information. It use the k-means clustering algorithm. In the phase, text document can partitioning data and create a centriod of data to form a cluster. It is based on text information only.

2. Main Phase

This main phase starts off with these initialization phase and iteratively reconstructs these clusters with the use of both text content and auxiliary information . in this step alternating iterations which use the text content and auxiliary attribute information in order to improve the quality of the clustering are performed. These iterations are

text content iterations and auxiliary iterations respectively. The combination of the text content iteration and auxiliary iteration is referred to as a major iteration. Each major iteration contains two minor iterations which is corresponding to the auxiliary attributes and text-based methods respectively.

V CLASSIFICATION BASED ON CLUSTERING OF SIDE INFORMATION

In this section to show how to extend the approach to classification. It will extend the earlier clustering approach in order to creates a model which summarizes the class distribution in the data in terms of the clusters. Then, it will show to the use of the summarized model for effective classification. For extension of classification to the problem of clustering , Content and auxiliary attribute-based Text classification (COLT) algorithm is used for classification of side information .This algorithm uses a supervised clustering approach in order to partition the data into different clusters then the partitioning is used for the purposes of classification. The algorithm works in three phases.

Feature Selection

In the first phase, it uses feature selection to remove the attributes which are not related to the class label. It is performed both for the text attributes and the auxiliary attributes.

Initialization

In this phase, it uses a supervised k means approach in order to perform the initialization with the use of purely text content clustering. The class memberships of the records in each cluster are pure for supervised initialization. Each cluster only contains records of a particular class when k-means clustering algorithm is modified.

Cluster Training Model Construction

In this phase, a combination of the text content and auxiliary attributes is used for the purposes of creating a cluster based model. During this phase the purity of the clusters is maintained.

VI CONCLUSION

This paper gives the brief introduction about the broad field of document clustering and classification .The techniques which are used for clustering like k-means, hierarchical etc. and classifications like naïve bayes, SVM etc. are discussed. This paper also presented methods for mining text data with the use of side-information. Many forms of text databases contain a large amount of side information or meta-information, which may be used in order to improve the clustering process. In order to design the clustering method, combination of an iterative partitioning technique with a probability estimation process which computes the importance of different kinds of side information takes place. COATES and COLT approach can greatly enhance the quality of text clustering and classification, while maintaining a high level of efficiency.

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A MACHINE LEARNING APPROACH TO FILTER UNWANTED MESSAGES FROM ONLINE SOCIAL NETWORKS

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ABSTRACT

Online Social Networks, also called as social networking sites, have gained popularity in recent years. A major issue in today's online social networks is that the users don't have direct control over the messages posted on their walls. So to prevent unwanted messages being posted on the user wall, a Filtered Wall is used which automatically filters the unwanted messages. Also the message posted on the walls is short text messages, a machine learning based text categorization technique is exploited to automatically assign with each short text messages a set of categories based on its content.

Index Terms: Filtered Wall, Online Social Networks, Machine Learning Techniques, Short Text Classification.

I INTRODUCTION

Social networks have become a part of people's daily life. It is the most common medium for communicating and sharing information. There are hundreds of social networking sites currently in existence. It gives the users the ability to create and share a personal profile. The profile information consists of details like the user's name, age, educational qualification, location etc. The content shared may be text, audio or video but mostly it consists of short text messages.

In online social networks, the users cannot have direct control over the messages posted in their walls. Content-based preferences are not supported so, there is possibility of posting unwanted content on particular public or private area, called in general walls. The aim of the present work is to support content based preferences and to provide direct control over the wall messages by Automatically preventing unwanted messages from the user walls.

To achieve this, a Filtered Wall is used which automatically filters the unwanted messages based on the content and behaviour of data.

A machine learning based text categorization technique is used to categorize the short text messages. It has the ability to automatically assign with each short text message a set of categories based on its content. The overall short text classification strategy is based on Radial Basis Function Networks (RBFN) which performs two level classification strategies. At the first level, it classifies the short messages as Neutral and Non-neutral. At the second level the Non-Neutral messages are further classified based on class of interest. The proposed system provides a rule layer which exploits Filtering Rules (FR) through which users can state what contents should not be posted on their walls. In addition, Black Lists (BL) are implemented in which user who post unwanted messages will be kept temporarily in black list for particular period of time.

