

E-COMMERCE APPLICATION BASED ON THE MVC ARCHITECTURE ON MULTI-CLOUD SYSTEM

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ABSTRACT

Cloud computing preeminently impelling the business models. Along-with the alluring features cloud computing provides a platform for businesses to work efficiently and different types of model based system which can help business application, in improvising them. Model based systems provide a different approach for e-commerce applications which are suitable for testing and upgrading the application. We propose a MVC based architecture for e-commerce application that runs on the multi-cloud service platform that can suitably solve the problems of testing and upgrading the application. Lastly, a web application example is shown to entice the research work.

Keywords: *Cloud Computing, E-Commerce, Multi-Cloud Computing, MVC, Testing, Web-Application.*

I. INTRODUCTION

It is an inarguable fact that internet has changed the world and provided a new way of peoples existence. With advancement in internet and development of cloud computing lead it to a different dimension which provided a new way of communication and transaction. So, as the transaction is concerned Internet changed the way of businesses to be done. Transaction between businesses is e-commerce that opens a era for the companies to get into the business. E-commerce include shopping, banking, real estate transaction, air line booking, transportation of goods, stock and bonds trading and anything one can imagine.

An e-commerce application is nothing but a lucid website that can be created or edited on various platforms. Traditionally platforms architecture comprised of client-server architecture. With advancement of technologies several architectures precluded multi-tier architectures such as two-tier and three-tier architecture, and Model View Controller (MVC) architecture.

MVC architecture separates the core functionality from presentation and control logic that uses this functionality. It allows multiple views to share the same data model. This architecture supports multiple client's implementation, testing and maintenance.

An e-commerce application can be contrived on the basis of MVC architecture which separates the core functionality from the presentation and logic unit and can efficiently work on cloud. Multiple companies can work on the same application unaware of the data of other company on the single cloud based application. This application can be maintained and upgraded with out any hitch to the other files and data.

II. RELATED WORK

2.1 E-commerce, Cloud Computing, MVC

2.1.1 E-Commerce

E-commerce is communication or transaction of the businesses. E-commerce is the exchange of the product and the services [6]. E-commerce provides nearly everything one can imagine in a 'website' form unlike traditional cases where it required expensive interfaces and personal security certificate [8]. Electronic commerce allows companies to combine their internal and external businesses through information and communication technology. Which can be accomplished using intranet, extranet and the Internet [4].

2.1.2 Influence of Cloud Computing on E-commerce

Cloud computing is a revolutionary idea which led the Internet to a new direction and radically changed the business models. Merging of cloud computing and e-commerce is very influential to the enterprise in all aspect [8]. Cloud computing best described as the technology that moves the data away from desktop or portable PCs to large data centres [4]. The cloud computing allows us to access the pool of the configurable computing resources like servers, storage application and services. Computing resources (services) can be accessed from cloud service provider on minimum effort. Cloud computing provides us Quality of Services (QoS) guaranteed infrastructure [3]. A consumer can purchase various services like infrastructure-as-a-service (IaaS), platform-as-a-service (PaaS), or software-as-a-service (SaaS) and sell value added services to the user like utility services. These services can be purchased from the cloud service provider [4]. The main idea of cloud computing is to abstract the implementation logic from service provider and efficiently virtualize the services [3].

2.1.3 MVC Architecture and Cloud based E-commerce application:

E-commerce applications basically use client server architecture where data is stored on the data repository and client access and manipulate the data in the given repository. The client might consist of model and view where model is client side business logic and view is the representation of the model. If several hundred thousands of users are in consideration than this model fails to exhibit editing and other operation in the given application [5]. Provision of the framework efficiently reduces the amount of the time required and is convenient for the editing and the upgrading the web application [2]. MVC framework has widespread use in contriving the web-based application. MVC stands for model view and controller fig. 1 shows the MVC architecture.

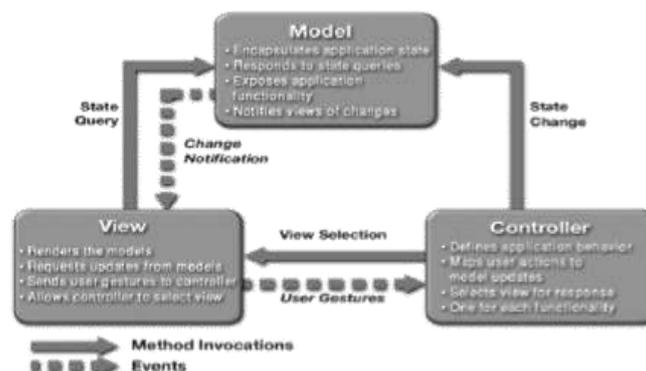


Fig.1 MVC Architecture

- Controller used for sending the command to model to update the model state or commands view to update the representation of model [9].
- Model notifies the associated view and the controller to update them for the occurred change and hence change the representation of the model in the view [9].
- View requests the information via controller to generate the output representation for the user [9].

Model View Controller (MVC) design is main source of the motivation that led to architect the domain module and interconnection. The controller and view modules are separated on distributed cloud. Different cloud offers different services depending on there type View cloud offers graphic user interface (GUI), where as Controller cloud offers task-as-a-service (TaaS) [3].

Each of the module in the MVC model are provided with certain classes. Model module contain the classes for the SQL syntax whose instances are used for manipulating the databases and is advantageous for reducing the syntax error in SQL commands. Controller module is created to handle the user events and the view module for representation of the model. Decoupling of the module reduces the complexity and hence provides the flexibility to reuse the code [2].

2.2 Testing and Security of the E-commerce Application based on the MVC model

2.2.1 Testing

With the increasing demand for the e-commerce the no of web applications are increasing. With implementation of the MVC architecture (model driven architecture), the model based testing approach is applied to the application to the application to check the flaw and incompetency in the application for more prominent use. Testing technique include checking of the model used to drive the code and testing the transformation that are made.

2.2.2 Security

Cloud service provider (CSP) provides the online storage for storing the data of the user. The data is stored in the encrypted form on the cloud which is not accessible to the lower authority member, but a higher authority member of CSP can access the user's information. The best approach to protect the unauthorized access of CSP member authentication, encryption and storage of the data can be done by different CSPs [7]. Different cloud provides different services depending on the there type [3]. Different CSPs can be used to authenticate, encrypt, and store the data so as the a single CSP can access to the particular information [7]. On the other hand security against the network attack can be done using a device security kernel wrapper. This wrapper makes a shield around the cloud securing the cloud from the malicious attacks of the network and other malicious user. The security kernel is provisioned for basic standard security measure so as to check the flow of the data and various security events [3].

III. PROPOSED WORK

Testing, Security and Modification are not an easier task in client server based e-commerce application [5]. To implement features of testing, security and modification we propose the E-commerce Application based on

MVC architecture which runs on the cloud platform provided from multi cloud service provider. The application based on this system can be used by number of users. Modifications can be done according the requirement of the user. Views can be set accordingly using the controller commands that are given in an user event. Improvised security feature can be used for securing the user data and the information from malicious attack and the other unauthorized malicious user, which is implemented using multiple cloud and forming a security kernel wrapper.

IV. THE EXAMPLE OF WEB APPLICATION

In this section we take an example of the web application created in PHP. The database relates the user data that is shown in the table below. A view of database is created in the table format as the output. The complete procedure is completed using MVC architecture as follows:

4.1 Model

The process starts by accessing the database and retrieving the data. The model notifies controller changes occurred in the database

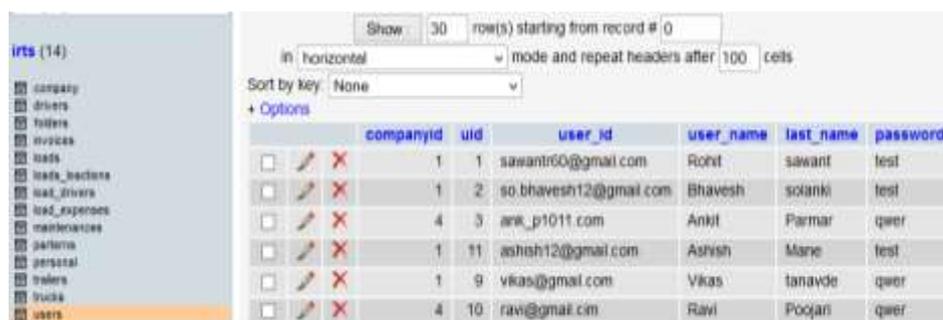
```

class User_Model extends CI_Model {
    function __construct() {
    }
    function list_users($user_id=NULL){
        $session_data = $this->session->userdata('logged_user');
        //print_r($session_data);
        if($user_id==""){
            $sql="SELECT * FROM users where companyid=' . $session_data['companyid'] . '";
        }
        else {
            $sql="SELECT * FROM users where uid=' . $user_id;
        }
        $rs = $this->db->query($sql);
        return $rs;
    }
}

```

Fig. 2 Model Module Code

The following table shows the existing entries in the database:



companyid	uid	user_id	user_name	last_name	password
1	1	sawant60@gmail.com	Rohit	sawant	test
1	2	so.bhaves12@gmail.com	Bhaves	solanki	test
4	3	ank_p1011.com	Ankit	Parmar	qwer
1	11	ashish12@gmail.com	Ashish	Mare	test
1	9	vikas@gmail.com	Vikas	tanavde	qwer
4	10	ravi@gmail.cin	Ravi	Poojari	qwer

Fig. 3 Database table Entries

4.2 Controller

At the very next step controller commands the view to show the present data in the user table on the reception of the user event.

```

public function generate_table()
{
    $this->load->model('user_model');
    $users = $this->user_model->list_users();
    if($users->num_rows() > 0)
    {
        $html = "";
        foreach ($users->result() as $row)
        {
            $html .= "<tr>";

            $html .= "<td>Name</td>";
            $html .= "<td>Email</td>";
            $html .= "<td>Name</td>";
            $html .= "<td>Email</td>";
            $html .= "</tr>";
        }
    }
    else {
        $html .= "<p>Record Found</p>";
    }
    return $html;
}

```

Fig. 4 Controller Module Code

4.3 View

At this step the view module is used to generate the view for representation to the user. Controller commands the view module to show the data in the requested manner.

```

<section>
    <div class="box">
        <div class="box-header">
            <h3 class="box-title">List of Users</h3>
        </div><!-- /.box-header -->
        <div class="box-body table-responsive">
            <table name="tbl" id="tbl" class="table table-bordered table-striped">
                <thead>
                    <tr>
                        <th>Name</th>
                        <th>Email</th>
                    </tr>
                </thead>
                <tbody>
                    <tr>
                        <td>Rohit</td>
                        <td>aawant60@gmail.com</td>
                    </tr>
                    <tr>
                        <td>Bhavesh</td>
                        <td>so.bhavesh12@gmail.com</td>
                    </tr>
                    <tr>
                        <td>Ashish</td>
                        <td>ashish12@gmail.com</td>
                    </tr>
                    <tr>
                        <td>Vikas</td>
                        <td>vikas@gmail.com</td>
                    </tr>
                </tbody>
            </table>
        </div>
    </div>
</section><!-- /.content -->

```

Fig. 5 View Module Code

The output generated using model view and controller module is the data from the model module in the requested manner.



The screenshot shows a web application interface. On the left, there is a sidebar with a user profile for 'bhavesh' (Online) and a navigation menu with items: Dashboard, Admin (with sub-items Companies and Users), Masters, and Leads. The main content area is titled 'Users' and 'List of Users'. It displays a table with the following data:

Name	Email
Rohit	aawant60@gmail.com
Bhavesh	so.bhavesh12@gmail.com
Ashish	ashish12@gmail.com
Vikas	vikas@gmail.com

Below the table, there is a blue button labeled 'Add New User'.

Fig. 6 Output of the View Module

V. CONCLUSION AND FUTURE RESEARCH

Client-server architecture have the drawbacks, it restricted the further development and enhancement of the web application. MVC architecture in place proven as a useful architecture for the development and enhancement of the web application. It supports maximum security and hence keep user data at safer place. Model based testing approach can be used for testing the flaw in the code. Modification can be provided according to the requirement of the user. The programmer can take full advantage of this architecture because of reusability of the code.

With the implementation of this research client will able to use multiple cloud service providers and can store data and run the web application from the multiple cloud platform.

Our future work is to develop a single web based tool for same type of enterprises and provide them a secure interface according to there requirement.

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DESIGN AND DEVELOPMENT OF TUNED VIBRATION ABSORBER FOR BEAM SUBJECTED TO HARMONIC EXCITATION WITH NONLINEAR PARAMETERS

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ABSTRACT

Vibration absorption is a method of adding a tuned spring-mass absorber to a system to create anti-resonance at a resonance of the original system. The dynamic vibration absorber is designed in such a way that the natural frequencies of the resulting system are away from excitation frequency. In this paper theoretical and numerical analysis of dynamic vibration absorber is carried out. Experimental setup for dynamic vibration absorber is also developed.

Keywords: Dynamic, Nonlinear, Resonance, Tuned, Vibration Absorber

I. INTRODUCTION

A machine or system may experience excessive vibration if it is acted upon by a force whose excitation frequency nearly coincides with a natural frequency of the machine. In such cases, the vibration of the machine can be reduced by using a vibration neutralizer or dynamic vibration absorber, which is simply another spring mass system [4].

II. THEORETICAL BACKGROUND

Vibration absorber with Two DoF system is as shown in Fig.2a

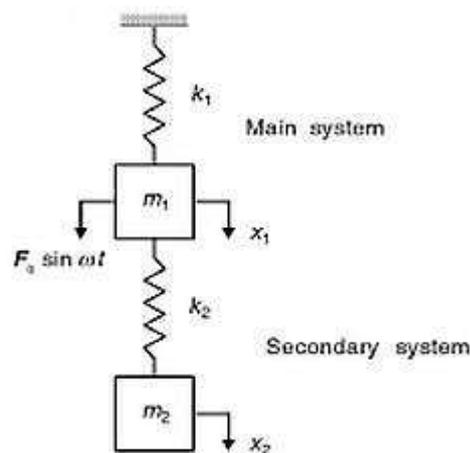


Fig.2a Two DoF Undamped Dynamic Vibration Absorber

For the system shown in Fig.2a let us assume $x_2 > x_1$,

Spring mass system k_1 - m_1 as main system and spring mass system k_2 - m_2 as absorber system.

Equations of motion for Two DoF system are as follows,

$$m_1 \ddot{x}_1 + F_0 \sin \omega t = -k_1 x_1 + k_2 (x_2 - x_1) \quad (1)$$

$$m_2 \ddot{x}_2 = -k_2 (x_2 - x_1) \quad (2)$$

Assuming solution under steady state condition,

$$x_1 = X_1 \sin \omega t$$

$$x_2 = X_2 \sin \omega t$$

Finally we get equation in dimensionless form as

$$\frac{x_1}{x_{st}} = \frac{1 - \frac{\omega^2}{\omega_2^2}}{\frac{\omega^4}{\omega_1^2 \omega_2^2} - \left[(1 + \mu) \frac{\omega^2}{\omega_1^2} + \frac{\omega^2}{\omega_2^2} \right] + 1} \quad (3)$$

$$\frac{x_2}{x_{st}} = \frac{1}{\frac{\omega^4}{\omega_1^2 \omega_2^2} - \left[(1 + \mu) \frac{\omega^2}{\omega_1^2} + \frac{\omega^2}{\omega_2^2} \right] + 1} \quad (4)$$

From this equations it is clearly seen that $x_1 = 0$, when $\omega = \omega_2$ i.e. When excitation frequency is equal to the natural frequency of the absorber system, the main system amplitude becomes zero even though it is excited by harmonic force. This the principle of an undamped dynamic vibration absorber [5].

Also it can be seen that when $\omega = \omega_2$, we get,

$$F_0 = -k_2 x_2 \quad (5)$$

The above equation shows that the spring force $k_2 x_2$ on main mass due to amplitude x_2 of absorber mass is equal and opposite to the exciting force on main mass resulting in no motion of main system.

2.1 Tuned Absorber

For the effectiveness of absorber at operating frequency corresponding to natural frequency of main system alone we have,

$$\omega_1 = \omega_2 = \frac{k_2}{m_2} = \frac{k_1}{m_1}$$

When this condition is fulfilled absorber is called as Tuned Absorber. To have a tuned absorber we can have many combinations of k_2 , m_2 as long as their ratio is equal to $\frac{k_1}{m_1}$ to satisfy the above condition.

We can have a small spring k_2 and small mass m_2 or k_2 large and large mass m_2 . In all these cases main system response will be zero at $\omega = \omega_2$.

However, Eq. shows that for same exciting force the amplitude of absorber mass is inversely proportional to its spring rate. In order to have small amplitude of absorber mass m_2 , we must have a large k_2 and therefore large m_2 which may not be desirable from practical considerations. So a compromise is usually made between amplitude and mass ratio μ . The mass ratio is usually kept between 0.05 to 0.2. A proper design of absorber spring is also necessary which depends upon its amplitude and available space.

The denominators of above equation and are identical. At a value of ω when these denominators are zero, the two masses have infinite amplitudes of vibration. The expression for the denominators is quadratic in ω^2 and therefore there are two values of ω , for which these expression vanish. These two frequencies are resonant frequencies or natural frequencies of the system [3].

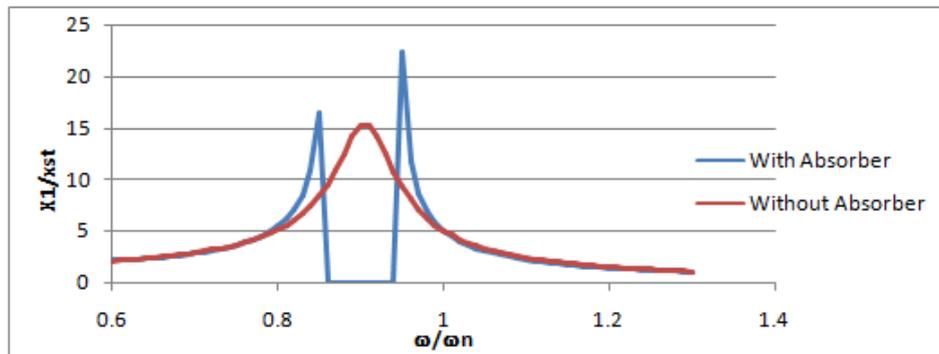


Fig.2b Magnification Factor Vs Frequency Ratio for Theoretical Analysis

When excitation frequency equals to any of the natural frequency of the system, all the points in the system have infinite amplitudes of vibration or the system is in resonance.

To find the two resonant frequencies of the system, when $\omega_2 = \omega_1$, the denominator of either of equation is equated to zero.

$$\frac{\omega^4}{\omega_1^2 \omega_2^2} - \left[(1 + \mu) \frac{\omega^2}{\omega_1^2} + \frac{\omega^2}{\omega_2^2} \right] + 1 = 0 \quad (6)$$

Solving we get,

$$\left(\frac{\omega}{\omega_2} \right) = \left[\left(1 + \frac{\mu}{2} \right) \pm \sqrt{\mu + \frac{\mu^2}{4}} \right] \quad (7)$$

This relationship is plotted in Fig. 2c

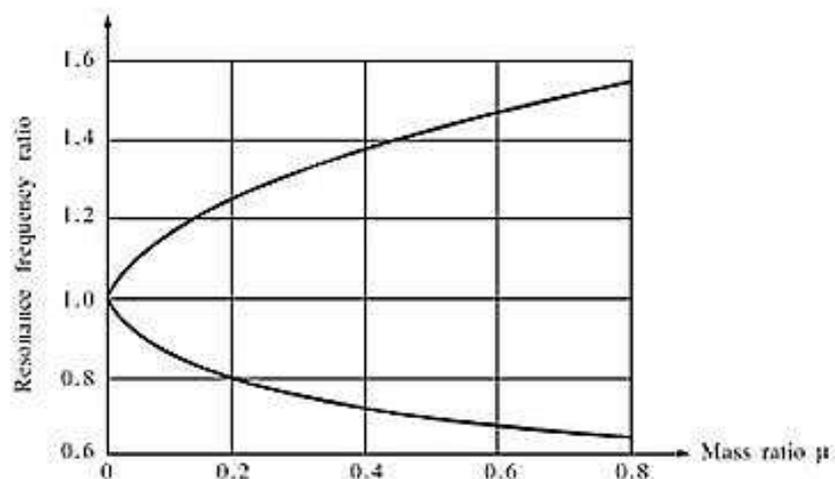


Fig.2c Resonant Speed Vs Mass Ratio

2.2 Experimental Parameters

Table1 Experimental Parameters of Cantilever Beam

Parameter	Symbol	Value
Material of Beam	MS	-
Total Length	L	0.9 m
Width	B	0.025 m
Thickness	T	0.005 m
Moment of Inertia	I	$2.6042 \times 10^{-10} \text{ m}^4$
Young's Modulus	E	$2 \times 10^{11} \text{ N/m}^2$
Mass Density	P	7830 m^3

III. NUMERICAL ANALYSIS

In order to carry out numerical analysis of vibration absorber ANSYS software is used. This analysis allows determination of resonance frequency of each mode, which is a function of location of mass along absorber plate. The type of element is used for analysis is SOLID186. It is a higher order 3-D 20-node solid element that exhibits quadratic displacement behavior. The element is defined by 20 nodes having three degrees of freedom per node: translations in the nodal x, y and z directions. The element supports plasticity, hyperelasticity, creep, stress stiffening, large deflection and large strain capabilities. It also has mixed formulation capability for simulating deformations of nearly incompressible elastoplastic materials and fully incompressible hyperelastic materials [1].

Using ANSYS analysis of linear and nonlinear cantilever beam is carried out as below,

3.1 Linear Analysis

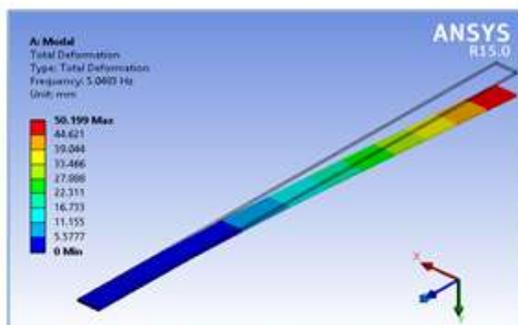


Fig.3a First Mode Shape of Linear Cantilever Beam

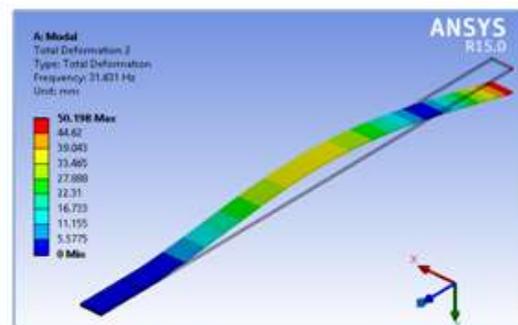


Fig.3b Second Mode Shape of Linear Cantilever Beam

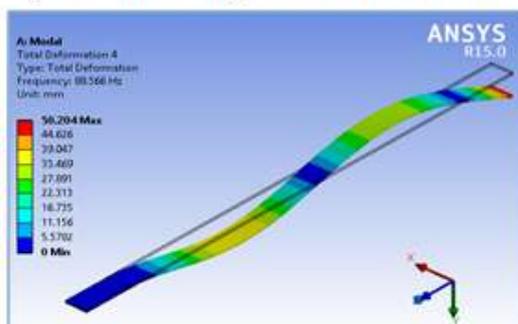


Fig.3c Third Mode Shape of Linear Cantilever Beam

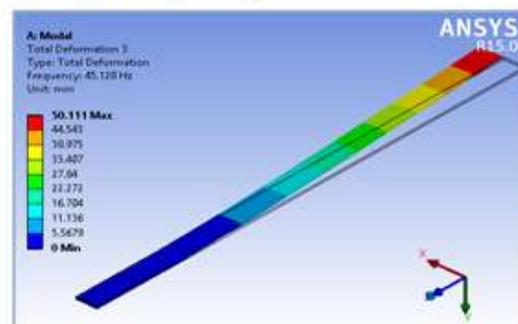


Fig.3d Fourth Mode Shape of Linear Cantilever Beam

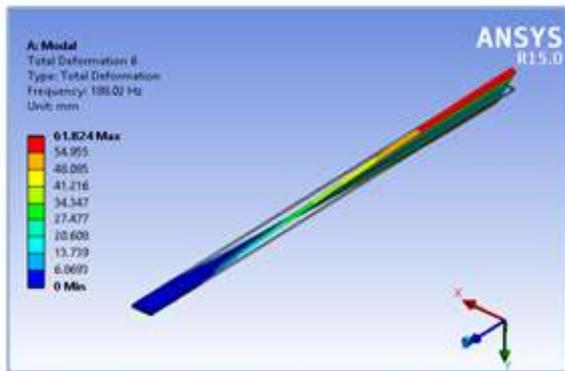


Fig.3e Fifth Mode Shape of Linear Cantilever Beam

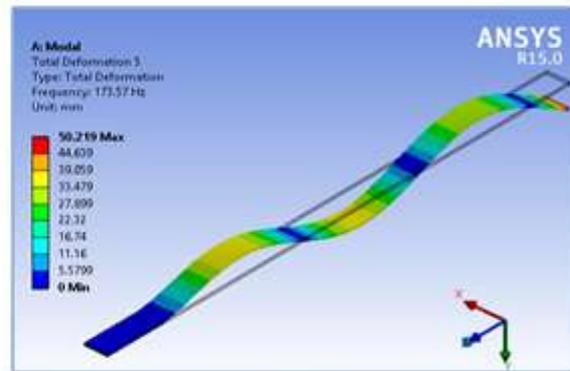


Fig.3f. Sixth Mode Shape of Linear Cantilever Beam

3.2 Nonlinear Finite Element Analysis

Non-Linear Analysis includes Material Nonlinearity: Force (stress) Vs. Displacement (strain) curve is nonlinear (polynomial). Geometric non-linearity: In real life, the stiffness [K] is a function of displacement [d]. This means in a geometric non-linear analysis, the stiffness K is re-calculated after a certain predefined displacement. Contact nonlinearity: In Contact analysis, the Stiffness K also changes as a function of displacement (when parts get into contact or separate) nonlinear analysis deals with true stress and strain (unlike engineering stress and strain in linear static analysis) [3].