II RELATED WORK

A large number of work has been done for filtering unwanted messages in social networks. Content-based message filtering for On-line Social Networks (OSNs) has been proposed[1]. The main aim of this paper is, users have a straight control over messages posted on their own private space. So an automated system called Filtered wall (FW) is used, which have a capacity to filter unwanted messages. That is achieved through a flexible rule-based system, that allows a user to customize the filtering criteria to be applied to their walls, and a Machine Learning based soft classifier capable of automatically labelling messages in support of content-based filtering. This system will blocks only the unwanted messages sent by the user in a private space.

A flexible rule based system is used [3] which allows a user to customize the filtering criteria to be applied to their walls, and a Machine Learning based soft classifier is used to automatically label messages based on their content.

When the Web continues to grow, it has become increasingly difficult to search for relevant information using the traditional search engines [2]. To support efficient information retrieval on the Web, Topic-specific search engines provide an alternative way by providing more precise and customized searching in various domains. Nevertheless, developers of topic-specific search engines have to address two main issues; that is how to locate relevant documents (URLs) on the Web and how to filter out irrelevant documents from a set of documents collected from the Web. The second issue is addressed in this paper.

A text categorization technique based on machine-learning-based approach is proposed that combines Web content analysis and Web structure analysis. Every Web page is represented by a set of content-based and link-based features, which can be used as the input for various machine learning algorithms. The proposed method was implemented using both a feed forward and feedback propagation neural network and along with a support vector machine. Two experiments were created and conducted to compare the proposed Web-feature approach with the existing Web page filtering methods such as keyword-based approach and a lexicon-based approach. When the number of training documents were small, the experimental results showed that the proposed approach in general performed better than the benchmark approaches. The suggested approaches can be applied other Web applications such as Web content management and in topic-specific search engine development.

The automated categorization [4] or classification of texts into predefined categories has evidenced a rapid growth of interest in the recent years, due to the increased availability of documents in digital form and the need to organize them. In research group, the common approach to this problem is based on machine learning techniques such as a general inductive process automatically builds a classifier by learning, from a set of pre-classified documents, the characteristics of the categories.

The advantages of using ML filtering strategies over other engineering approaches are a very good effectiveness, flexibility to changes in the domain and portability in differ applications. However difficulties arise in finding an appropriate set of features by which to represent short, grammatically ill formed sentences and in providing a consistent training set of manually classified text.

III SYSTEM ARCHITECTURE

The architecture of the proposed system consists of three main layers. The first layer is the Social Network Manager (SNM), which provides the basic OSN functionalities such as management of user profile and their

relationship among other users. The second layer is the Social Network Application (SNA) which allows the external social network applications. The SNA needs an external user interface which is provided by the Graphical User Interface (GUI) and is the third layer. The second and third layers are the core part of the proposed system.

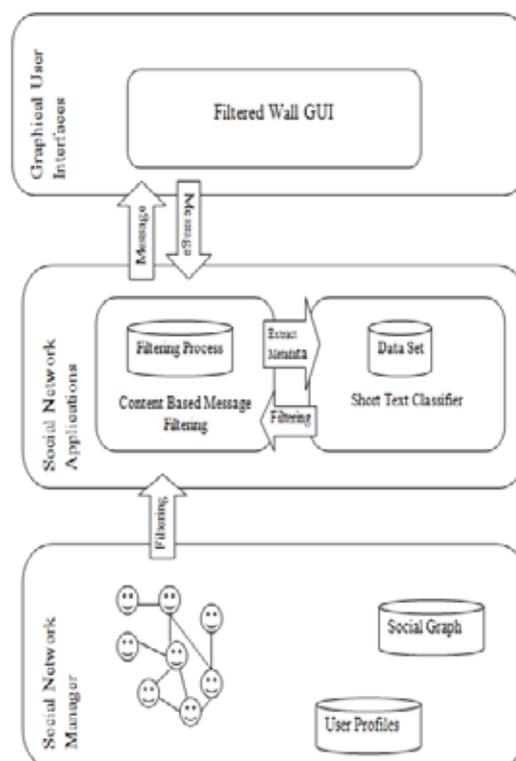


Fig.1 Proposed Architecture

The working process of the proposed architecture is as follows;

- When the user tries to post a message on a private wall of a particular user, it is captured by the filtered wall.
- A short text classifier built using machine learning extracts the meta data from the content of the message.
- Then the FW uses metadata provided by the short text classifier, and combines the data extracted from the social graph and users' profiles, for implementing filtering and BL rules.
- Based on the result of the previous step the message is either published or blocked.

IV TECHNIQUES USED

The methodologies used in this work are discussed as follows;

4.1 Machine Learning Based Short Text Classifier

The short text classifier is called as multi class soft classification process and this process is composed of two phases called as text representation and machine learning based classification. Short text categorization is performed as a hierarchical two level classification process. At the first-level, the classifier performs a binary

hard categorization that labels messages as Neutral and Non-neutral. The first-level filtering task presides the subsequent second-level task where a finer-grained classification is performed.

At the second-level, the classifier performs a soft-partition of Non-neutral messages assigning a given message a gradual membership to each of the non-neutral classes. The neutral messages are eliminated and cannot be used for the second level. Among the variety of Multiclass ML models well suited for text classification, the RBFN model is chosen for the experimented competitive behaviour with respect to other state-of-the-art classifiers. RBFNs have a single hidden layer of processing units with local, restricted activation domain, where a Gaussian function is commonly used, but any other locally tuneable function can also be used. Machine learning plays a vital role to generate the blacklist of the bad words and the unauthorized users.

4.2 Filtering Rules

There are three main issues that affect a message filtering decision. First, in OSNs like in everyday life, the same message may have different meanings and relevance based on who writes it. As a result, FRs should allow users to state constraints on message creators. Creators on which a FR applies can be selected on the basis of several different criteria; one of the most relevant is by imposing conditions on their profile's attributes. In such a way it is, for instance, possible to define rules applying only to young creators or to creators with a given Religious or political view. Given the social network scenario, creators may also be identified by exploiting information on their social graph. This implies to state conditions on type, depth and trust values of the relationship creators should be involved in order to apply them the specified rules.

The difficulty of setting thresholds to filter rules is addressed, by conceiving and implementing within FW, an Online Setup Assistant (OSA) procedure. For every single message, the user tells the system, the decision to accept or reject the message. The collection and processing of user decisions on an adequate set of messages distributed over all the classes allows computing customized thresholds representing the user attitude in accepting or rejecting certain contents. Such messages are selected according to the following process. A certain amount of non neutral messages taken from a fraction of the dataset and not belonging to the training or test sets, are classified by the ML in order to have, for each message, the second level class membership values.

4.3 Blacklist Rules

Blacklist (BL) mechanism to avoid messages from undesired creators, independent from their contents. BL is directly managed by the system, which should be able to determine who are the users to be inserted in the BL and decide when user's retention in the BL is finished. To enhance flexibility, such information is given to the system through a set of rules, hereafter called BL rules. Such rules are not defined by the Social Network Management, therefore they are not meant as general high level directives to be applied to the whole community. Rather the wall's owners to specify BL rules regulating who has to be banned from their walls and for how long. Therefore, a user might be banned from a wall, and at the same time, he will not be able to post in the wall.

BL rules make the wall owner able to identify users to be blocked according to their profiles as well as their relationships in the OSN. The wall owners can be able to block users they do not directly know, or users that are

friend of a given person as they may have a bad opinion of this person. The users can be blocked temporarily for a particular period of time.

V ALGORITHM USED

A simple algorithm implemented to filter unwanted messages from user walls is as follows

- Step 1 Start
- Step 2 A User attempts to post a message in a private wall.
- Step 3 Short text classifier checks each word of the Message.
- Step 4 If (Text == Good Words)
- Step 5 The Message is posted on the user's wall.
- Step 6 Else if(Texts == Bad Words)
- Step 7 Eliminate the Bad Words and post the filtered message on the wall.
- Step 8 Stop

The Machine Learning technique uses traces the posted messages for the good and the illegal words used in the wall by the public users. When a user tries to post or comment in other person's wall, he can post any message there without the filtering technique. But the Machine Learning here learns the message which is yet to be posted and finds whether it contains any vulgar or illegal words in it. If it can't find any illegal or vulgar words, then the system allows the message to be posted on the wall. If it finds any illegal or vulgar words in that message while learning it, then it will remove the vulgar words from the message and then insert those words in the Blacklist which stores the unwanted words in it. Finally the system prints the message without the unwanted words.

This mechanism helps in preventing the users to get annoyed by the vulgar words in a public wall of the Social Networking Sites. It does not prevent the unknown users from posting their messages; rather, it helps in preventing the profanity with the unwanted words.