3.3 Nonlinear Analysis

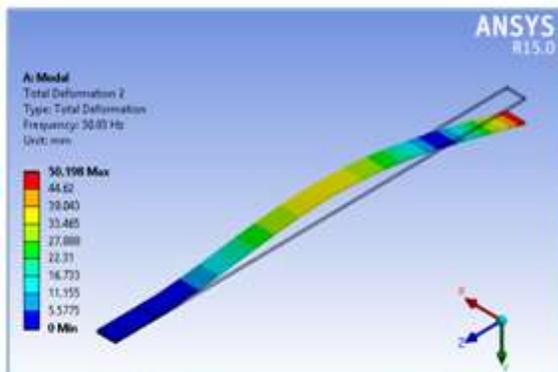


Fig.3g First Mode Shape of Nonlinear Cantilever Beam

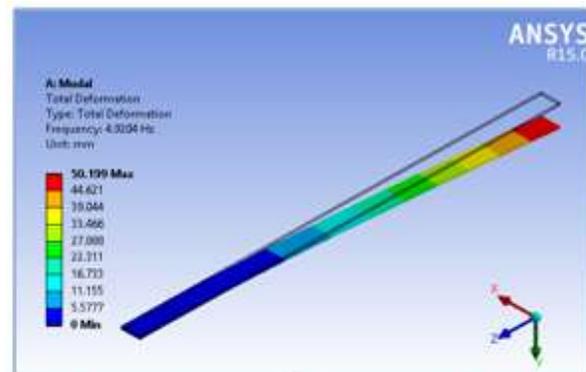


Fig.3h Second Mode Shape of Nonlinear Cantilever Beam

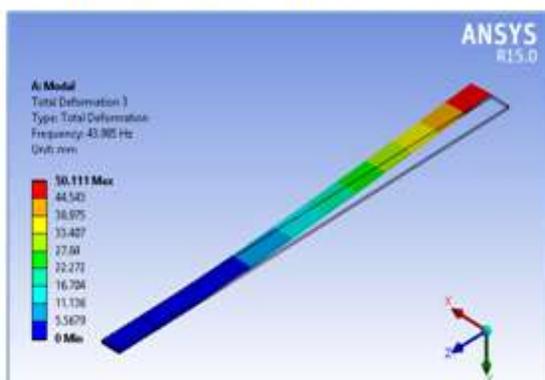


Fig.3i Third Mode Shape of Nonlinear Cantilever Beam

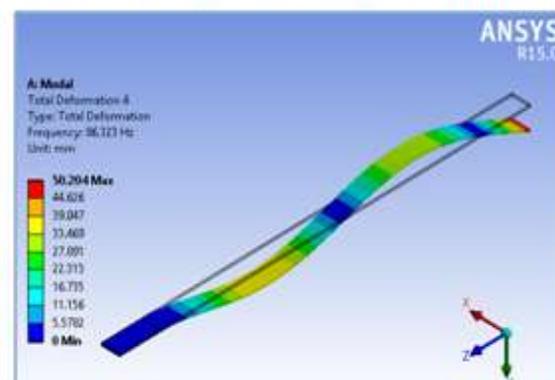


Fig.3j Fourth Mode Shape of Nonlinear Cantilever Beam

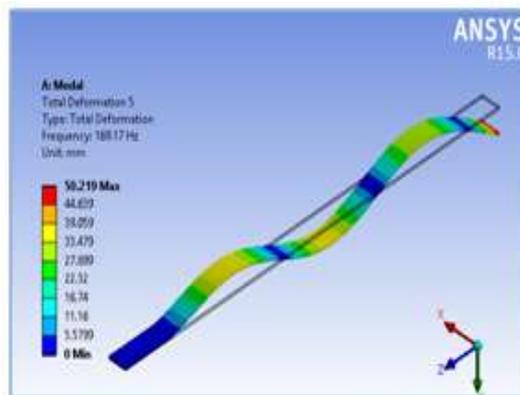


Fig.3k Fifth Mode Shape of Nonlinear Cantilever Beam

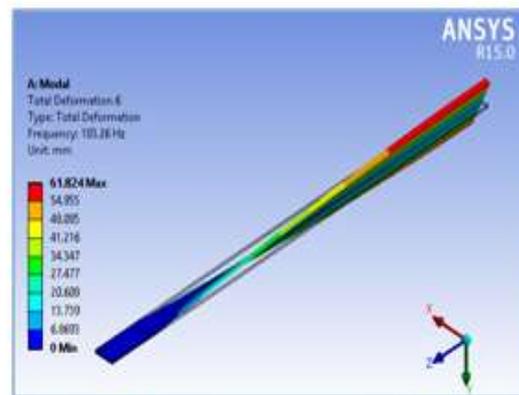


Fig.3l Sixth Mode Shape of Nonlinear Cantilever Beam

IV. DESIGN OF DYNAMIC VIBRATION ABSORBER

The variable stiffness and variable damping mechanism consists of mass and cantilever beam as absorber plate, lead screw, D.C. motor, variable support, guide plate, circular magnets and fixed frame to combine the mechanism as one. In the absorber, the spring constant at mass varies by moving the movable support along the cantilever beam. The movable support consists of plate with a rectangular slot in which a rectangular plate is inserted. Hence, Middle support moves when motor rotates. Hence, absorber resonances can be changed by the movement of support along the length of cantilevered beam.

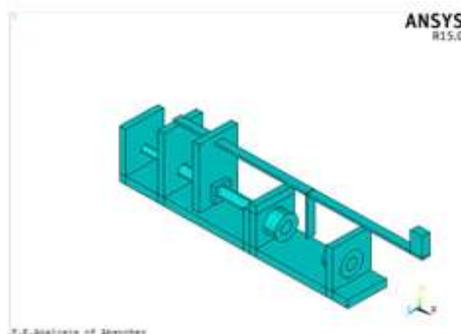


Fig.4a

Fig.4a CAD Model of Vibration Absorber

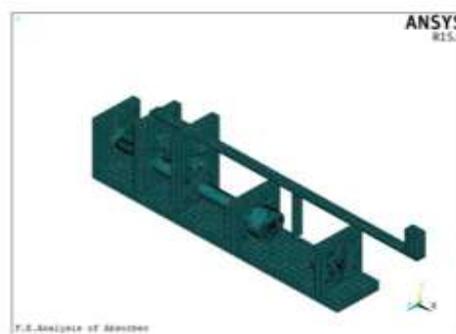


Fig.4b

Fig.4b Meshed Model of Vibration Absorber

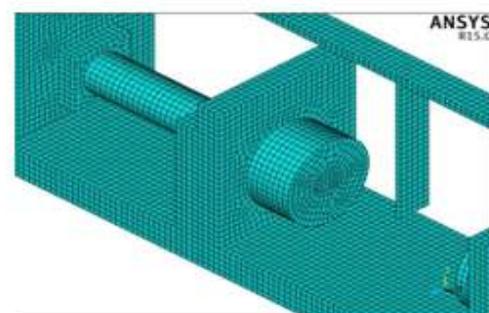


Fig.4c

Fig.4c Meshed Model of Vibration Absorber

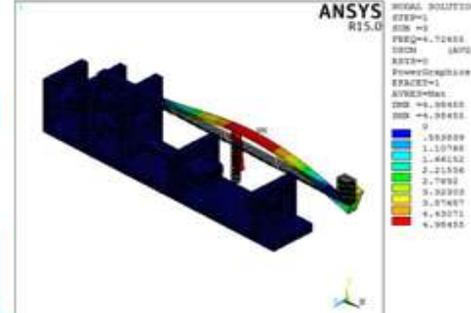


Fig.4d

Fig.4d Third Mode Shape Vibration Absorber

Frequency of absorber plate for nonlinear parameters,
When L (length of absorber plate) is 325 mm then,

$$f_n = \frac{1}{2\pi} \sqrt{\frac{k}{m}}$$

$$f_n = \frac{1}{2\pi} \sqrt{\frac{251.35}{0.258}}$$

$$f_n = 4.97 \text{ Hz}$$

V. RESULTS AND DISCUSSION

Table 2 First Six Natural Frequencies for a Linear and Nonlinear Cantilever Beam

	LINEAR BEAM	NONLINEAR BEAM	ABSORBER PLATE
Mode	Frequency (Hz)	Frequency (Hz)	Frequency (Hz)
1	5.2483	4.9604	4.98
2	31.631	30.83	30.88
3	45.128	43.985	43.99
4	88.566	86.323	86.35
5	173.57	169.17	169.21

From above table it is seen that natural frequency of nonlinear cantilever beam and absorber plate matches. Therefore it can be concluded that by using nonlinear analysis it is possible to design actual vibration absorber.

VI. CONCLUSION

As natural frequency of absorber system matches with natural frequency of nonlinear cantilever beam. Hence vibrations of beam will be absorbed for nonlinear cantilever beam. From the analysis it is seen that there is difference between frequencies of linear and nonlinear cantilever beam. Results of analyzed cantilever beam by considering nonlinear parameters tends to actual results. Therefore while designing the tuned vibration absorber for cantilever beam it is necessary to consider the nonlinear parameters to achieve real life results.

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DECLINE OF TRADITIONAL BUSINESSES / ARTISANS IN PRESENT COMPETITIVE SCENARIO: A RESEARCH ON ORNAMENTAL STONE SETTERS IN AMRITSAR

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ABSTRACT

Goldsmiths are a class or community of artisans, who manufactures, & deals in Gold Ornaments. Stone Setters (Jaria) are a sect of this class, who manufactures & deals in 'Jarau' Jewellery, also known as 'Setting Jewellery'. This sect presently resides in a single city of North-Western India, namely Amritsar (Punjab), where it produces & supplies this style of jewellery world over. Some manufacturers also to a very little extent manufacture it at Patiala & Jalandhar. Before Partition, i.e., 1947, this community had also resided in Lahore & its outskirts. Hence then this was a community of 'majha doab' of South Asia between rivers Ravi & Beas. After partition all the artisans moved on towards east and settled down in the city of golden temple, Amritsar. In the last 65 years, this community faced several ups & down followed by a phenomenal decline caused out of enormous competitive scenario as well as such other factors.

In this research, we will cover their whole scenario throughout these 65 years, their present conditions, present market structure, and their problems in this competitive era & will commit to predict up the ways out to overcome from such problems.

We had used personal interviewing, peer group interviews and expert opinions for the purpose of analysis, appraisal & conclusion of this research. Further anything observed significant has been well merged with the study to make it more producible.

Keywords: The Traditional Artisans; Present Scenario and the Causes of such Decline; Ways to recover; Modern Success Mantra in for MSMEs.

I INTRODUCTION

The NCEUS (National Commission for Enterprises in the Unorganized Sector) Report, 2007 states that 836 Million Indians (77% of total population) live on an income less than Rs. 20 / per day only. 50% of this 77% constitute 92% of our workforce, i.e., 422.7 Million people, work & are supporting dependent with income less than Rs. 20 / per day without any job security or social security. As per Census 1995-96, 47.61 lakh artisans are there. It is estimated that India has about 3500 Clusters producing a variety of craft of items, with an estimated

employment of 13 Million people. Artisans becoming an under-privileged section are under or majorly prone to come under this section and our research is addressing the issue by having our focus on a given set of artisans. Now let us introduce ourselves with the study.

The skills of Rural Artisan continue to be old & they are still using the traditional technology which is the main cause of their back foot performance. Their economic status is far from satisfactory, which makes their marketing power also weak at both selling & buying levels. Further, their low level of education & their weak or non-existent linkages with Rural Development Institutions makes them much prone to the decline. Their shyness, weak communication skills & tendency to remain “small & satisfied” adds much to their problems. The main reasons for the problems faced by the Unorganized Sector of Artisans are: (a) Lack of skills; (b) Less exposure to information & technology; (c) Lack of formal training; (d) Absence of non-farm policy marketing support; (e) Non-competitive products; (f) Unable to thrive competition; (e) Application of traditional left over technologies. Main cause of non-development of artisans is their non-involvement in rural development programmes, which is also a prominent reason of the failure of the motto of such programmes (Solanki, 2008).