VI CONCLUSION

Online Social Networks (OSNs) are an important medium to develop a strong social relationship between the people to share and communicate a part of life. The system exploits a ML soft classifier to enforce customizable content-dependent FRS. Moreover, the flexibility of the system in terms of filtering options is enhanced through the management of BLs. When machine learning is used, higher results have been given to the system to trace the messages and the users to distinguish between the good and bad messages and the authorized and unauthorized users in the Social Networking User Profiles automatically. Thus it plays a vital role to generate the blacklist of the bad words and the unauthorized users. So, by using filtering rules and black lists, the user can avoid unauthorized persons from posting unwanted messages thus ensuring security of the user's private wall.

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ROLE OF METRICS ON SOFTWARE QUALITY

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ABSTRACT

Software metrics refers to the Quantitative measure for computer software that assist in quality control and productivity of software. Quality increases the productivity of the software. This paper includes various metrics contributed to software quality and reliability. It also contain numerical analysis of metrics with a example. It also contain the view on software quality.

Keywords: Software Metrics; Software Quality, Measure, Measurement.

I. INTRODUCTION

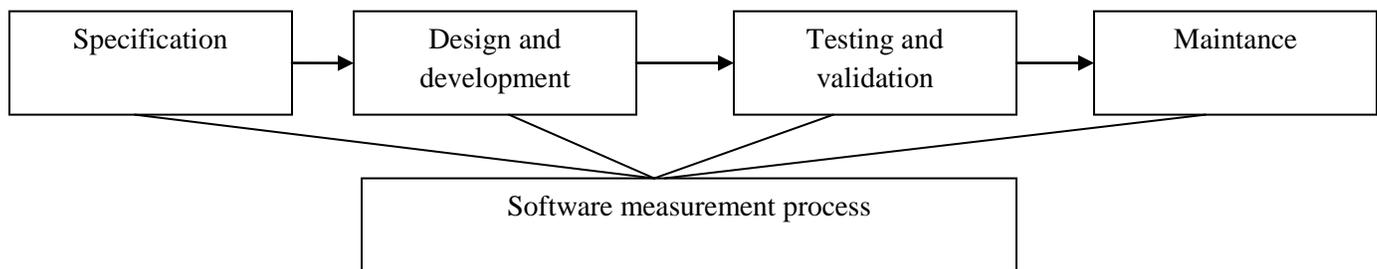
Software metrics is a term used to measure software item. Software item may be:

1. Software product or partial product.
2. Software process such as coding.
3. An event such as product failure.
4. Person involved in software production.

According to Lord Kelvin “ when you can measure what you are speaking about and can express it as number ,you know something about it. But when you can not measure and express it in number then your knowledge is unsatisfactory.

II. OBJECTIVE OF METRICES

1. To measure the size of software.
2. To measure the cost of developing of a software.
3. To find expected no. of bugs.
4. To find complexity of a module.
5. Reliability of the software at the time of release.
- 6.



III. NUMERICAL ANALYSIS OF MATRICES

Suppose there are 6 test engineer and 5 months to do necessary testing of product. So total engineer month is 30. Suppose they found 60 error.

$$\text{Error found per engineer month(EFPEM)} = \frac{\text{Total no. of errors}}{\text{Total no. of engineer months}}$$

So by using the result of this model we can analysis how efficient the test team is and how good the product is.