The most national award winning craftsmen are living without even basic amenities. Most of them take loans from local money lenders at comparatively high interest rates. It was in 1963, when Government of India constituted National Awards for Excellence in Crafts; still they are not enough to rejuvenate rural crafts. Government needs to exhibit these works through national & international museums & trade fairs (Gupta, 2012). The satisfactory performance in marketing of handicrafts is possible on special interest of government (Ahmed, 1987). Some Government Agencies & NGOs make efforts to rejuvenate them; still there are many challenges for them including terrorism in some regions slowing down the activity of tourism as well as these artisans. There is a need to set up a national institution, where shilpaguru can teach as a government servant, to save art as well as artisans (Gupta, 2012).

Goldsmiths are a class or community of artisans, who manufactures, & deals in Gold Ornaments. Stone Setters (Jaria) are a sect of this class, who manufactures & deals in ‘Jarau’ Jewellery, also known as ‘Setting Jewellery’. This sect presently resides in a single city of North-Western India, namely Amritsar (Punjab), where it produces & supplies this style of jewellery world over. Some manufacturers also to a very little extent manufacture it at Patiala & Jalandhar. Before Partition, i.e., 1947, this community had also resided in Lahore & its outskirts. Hence then this was a community of ‘majha doab’ of South Asia between rivers Ravi & Beas. After partition all the artisans moved on towards east and settled down in the city of golden temple, Amritsar. In the last 65 years, this community faced several ups & down followed by a phenomenal decline caused out of enormous competitive scenario as well as such other factors.

1.1 Historical Background

India is a land of various cults & communities. People belonging to different fields & mindsets co-survive here. Everybody has his own way of living & profession. Goldsmiths are one of these professions. They are a class of guilds incepted from the very early age of Indus valley civilization, when female members of the family started

making their own jewellery from materials such as bones, animal teeth, and lustrous stones. Later a class developed from this art that used to make ornaments from various metals such as gold, silver & bronze. This class was well evident in many myth stories, mythological books, archaeological remains at various sites and texts of history (BSHF101, FST01).

At the times of dynasties, this community used to make ornaments like crowns, necklaces & even gold & silver chariots (in the Vedic age). Parallel, they also served common people for their ornamental & banking needs (General Studies).

Till independence, this art improved with the passage of time, but was still not much artistic, as major buyers in village communities were interested in gold just for their status symbol and investment, and India was a village economy at that time. They prefer the ornament much by their heavy weights, not by their articulation.

Even today, still in rural areas, people prefer plain gold jewellery, often referred as “Yellow Jewel”, while purchasing. A lot of changes have happened in the whole community at large, with the development of well designed selling premises & other changes happened with the advent of modernisation, but still the stone setter branch / sect of this community has not become so well organised & is facing a lot of problems due to less availability of labour, increased competition, globalization & other changes, which will discuss later in this study.

1.2 Post-Partition Era & Current Scenario

As discussed earlier that after partition all these artisans settled in Amritsar. At the time of eighties, when conditions are not stable in Punjab, a company of Dubai took initiative to manufacture this jewellery in Dubai and supply thereof, in an organized way, by taking some of these artisans to there to execute the manufacturing activity, but this attempt was not successful for a long. Since then no major attempt is noticed to establish this art elsewhere, except the tiny instances at Patiala & somewhere at Jalandhar also. So its major manufacturing market lies in Amritsar. Still, this art is imparted to the disciple free of cost by the master, without any fee charge by the master (ustad), under the ‘guru-shishya parampara’ (master-disciple pedagogy).

Main parties involved in this industry, at present, are depicted below:

- 1) **End Customers:** They purchase jewellery for their personal use & in turn make payment for the purchase.
- 2) **Market Sellers / Jewellers:** They purchase the ordered jewellery on credit (usually 1-2 months) from the stockists, traders and/or manufacturers & later make payment to the respective parties on it being realised from the end customers.
- 3) **Stockists / Traders / Suppliers / Exporters:** They purchases jewellery from manufacturers and/or professional labourers (stone setters) to supply / export on credit as earlier.

- 4) **Manufacturers / Wholesome Producers (Saraf):** They manufacture jewellery on large scale to supply / export it to retail jewellers / stockists on credit. They get it manufactured from the professional labourers, who in turn receive a fixed rate labour on the work executed at their premises.
- 5) **Professional Labourers (Jaria):** They are those people who actually manufacture this setting jewellery for manufacturers usually. Some professional labourers also manufacture and supply jewellery on their own at a micro/small scale and supply the same to stockists and/or jewellers, of which major trading usually incurs with that of Stockists. Professional labourers, in turn, further employ daily wagers and/or permanent disciples for their assistance in such manufacturing activity.
- 6) **Daily Wagers / Permanent Disciple (Shagird):** Daily Wagers are a type of disciples (Shagird), who left their master / professional labourers (ustad), in between their training, before the acquisition of all skills of professional labourer. They work on a flexible wage rate determined on the basis of demand & supply of work force.
Whereas, Permanent Disciples work permanently with their masters (ustad), until they become skilfully eligible to work as a professional labourer & their master allows & guarantees them to do so. They also receive a consideration for their work in the form of stipend on both weekly as well as monthly basis.
- 7) Besides there are some other intermediaries / persons a bit involved in, which are numerous to be included in the study.

Note: Credit, wherever it occurs, it goes approximately to the period of 1-2 months in normal cases.

II METHODOLOGY / PLANNING OF WORK

Being a **Primary Descriptive Research** in this branch of gold smith, presently no literature is available on the field. The research has started from consultation with the persons having experience in this field or are being well verged with this class of guilds. Further any literature or other material relevant to this research has also been considered well to make the study more realistic & addressing one. Core researcher having a substantial experience in the area, has used self opinion as well as went in deep consultation of experts (within Amritsar & adjoining areas within the reach of researcher) for developing the base plan of the research. A round of interviews have been conducted with various classes of the field, namely, the manufacturers, intermediaries, sellers & so on; and their responses has been collected by way of questionnaires. They have been questioned for the problems faced by them in the area in recent times, their limitations towards current trends, way to overcome & awareness towards use of new technology, in a structured questioning format. Based on such responses, summary of the research findings has been made.

2.1 Research Scope: To find out the problems of Ornamental stone setters in Amritsar & devising their solutions thereof.

2.2 Objectives of the study: (1) To study the perceptions of customers with regards to setting jewellers; (2) To study the perceptions and problems of major sellers involved in trading setting jewellery; (3) To study the

perceptions and problems of stockists / traders etc; (4) To study the perceptions and problems of Manufacturers etc.; (5) To study the perceptions and problems of Professional labourers; (6) To study the perceptions and problems of Daily wager / Permanent disciple; (7) To provide the solutions thereof.

2.3 Sample Space & Sampling Technique(s): End customers have been surveyed 100 out of collected on convenience sampling (Punjab and adjoining states within the reach of researcher). 50 Major entities of the Jewellers/etc., has been taken for the survey (20 from Amritsar collected on rational judgement / randomly & rest from adjoining districts and states, within the reach of researcher). 10 out of 50 Stockists/etc. (approx., as per experts) within Amritsar and adjoining areas within the reach of researcher has been taken. 10 out of 10 (as per expert) major one manufacturers existent within Amritsar have been surveyed. 20 out of 100 professional labourers (approx., as per experts) within Amritsar (randomly + personal judgement of relevance) has been taken. 50 out of 300 daily wagers / disciples within Amritsar randomly sampled.

2.4 Data Collection & Analysis: Questionnaire consisted of open-ended objective / logical as subjective questions depending upon the need of question. Format of questioning was prefixed without any later modification. It has not covered any personal questions breaking the limit of secrecy & trust.

A combination of Scales has been used for measurement including Nominal, Ordinal, interval, etc. Samples have been collected by personal interviewing & entering responses thereby in major cases. For the purpose of analysis, various statistical tools as per the need requirement of analysis have been used.

III FINDINGS & RECOMMENDATIONS

Numerous problems faced by this sect are responsible for the low development & non-spread of this art form elsewhere. At present, as revealed by the research, some of the major problems lying against them are as follows (party wise):

- a) End customers (Why they don't prefer to purchase setting jewellery?)
 - i. Precious stones settled in this jewellery are priced as gold at the time of purchase, but values nil at the time of resale / return to vendors usually, so there is a loss of investment.
 - ii. Setting jewellery can't be verified accurately in purity testing machines.
- b) Market sellers / retail jewellers
 - i. Dynamic instability in market trends on daily basis.
 - ii. Customer prefers plain jewellery rather than setting jewellery.
 - iii. They have disputes with their customers regarding return value of setting jewellery.
 - iv. Customers dispute many a time for the return value of setting jewellery.
 - v. Manufacturer resides / manufactures far away from the retail outlets spread over the world. So they are unable (from their busy schedule) to give a personal visit and discuss their

specification with the technical personnel at manufacturing location. They have to rely upon the produce quality of manufacturers.

- vi. Further all the parties involved in manufacturing activity are not so much aware or interested in usefulness of the new technologies in their activities, which adds on to the problems of modern age jewellers.
- c) Stockists / traders / suppliers / exporters
- i. Dynamic instability in market trends on daily basis.
 - ii. Funds remain idle in jewellery stock.
 - iii. If not saleable, convertible in cash with huge losses, because of stones & other costs not recoverable.
 - iv. Risk of non-receipt of consideration for jewellery sold on credit.
 - v. Security risks, while delivering and otherwise carrying on the valuable jewellery to the premises of stockiest / jewellers.
 - vi. Excessive government regulations & departmental verification usually interrupting the business activity.
 - vii. Purity of stock purchased usually relied upon mutual trust, as every time verification involves numerous costs and waste of time. So the chances of misinterpretation regarding purity increases.
 - viii. They individually are responsible for the quality & purity of the goods, even if other party has incurred fraud.
- d) Manufacturers / wholesome producers (saraf)
- i. Dynamic instability in market trends on daily basis.
 - ii. Huge investment cost in stock maintenance. Sometimes, it remains idle for a no. of years.
 - iii. Purchaser keeps a considerable part of payment for credit purchases with them till date, the person supplying jewellery want to continue trade with him.
 - iv. Further, even on discontinuation of trade relations, some purchasers not return the indebted amount.
 - v. Risk of discontinuation of trade relations in present competitive scenario, i.e., he is not sure about whether the customer purchase it again or not.
 - vi. Risk of non-receipt of consideration for jewellery sold on credit.
 - vii. Security risks, while delivering and otherwise carrying on the valuable jewellery to the premises of stockiest / jewellers.
 - viii. Excessive government regulations & departmental verification usually interrupting the business activity.
 - ix. Purity of stock purchased usually relied upon mutual trust, as every time verification involves numerous costs and waste of time. So the chances of misinterpretation regarding purity increases.
 - x. They individually are responsible for the quality & purity of the goods, even if other party has incurred fraud.

- e) Professional labourers (jaria / sunar / ustad)
- i. Dynamic instability in market trends on daily basis.
 - ii. Risk of discontinuation of trade relations in present competitive scenario, i.e., he is not sure about whether the customer purchase it again or not.
 - iii. Risk of non-receipt of consideration for jewellery sold on credit.
 - iv. Security risks, while delivering and otherwise carrying on the valuable jewellery to the premises of manufacturer / stockiest / jewellers.
 - v. Excessive government regulations & departmental verification usually interrupting the business activity.
 - vi. At this level, he is not efficient to maintain records as per govt requirements.
 - vii. They individually are responsible for the quality & purity of the goods, even if other party has incurred fraud.
 - viii. There is a scarcity of daily wagers / labourers in high demand seasons.
 - ix. It incurs higher costs to maintain permanent disciples throughout the year.
 - x. It takes years to train a disciple about how to execute a single process in the manufacturing activity perfectly.
- f) Daily wager
- i. Dynamic instability in market trends on daily basis.
 - ii. Excessive fluctuations and changes in their employment patterns on daily basis.
 - iii. Fluctuating rates depending upon demand & supply of workforce.
 - iv. Have to strive for finding work on daily basis in the whole market.
 - v. Professional labourers employ them by the need of orders.
 - vi. Ill-treatment/abusive language used by their switching employers, in some cases
 - vii. They need to work for excessive working hour to ensure their full bread (sometimes 16-18 hours)
 - viii. There is no surety that whether they will earn their bread in the following day or not.
- g) Permanent disciple (Shagird)
- i. Have to leave their formal / regular education, while joining their masters. It leads to a lower level of education in the sect. Usually most of them are just middle or matriculates.
 - ii. Have to work / remain committed regularly, on a minimal stipend / salary (decided on time to time by their masters/ustad), for a period of 10-15 years.
 - iii. Ill-treatment / abusive language used by their masters / co-workers / market persons, in some cases.
 - iv. They have to work for excessive working hours (sometimes 16-18 hours a day), for a fixed stipend / salary.
 - v. They are not sure that they would become successful professional labourers, even after the completion of training or has to strive as a daily wager. As a good much no. of professional labourers are already there in market striving for and there is limited span of growth entangled by in excess competition and global financial scenario.

As per the research and general observation, an important point found out the Professional labourers and daily wagger are the more effected segments of the sect, who are exposed to seasonal variation, since they have no or negligible savings to cure in such situations. Excess Price fluctuation is another major threat, since gold prices move every minute, it makes much more inconsistent for all the above parties expect daily wagers and disciples, to stay within profits always.

Further in general a major problem affecting the whole community of gold smiths in previous years was the duty hike on gold and jewellery to reduce the yellow metal's imports bill. India imports in excess of 1000 tons of gold annually, (including unofficially smuggled gold, with negligible local productions (US Debt Clock, 2014). The annual gold imports are around 50 billion US\$ next only to crude oil imports widening the trade deficit. Gold imports cost nearly 3% of the GDP. Alarmed by the huge trade deficit in the year 2012, GoI introduced moderate customs duty (below 10%) on gold imports. Through the policy is fetching good customs income, the imports demand is not drastically coming down. It is due to the reason that world gold demand is mainly driven by Indians. Customs duty imposition also led to increase gold smuggling but narrowed the trade deficit to permissible limit as the smuggled would not get accounted as imports in trade deficit calculations (PTI, 2013). This makes very difficult for the goldsmiths to smoothly execute their sales and operations. Against which numerous strikes and rallies held throughout the nation previously. Finance ministry worked to sort out the problem and thereby made no further duty hike on gold & jewellery in Finance Act 2013 (Budget 2013), as it would lead to increase in smuggling & other illegal activities (Rustagi, 2012), in addition to affect the performance of Indian exports of jewels. The custom duty foregone during the F.Y. 2013-14 on non-essential gold and diamonds import is Rs. 48,635 crores which constitutes 16% of the total customs duty foregone (Budget, 2014).

3.1 Solutions recommended

- a) To tackle with the problem of trade instability, government needs to design it efficient monetary and trade policies in a manner, so as to benefit the industry as well as the economy as a whole.
- b) Regarding the consumer preference and their concern about the resale value, prior pre-disclosure about the expected realisable value, which is usually near about 90%, can be helpful to let the customer satisfy best with the vendor. Furthermore, art forms are not measureable in the terms of money, if the customer is art lover, he/she will prefer the art, where cost hardly matters.
- c) Regarding the far distance reach of the vendors and manufacturers, same can be solved by the use of internet technologies by the use of tools such as e-conferencing, e-networking, etc. Some of the population of this sect are well using the technologies available within their reach to tackle this distance, still there is lag behind in awareness and technical upgradation of the sect as a whole. Same can be sorted out by the individual as well as institutional initiatives by the development bodies at the local level; to let the awareness of the artisans got improved.
- d) Regarding the problem of stockists / manufacturers of their huge and idle investment in the stock maintenance as well as later losses, there is a need of efficient forecasting and resource management

systems to be developed. It would be quite convenient for this level of traders to go for modern and sophisticated tools of resource management and production forecasting to raise their profits and lessen their probable losses.

- e) In case of recovery as well as purity authorisation problems, in addition to mutual trust arrangements, formal laws and evidence worthy credit system need to be formed out, to lessen out the possibility of such defaults. Further, the local public machinery also needs to be regulated to let it make more helpful in such a circumstances.
- f) Government also needs to take initiative towards reducing the in excess regulations and departmental interference, by initiating a self reporting structure, official inferring only the suspicious cases.
- g) A gross tax and reporting system needs to be devised for small traders and manufacturers of gold jewellery on annual or biannual basis, to let those focus on the development on their business activities and reducing their expenditure on filing in excess documentation.
- h) To reduce the fluctuation between the supply and demand in high end seasons, the local association itself needs to actively take initiative to organise the labour market, by maintaining a centralised mechanism to ensure a centralised and regular flow of labour force.
- i) Regarding the low level of education of the learning disciples, initiatives of evening schools and colleges and flexi classes would be much helpful in addressing out the problem, as did in Maharashtra and some other Indian business worthy states. Further their experience earned in should be professionally recognised with the constitution of a professional body regulating the whole affairs of training and development.
- j) Regarding the employment prospects of the learned out disciples the local development bodies needs to take initiatives to increase their market awareness, marketing & communication skills by way of its actively organised terminal workshop programmes, as in case of food processing, MSMEs, etc. and some other developing industries.

IV CONCLUSION

As analyzed from the available facts & figures as well as suggestions reverted from the market in the survey, it is interpreted there are some problems where the sect individually needs to take initiative by make it more educated, competitive & market worthy. Since Innovation has an important role in the growth of any sector. Besides, government need to take some initiatives for the betterment of this sect at its will. Form the survey and analysis we have formed out the following suggestive solutions as follows:

The most prominent problem in common is Dynamic instability in market trends on daily basis and Lower level of education and awareness in the sect which makes them lagging behind others. To tackle this problem of trade instability, government needs to design it efficient monetary and trade policies in a manner, so as to benefit the industry as well as the economy as a whole. Regarding the low level of education of the learning disciples, initiatives of evening schools and colleges and flexi classes would be much helpful.

The Main Factors de-motivating seller to trade in setting jewellery is Customer prefers plain jewellery rather than setting jewellery and dispute many a time for the return value of setting jewellery after purchase. Regarding the consumer preference and their concern about the resale value, prior pre-disclosure about the expected realisable value, which is usually near about 90%, can be helpful to let the customer satisfy best with the vendor.

Problems to Traders / manufacturers include Excessive government regulations & departmental verification; Investment / credit recovery problems; Risk of discontinuation of trade relations; Security risks. They have to incur a huge investment in stock maintenance which sometimes remains idle for a no. of years. Regarding this problem of stockists / manufacturers, there is a need of efficient forecasting and resource management systems to be developed. Formal laws and evidence worthy credit system need to be formed out, to lessen out the possibility of defaults. In addition to the above discussed problems professional labourers face the scarcity of daily wagers / labourers in high demand seasons and the main problem of wagers is also excessive fluctuations and changes in their employment patterns and labour rates on daily basis. They strive for finding work daily. To reduce the fluctuation between the supply and demand in high end seasons, the local association itself needs to actively take initiative to organise the labour market, by maintaining a centralised mechanism to ensure a centralised and regular flow of labour force.

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EFFECT OF FLY ASH ON THE PROPERTIES OF BLACK COTTON SOIL: A REVIEW

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ABSTRACT

To full fill the infrastructural need of increasing population, small multi-storey buildings, express highways, high speed rail tracks, new bridges, airports etc. are required to construct. In many places it is not feasible due to the presence of Black cotton soil or clayey soil. Black cotton soil is a problematic soil which expands by absorbing water and shrinks when the moisture is removed. This review paper represents the study of “fly ash” as a stabilizer or admixture in improving some of the properties of the black cotton soil. Fly ash is a fine, glass powder recovered from the gases of burning coal during the production of electricity. These micron-sized earth elements consist primarily of silica, alumina and iron. The aim of this review paper is to discuss the effect of fly ash on the basic engineering properties of black cotton soil such liquid limit, plastic limit, compaction, CBR value etc.

Keywords : *Black Cotton Soil, Fly As, Stabilization.*

I INTRODUCTION

Expansive soil are mostly found in the arid and semi-arid regions and it cover very large area of the world. It covers nearly 20% of the land in India and includes approximately the entire Deccan Plateau. Maharashtra, Andhra Pradesh, Karnataka and parts of Gujarat and western Madhya Pradesh. Black cotton soil is a type of expansive soil with high plasticity and can maintain water throughout the summer season. It is expansive in nature and possess high swelling and shrinkage properties. It is hard as long as it is dry but loses its stability almost completely when it becomes wet, Again when it became dry shows a lot of cracks on its surface. So we have to find stabilization methods which are economic and improves the problematic nature of black cotton soil. One of the finest method to deal with this problem is to stabilize this soil with fly ash. Thermal power plants, cement, steel and paper industries all over the world contribute enormous quantity of fly ash every year. Environmentally safe disposal of fly ash has necessitated the exploration of innovative and cost effective methods of utilizing the fly ash in many fields. The major uses of fly ash mostly arise out of its pozzolanic property which can be used for stabilization of soils. Pozzolanic fly ashes can be advantageously made use of to improve the geotechnical properties of black cotton soil. Fly ash has been successfully used as stabilizing agent for different soils by various researchers, both in laboratory and also in field (Amos and Wright 1972) reported the effect of mixing fly ash with clayey and loamy soils on their geotechnical properties. The properties of soil are improved by cat ionexchange,

flocculation and pozzolonic cementation (Bell, 1988).The addition of fly ash to clayey soils reduced their plasticity and swelling characteristics (Shivapullaiah et.al.1996).

II FLY ASH

Fly Ash is an industrial waste product from thermal power plants which uses coal as fuel.It is estimated that 170 million tons of fly ash is being produced from different thermal power plants in India consuming 70 thousand acres of precious land for its disposal causing severe health and environmental hazards (Ahmad et al. 2014). There are two major classes of fly ash, class C and class F. The former is produced from burning anthracite or bituminous coal and the latter is produced from burning lignite and sub bituminous coal. Both the classes of fly ash are pozzolans, which are defined as siliceous and aluminous materials (ErdalCokca 2001). The micro sized fly ash mainly consists of silica, alumina and iron and the particles are generally spherical in size which makes them easy to blend and make a suitable mixture. In order to utilize fly ash in bulk quantities, ways and means are being explored all over the world. In spite of continuous efforts made by the government hardly 5-10% of the fly ash is being used for construction purpose like brick making, cement manufacturing, soil stabilization and as filling material. As the properties of fly ashes vary from place to place, there is a need to check the variability of properties for its effective utilization. Hence, before the utilization of fly ash as a construction material, it is necessary to study properties of fly ash from different sources, so that it can be used beneficially. Physical and chemical properties obtained from different studies are presented in Table 1 and Table 2. It can be seen that silica content in the fly ash is very high. Such high content of silica is reason for the pozzolonic activity.



Fig.1 Original picture of fly ash

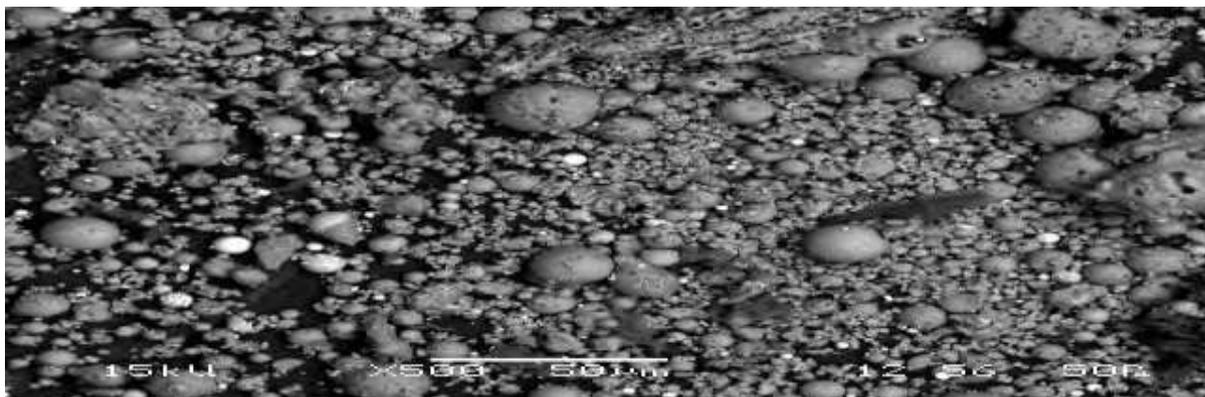


Fig.2 SEM picture of fly ash

Table.1 Physical property of Fly Ash (Mehta et al. 2013, Harkari et al. 2012, Ahmed Naseem et al. 2014)

Physical property	Value
Colour	Grey
Specific gravity	1.9-2.7
plasticity	Non plastic
OMC (%)	38.0 – 18.0
MDD	0.9 – 1.6
Angle of internal friction	30 ⁰ – 40 ⁰
Compression index C _c	0.05 – 0.4
Permeability	8 x 10 ⁻⁶ – 7 x 10 ⁻⁴
Coefficient of uniformity	3.1 – 10.7

Table.2 Chemical properties of Fly Ash(Bairwa et al. 2013,Bidulabose 2013, Kalyanshetti et al. 2013)

Chemical properties (%)	Range of values
Silica (SiO ₃)	50 - 62
Alumina (Al ₂ O ₃)	24 - 30
Ferric oxide (Fe ₂ O ₃)	0 - 9
Calcium oxide (CaO)	1 - 3
Magnesium oxide (MgO)	0.5 - 1
Titanium oxide (TiO ₂)	0 - 0.3
Loss of ignition	1 - 19