IV. DIFFERENCE BETWEEN MEASURE, MEASUREMENT, METRIC AND INDICATOR

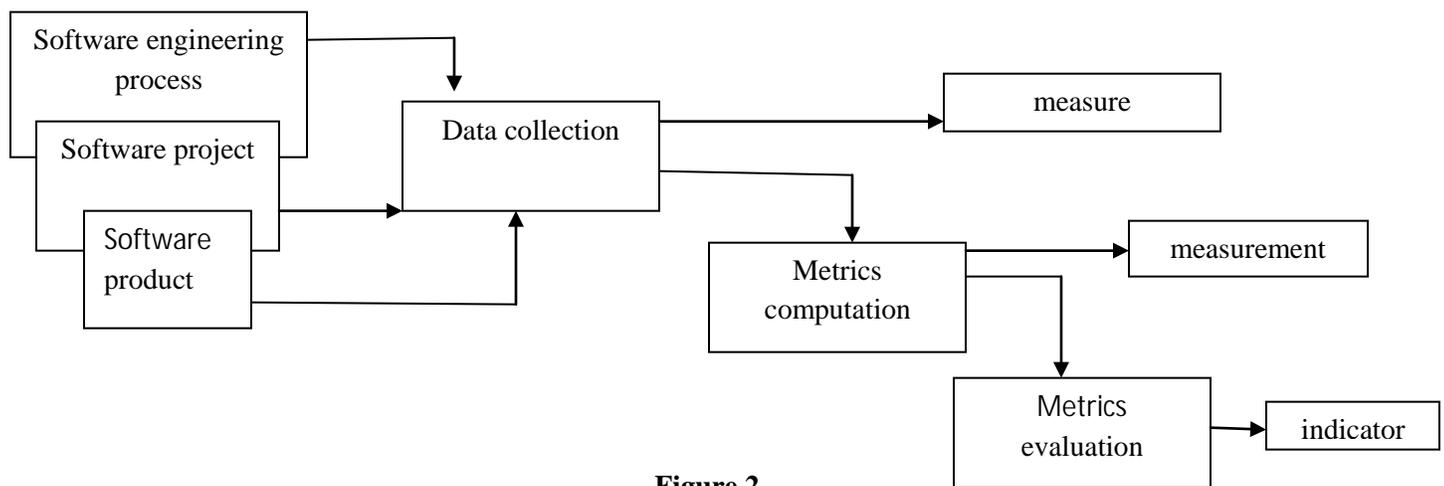


Figure 2

Measure

It is a quantitative indicator of size, dimension ,capacity of some attribute of a product or process. In the example error found in test cycle is the measure.

Measurement

It is act of determining measure. In the example no. of test engineer and no. of month spent on testing process.

Metric

It is a quantitative measure of degree to which a system component or a process posses a given attribute. In the example no. of errors found per engineer month.

Indicator

It is a metric or combination of metrics that provide insight into software process, project and product itself.

V IMPORTANCE OF SOFTWARE QUALITY

Software quality assurance start from the beginning of the project right from the analysis phase.Some errors of software include:

1. Error on electricity bill.
2. Error in Bank transaction.

3. Error in space shuttle's.

VI WHO CARES SOFTWARE QUALITY

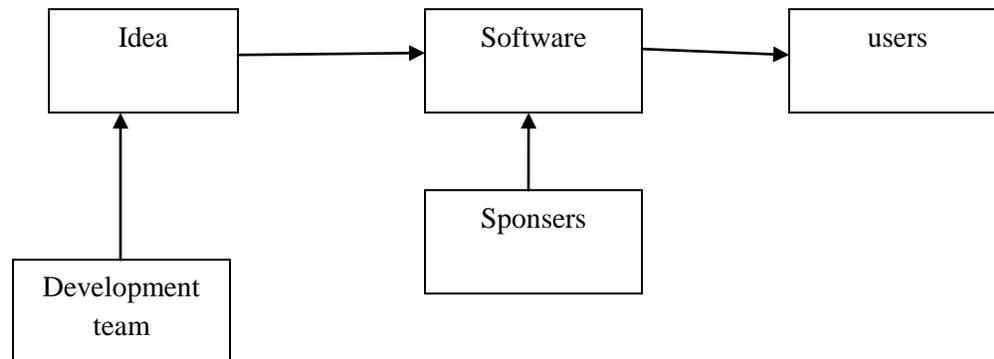


Figure 3

Software users

They apply the software to some problem.

Development team

They create the software.

Sponsors

They are the people paying for software creation.

Software quality is mainly divided into three aspects:

1. Functional quality
2. Structural quality
3. Process quality

Functional quality

It specifies software correctly performs the task according to users. Example:

1. Meeting the specified requirement.
2. Create software that has no defect.
3. Ease of learning and easy to use.

Structural quality

It specifies that code itself is well structured. Example:

1. Code testability
2. Code maintainability
3. Code understandability

4. Code efficiency
5. Code security

Process quality

It specify

1. Was the software delivered on time.
2. Was the software delivered for the expected amount of money.

VII CONCLUSION

With the rapid development in software industries software metrics become the basis for software development .There is no adequate international standard for any of the extensive used software .So software metrics play a very important role to determine the quality of the software. This paper focuses on various type of quality and role of metrics on software quality.

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