III EFFECT OF FLY ASH ON THE PROPERTIES OF BLACK COTTON

Many laboratory tests were carried out on Black cotton soil mixed with fly ash by many national and international researchscholars and they found that the results are quite satisfactory. The effect of the fly ash on the index and engineering properties of the soil is presented in the following section

3.1 Specific Gravity

The specific gravity of soil fly ash mix decreases with the increase in the percentage of fly ash. It is found to decrease from 2.62 to 2.22 with the increase in the percentage of fly ash from 10% to 50% respectively (Hakariet al.2010)

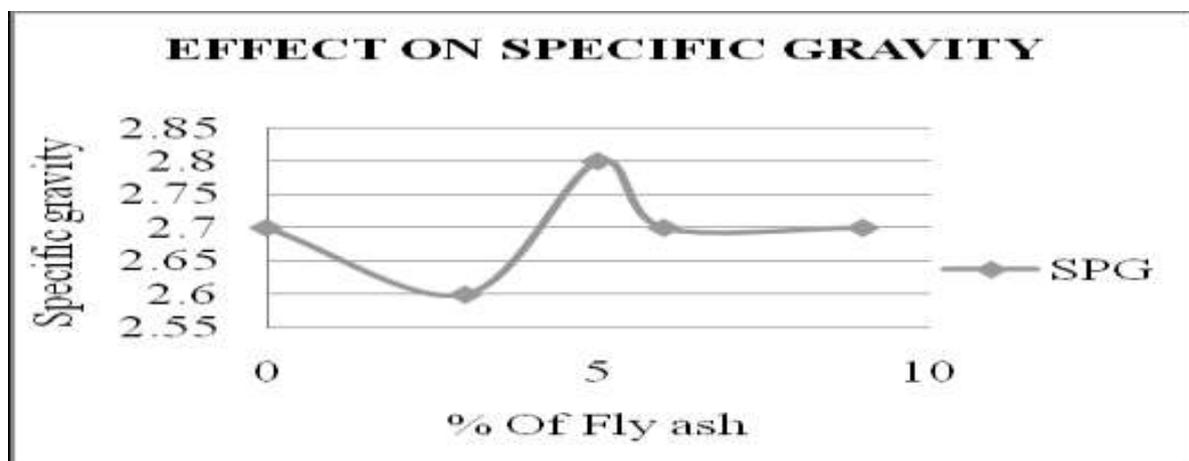


Fig 3. Variation of specific gravity

3.2 Liquid Limit

The liquid limit decreases with the addition of fly ash, showing a marginal decline up to 30% of fly ash and then decreases considerably with the addition of more than 30% fly ash (Naik et al.). Also Hakari et al.(2010), reported that the liquid limit decreases with the addition of fly ash, showing a marginal decline up to 30% of fly ash and then after decreasing considerably for 40% addition. The decrease of liquid limit due to the effect of reduction in the diffused double layer thickness as well as effect of dilution. Also Possible explanation may be related to the flocculation, and aggregation of the clay particles by addition of fly ash. Furthermore, fly ash inclusion diminished the clay size fraction of soil in view of flocculation of the clay particles by cementation.

3.3 Plastic Liquid

The addition of 10% fly ash slightly increases the plastic limit, which is due to flocculation owing to the presence of free lime in the fly ash. Further increase in the addition of fly ash results in the marginal increase of plastic limit (Naik et al.). Also (Kalyanshettiet al.2013) reported that Plastic limit increases with increase in percentage of fly ash up to 10-15% and then further almost remain constant. Similar results were found by Pravin Patel in 2014.

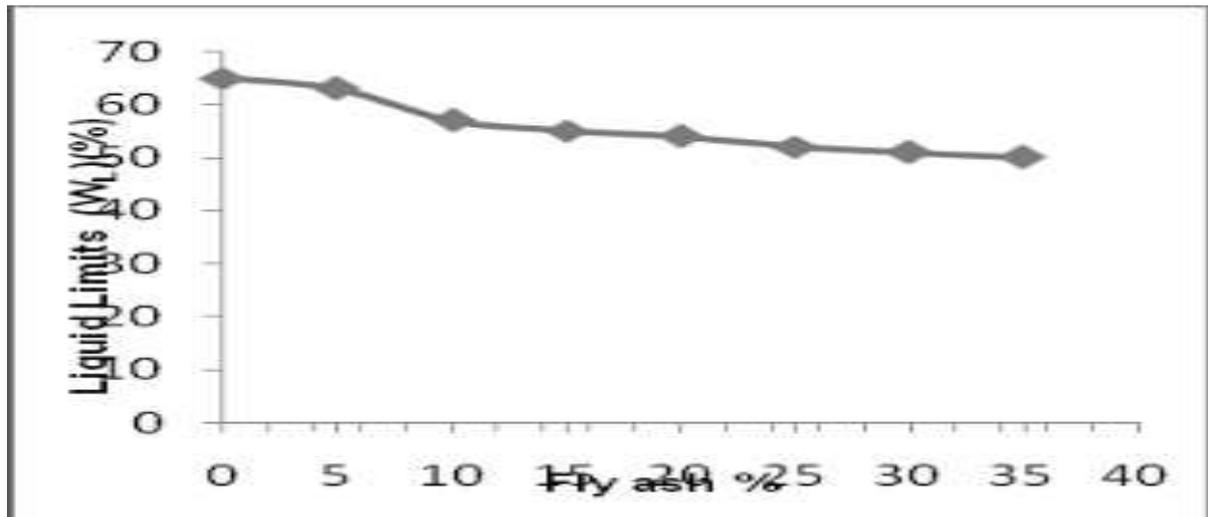


Fig 4. Variation of L.L with addition of fly ash (Kalyanshettiet al.2013)

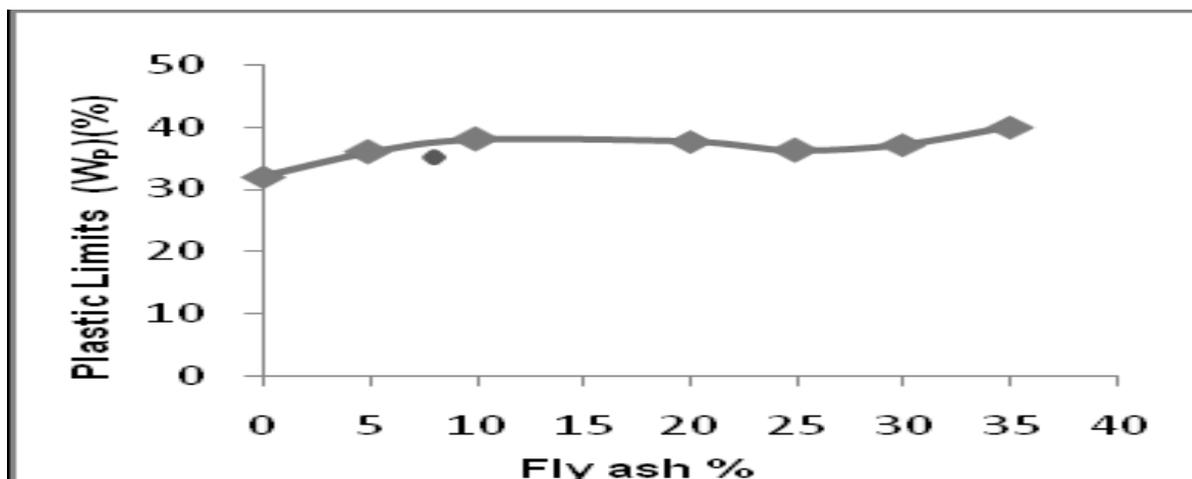


Fig 5. Variation of P.L with addition of fly ash (Kalyanshettiet al.2013)

3.4 Shrinkage Limit

The addition of fly ash increases the shrinkage limit of black cotton soil. It increases with increasing percentages of fly ash. The gradual increase is observed up to 30% of fly ash added and is considerable on further addition of fly ash (Naik et al.). Similar results were found by Pravin Patel in 2014.

3.5 Compaction Parameters (OMC and MDD)

In B.C. soil Maximum Dry Density increases slightly up to 20% of fly ash, and then it decreases. It is shown that for depressive clays the Maximum Dry Density first increases and then decreases with the increase in fly ash content (Hardaha et al. 2013). Hayder A. Hasan (2012) has reported that Maximum dry density decreased with increasing fly ash content, and the optimum moisture content increased with added fly ash content. It is observed that there is a steady increase in Optimum Moisture Content up to 30% and beyond 30% a decrease in Optimum Moisture contents were observed. As the percentage of Fly ash increases a steady decrease in dry density values

were observed (S.Hemanth Kumar et al.2013). Addition of fly ash beyond 20% to 25%, is not significant (Kalyanshetti et. al.)

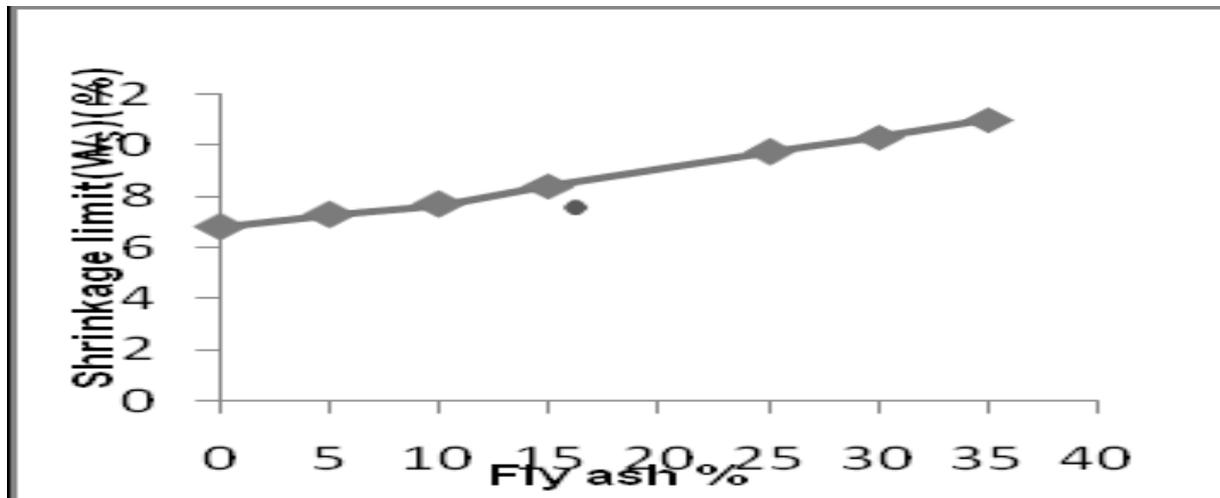


Fig 6.variation of S.L with addition of fly ash (Kalyanshetti et al.2013)

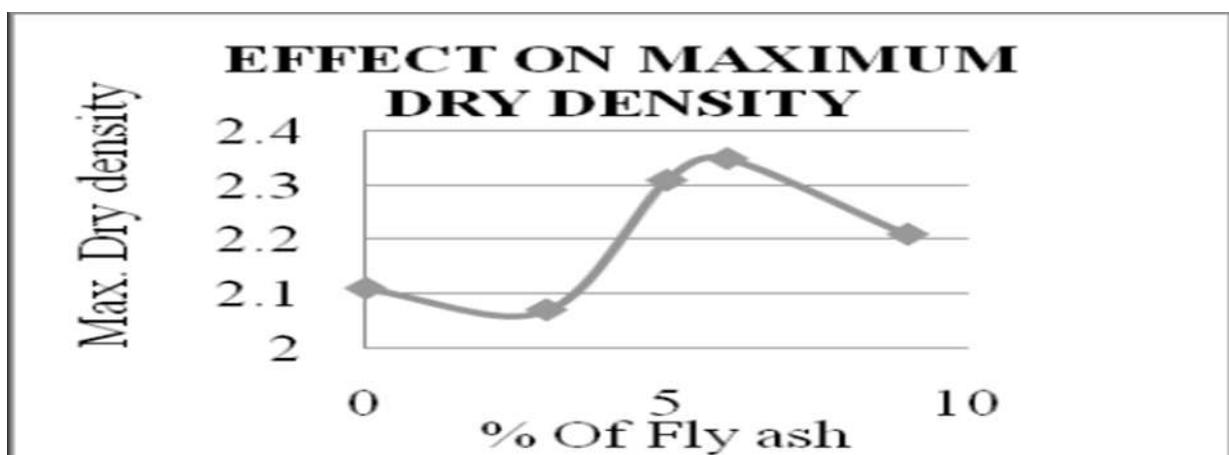
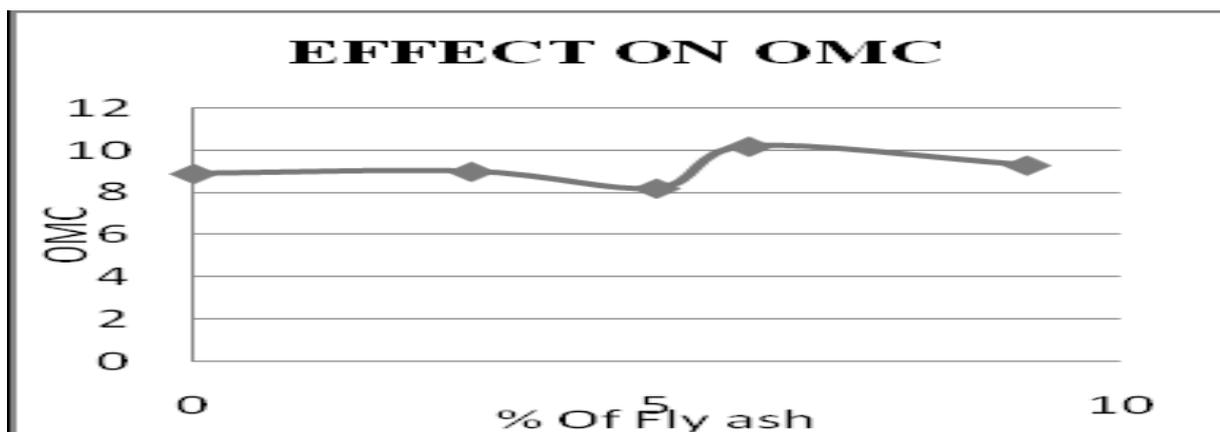


Fig 7. OMC & MDD Curves for fly ash mixed with black cotton soil (Karthik et. al. 2014)

3.6 California Bearing Ratio (CBR)

The low CBR of the black cotton soil is attributed to its inherent low strength which is due to the dominance of the clay fraction. Addition of fly ash to the black cotton soil increases gradually the CBR of the mix up to a peak value of addition of 30-40% of fly ash (Hakari et.al. 2012). CBR value of Black Cotton soil also increase with increasing varying % fly ash. The optimum percentage of fly ash at 20% for gave the best result for sub grade soil (Pravin Patel, 2014). The CBR values of clay-fly ash mixes, tested under un-soaked conditions, shows peaks at 20% and 80% ash content (Bidula Bose, 2012). Similar results were obtained by Pandian (2004).

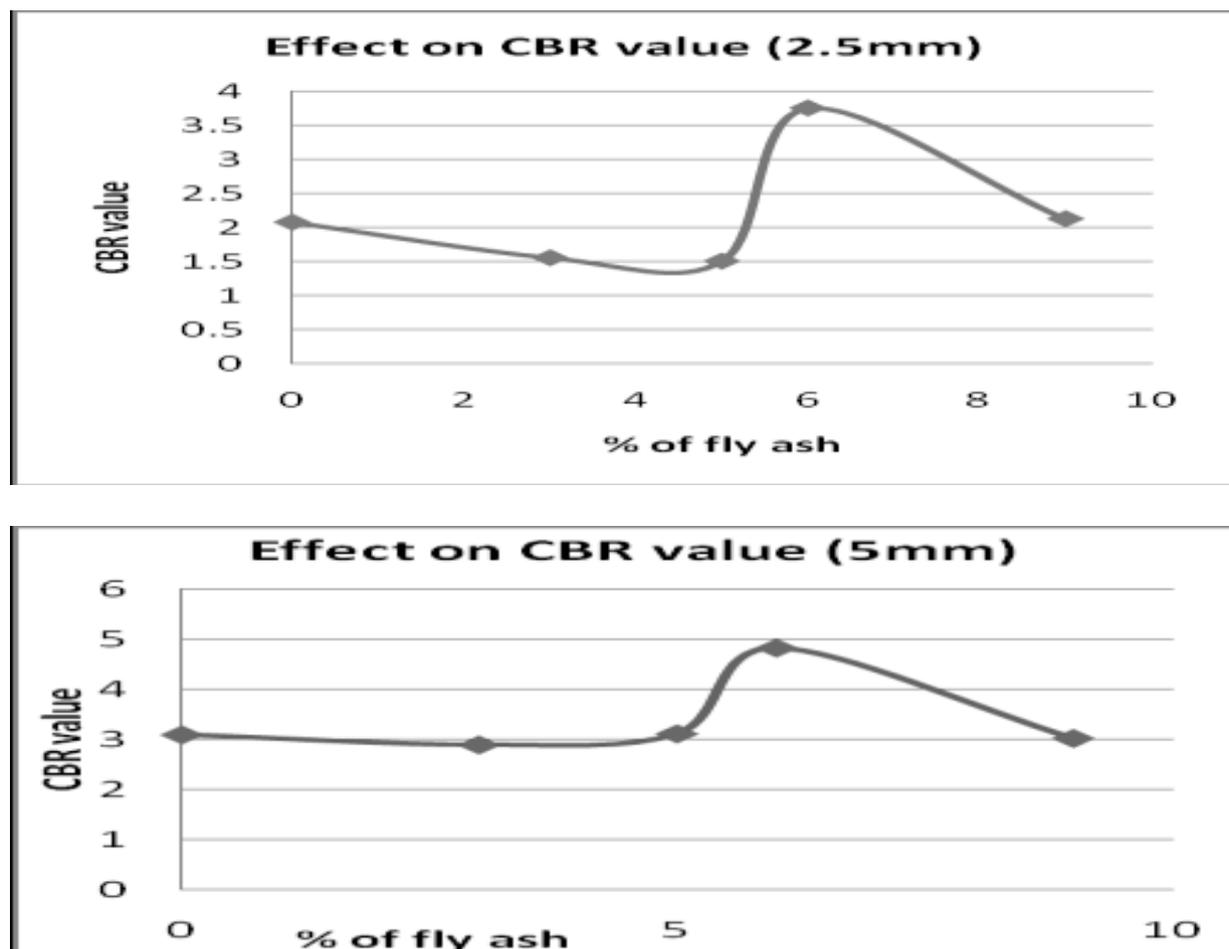


Fig 8. CBR curves for fly ash (Karthik.S.et. al. 2014)

3.7 Unconfined Compressive Strength(U C S)

It is seen that the strength increases on addition of small percentage of 10% or 20% of fly ash. Further increase in fly ash percentage shows no considerable increase in the strength. This is due to the probable disturbance of soil skeleton and consequent reduction in cohesion (Hakari et. al.2012). UCS value of Black Cotton soil also increase with varying % of fly ash (Pravin Patel, 2014). Maximum Unconfined compressive strength was obtained at 20% fly ash mix with clay and further addition of fly ash reduces the strength (Bidula Bose, 2014).

3.8 Swelling Characteristics

Up to the addition of 20% to 25% of Fly ash. Swelling Pressure reduces with higher rate, after that it reduces with slower rate so addition of fly ash beyond 20% to 25% is not significant (Hakarriet al.2010).Swell percentage and swell pressure decrease with addition of fly ash. Both swell % and swell pressure decrease at samples containing 15% fly ash (HayderA.Hasan, 2012) .The Free swell index is reduced by about 50% by the addition of 20% Fly ash (Phanikumar et.al. 2004).

IV CONCLUSION

- The addition of fly ash reduces the plasticity characteristics of black cotton soil. The liquid limit, plastic limit, plasticity index, linear shrinkage decreased drastically and shrinkage limit increased with the addition of fly ash.
- The maximum dry density increases up to 20% fly ash mix, and then gradually decreases whereas the optimum moisture content decreased with increase in fly ash content.
- CBR value of Black Cotton soil also increase with increasing varying % fly ash.CBR value increases with higher rate up to 25-30 % of fly ash and then with slower rate.
- Unconfined compressive strength attains peak value between 20 and 30 % of fly ash, beyond which the increase in the strength is marginal. The addition of fly ash to expansive soil reduces the free swell and swelling pressure. For the expansive soil used both free swell and swelling pressure were reduced by 40-50% at 20% fly ash. At higher percentage of fly ash rate of reduction in free swell and swelling pressure gradually decreased.
- Both Swell percentage and swell pressure decrease with addition of fly ash.

From the above observations it can be concluded that Fly ash has good potential for use in geotechnical applications. The relatively low unit weight of fly ash makes it well suited for placement over soft or low bearing strength soils. Its low specific gravity, freely draining nature, ease of compaction, insensitiveness to changes in moisture content, good frictional properties, etc. can be beneficially used in the construction of embankments, roads, reclamation of low-lying areas, fill behind retaining structures, etc.

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PERFORMANCE OF DIFFERENT FORM OF SOIL REINFORCEMENT: A REVIEW

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ABSTRACT

Soil reinforcement is most popular ground improvement technique. Major advantages of soil reinforcement method are ease of construction, overall economy, time saving etc. Use of geosynthetic material in place of metal is in practice now. Form of metal reinforcement were strips, bars etc. But planar form is the traditional way of reinforcement prepared by geosynthetics. Now new forms of reinforcement geocell and fibers are becoming popular. Geocell and fibers have three dimensional reinforcement systems, while planar reinforcement has interaction only in plane. Geocell is three dimensional honey comb structure in which soil is filled and compacted. All around confinement provided by the geocell membrane increase the load carrying capacity of soil. Fiber reinforcement is similar to the root reinforcement, in which fiber binds the soil particle. During shearing it resist the movement of soil particles which results in the improvement in the load carrying capacity of soil. In this paper review on the mechanism and limitation of different form of the reinforcement is discussed in brief.

Keywords: Geocell, Fiber, Load Carrying Capacity.

I. INTRODUCTION

All civil engineering structures are constructed on the soil. Many times engineers encounters with poor or problematic soil like soft soil, swelling soil etc. In old times engineers generally avoid construction on such soil, but now a day due to limitation of land we avoid such solution. Problematic soil can be cause of serious damage of structures. So generally they are replaced by some strong soil or they are treated for better engineering properties. The techniques utilized for enhancement of the properties of those soils are known as ground improvement techniques. Ground improvement can be done by some mechanical method, through soil reinforcement or by adding some admixtures in the soil. Suitability of particular methods depends upon the site condition and economy. Among all these methods soil reinforcement technique is most popular method for ground improvement. The advantages of these methods are ease of construction, time and overall economy. Availability of different materials and methods are also important advantages of soil reinforcement. Use of geosynthetics in place of metal bars, strips etc. is advancement in the materials. Geosynthetics are polymeric materials, so they are less degradable and costs of these materials are less. Geogrids, geotextiles, geomembranes etc. are different form of geosynthetics. Utilization of geocell and fiber reinforcement which provide three dimensional reinforcing action in place of planar reinforcement with reinforcing action only in one direction have shown the further improvement in the methods of soil reinforcement.

1.1 Reinforcing Mechanism

Reinforcing mechanism in soil is the technique where tensile elements are placed in the soil to improve stability and control deformation. Strains in the soil mass generate strains and tensile loads in the reinforcements. These tensile loads act to restrict soil movements and thus impart additional shear strength. This result in the composite soil/reinforcement system having significantly greater shear strength than the soil mass alone. Reinforcing the soil with coir fibers/coir geotextiles is a cost effective solution to the ground/soil improvement problems. Soil nailing is one of the extensively used techniques for stabilizing vertical cuts in India and work at Indian Institute of Science significantly contributed to this development. The high modulus geotextiles or any confinement technique is Geocell. The geocell confinement system not only increases the load bearing capacity of the soil but also substantially reduces the settlement. Different types of geosynthetic reinforcement are Geotextiles, Geogrids, Polymeric strips and Grid made of strips. A geotextiles defined as any permeable textile material that is used with foundation, soil, rock, earth, etc. to increase stability and decrease wind and water erosion. Geogrids improves the structural integrity of soil in roadways, walls and slopes by reinforcing and confining fill materials and distributing load forces.

II. DIFFERENT FORM OF SOIL REINFORCEMENT

To give reinforcement to the soil there are three methods. First is by physical method which is done by vibration, thermo-electrical, freeze and thaw. Second is by mechanical method using fibrous materials from Geo-synthetic family (Geo-grid, Geo-textile, Geocomposite, Geo-net, and Geo-cell). The third is by chemical method using conventional materials, enzymes & polymeric resins. Reinforcing soil is a very old and effective technique. Different procedure of soil reinforcement as shown in **Fig 1**.

2.1 Brief History: Soil Reinforcement

Alternatively, the presence of plant roots is a natural means of incorporating randomly oriented fiber inclusions in the soils. These plant fibers improve the strength of the soils and the stability of natural slopes. Therefore, the concept of fiber reinforcement was recognized more than 5000 years ago. There are several examples of reinforcing the soil like **Great Wall of China** (earliest example of reinforced earth using branches of trees as tensile elements), ziggurats of Babylon (woven mats of reed were used), etc. In the modern history of soil stabilization, the concept and principle of soil reinforcement was first developed by **Vidal**. He demonstrated that the introduction of reinforcing elements in a soil mass increases the shear resistance of the medium. Consequently, efforts for using fibrous materials, as mimicry of the past, were started. Since the invention by **Vidal in 1966**, nearly 4000 structures have been built in more than 37 countries so far using the concept of earth reinforcement. Firstly, polyester filaments before staple fibers entered to the geotechnical engineering market under the traditional brand of "Texsol". This product was used in retaining walls and for slope protections. However, randomly distributed fiber-reinforced soils, known as short fiber soil composites, have recently attracted increasing attention in many geotechnical engineering applications, not only in scientific research environment, but also at executive real field. Synthetic staple fibers have been used in soil since the late 1980s, when the initial studies using polymeric fibers were conducted. At final, it can be concluded that the concept of reinforcing soil with natural fibers was originated in ancient times. However, short natural and synthetic fiber

soil composites have recently attracted increasing attention in geotechnical engineering for the second time. Therefore, they are still a relatively new technique in geotechnical projects.

2.1.1 Effect of Type of Geogrid Used to Make Geocell

Both the geocells made of BX and NP-2 grids have shown the same improvement factor up to a settlement equal to about $0.2B$, found when a test perform. Although, both NP-1 and NP-2 grids have almost same stiffness. At higher settlements, the performance with geocells made of BX grids is much better because of its higher stiffness. At this stage, the sand starts moving out of the geocell pockets and hence the stiffness of the geocell layer has influence on the overall behaviour. In the case of geocells made of NP-2 geogrids, a sudden failure was observed at a settlement of about 20% of the footing width.

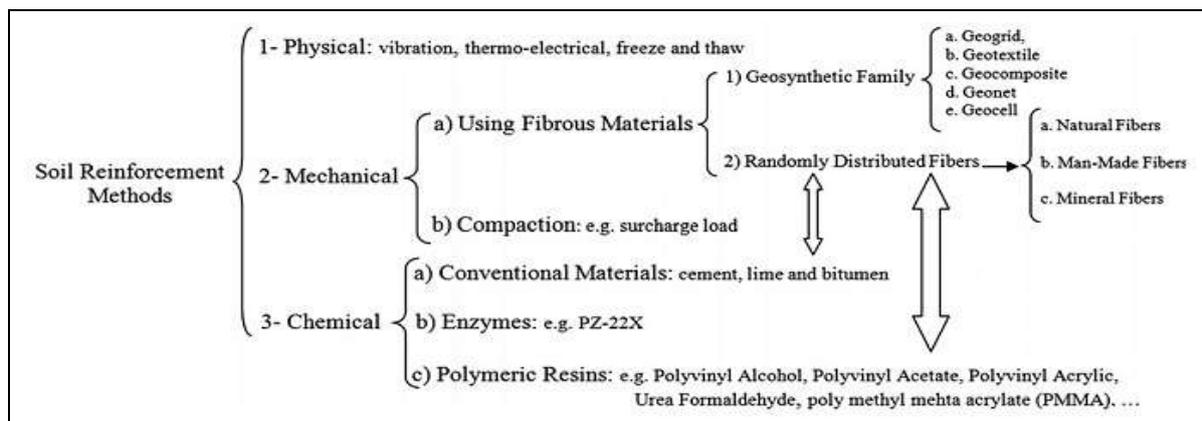


Fig. 1 Different Procedures of Soil Reinforcement

2.2 Use of Geocell as Soil Reinforcement

Geocell is three dimensional honeycomb structures generally prepared by geogrids or plastic materials in which soil is infilled (Fig. 2). They are made from ultrasonically welded high density polythene strips and widely used in construction for erosion control, soil stabilization. In other way, fiber is used as reinforcement to improve the soil stabilization. Natural fiber are extracted from plants and then converted in to yarns by spinning. Natural fibers such as jute, flax, coconut, coir etc. are used to improve soil erosioncontrol. The geocells were formed using three different types of geogrids; one of these is a biaxial grid (BX) made of oriented polymer while the other two were made of non-oriented polymers, referred to as NP-1 and NP-2 grids. The properties of the geogrids were determined from standard wide width tension tests (American Society for Testing and Materials, 1986) and are listed in Table 1. The load–strain behavior of these geogrids is presented in Fig. 4. The geocell mattress was prepared by cutting the geogrids to required length and height from full rolls and placing them in transverse and diagonal directions with bodkin joints (plastic strips) inserted at the connections (Bush et al., 1990). The two different patterns (chevron and diamond) used to form geocell mattress are illustrated in Fig. 3(a) & 2(b).

Geocells are engineered for protection and stabilization applications. They are often used to help improve the performance of standard construction materials and erosion control treatments. Geocell products were developed in the late 1970s and early 1980s. The primary geocell applications include:

- Protection and stabilization of steep slope surfaces.
- Protective linings of channels and hydraulic structures.
- Static and dynamic load support on weak subgrade soils.

- Multi-layered earth retaining and water retaining gravity structures.

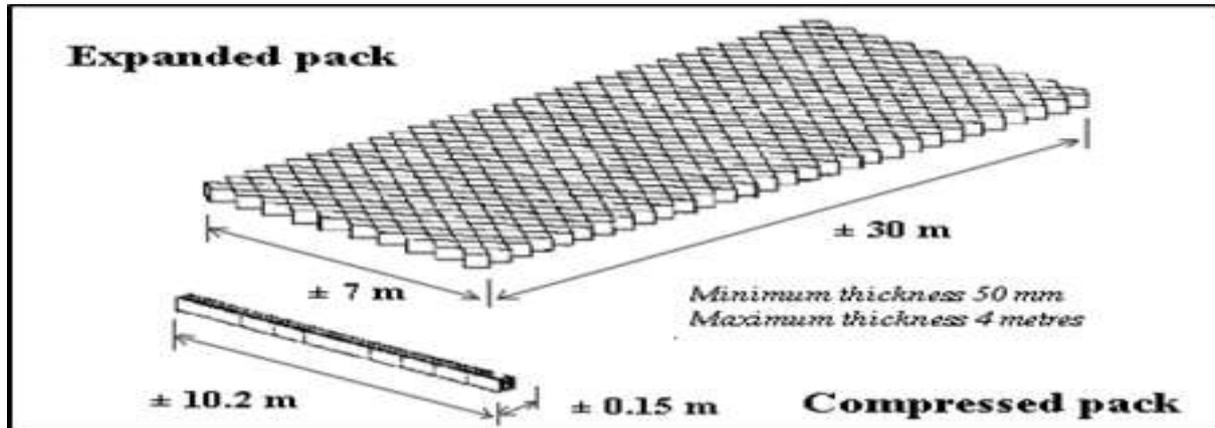


Fig.2 Geocell Cellular Confinement System (Bathurst And Knight 1998)

2.3 Use of Fiber as Soil Reinforcement

Natural fibers are extracted from plants and are then converted into yarns by spinning. These fabrics are sometimes treated with rot resistant materials or reinforced with synthetic fibers to enhance their durability under different soil conditions without affecting its strength and other properties. Fabrics from natural fibres such as jute, flax, coconut, coir etc. are used to improve soil erosion control and drainage applications. The type of fiber i.e. bast fibers are defined as those obtained from outer cell layers of the stems of various plants. The fibers are composed primarily of cellulose which potentially has a Young's Modulus of ~140 GPa. The well-established techniques of soil stabilization and soil reinforcement are often used to obtain improved geotechnical materials, either through the addition of cementitious agents or through the inclusion of oriented or randomly distributed discrete elements such as fibers. Stabilized and reinforced soils are composite materials that result from the combination and optimization of the properties of individual constituent materials.

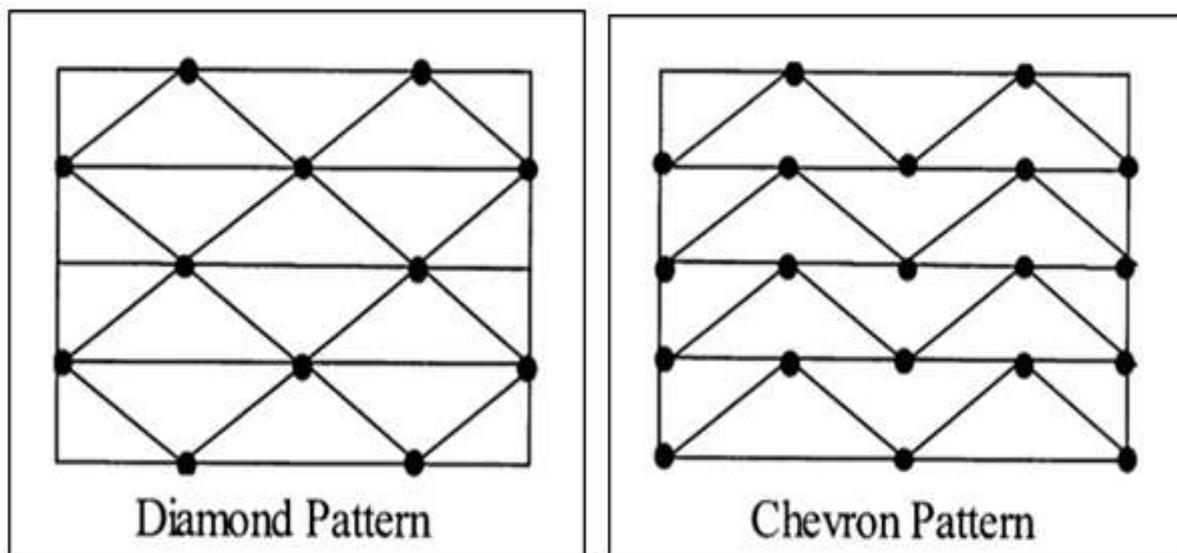


Fig. 3 Patterns Used For The Formation Of Geocells.

- Bodkin Joint

Soil reinforcement is defined as a technique to improve the engineering characteristics of soil. In this way, using natural fibers to reinforce soil is an old and ancient idea. The **standard fiber-reinforced soil** is defined as a soil mass that contains randomly distributed, discrete elements, i.e. fibers, which provide an improvement in the mechanical behavior of the soil an improvement in the mechanical behavior of the soil composite. Fiber reinforced soil behaves as a composite material in which fibers of relatively high tensile strength are embedded in a matrix of soil. Shear stresses in the soil mobilize tensile resistance in the fibers, which in turn imparts greater strength to the soil.

Table 2: Peak Strength Parameters for Non-Reinforced and Fiber-Reinforced Cemented Sand

Cement content (%)	Non-reinforced sand		Fiber-reinforced sand	
	c' (kPa)	ϕ' (degrees)	c' (kPa)	ϕ' (degrees)
zero	zero	36.7	14.5	48.5
1	19.5	30	56	45
4	84	39	132	44
7	146.5	52	193.5	46.5
10	328	48.5	225	51.5

Consoli et al. (2003a) proposed a field application for such materials designed for increasing the bearing capacity of spread foundations when placed on a layer of fiber-reinforced cemented sand built over a weak residual soil stratum. In addition, studies of the reinforcement of sand by the inclusion of fiber have also been reported (e.g. **Gray and Ohashi, 1983; Gray and Al-Refeai, 1986; Maher and Gray, 1990; Morel and Gourc, 1997; Zornberg, 2002; Consoli et al. 2003b, 2005, 2007b, 2007c, in press; Park and Tan, 2005; Latha and Murthy, 2007; Sivakumar Babu et al., 2008;**). **Tang et al.** investigated the micromechanical interaction behavior between soil particles and reinforcing PP fibers. They concluded that the interfacial shear resistance of fiber/soil depends primarily on the rearrangement resistance of soil particles, effective interface contact area, fiber surface roughness and soil composition. Fig.5 illustrates the real and the schematic of fiber and soil interaction.

Maheshwari mixed polyester fibers of 12 mm in length with highly compressible clayey soil vary from 0% to 1%. The results indicated that reinforcement of highly compressible clayey soil with randomly distributed fibers caused an increase in the ultimate bearing capacity and decrease in settlement at the ultimate load. They concluded that the soil bearing capacity and the safe bearing pressure (SBP) both increase with increase in fiber content up to 0.50% and then it decreases with further inclusion of fibers.

2.3.1 Types Of Natural Fiber

Fibers or **fibres** are a class of hair-like materials that are continuous filaments or are in discrete elongated pieces, similar to pieces of thread. They can be used as a component of composite materials. They can also be matted into sheets to make products such as paper or felt. Fibers are of two types: natural fiber which consists of

animal and plant fibers, and manmade fiber which consists of synthetic fibers and regenerated fibers. The earliest evidence for humans using fibers is the discovery of wool and dyed flax fibers found in a prehistoric cave in the Republic of Georgia that date back to 36,000 BP.

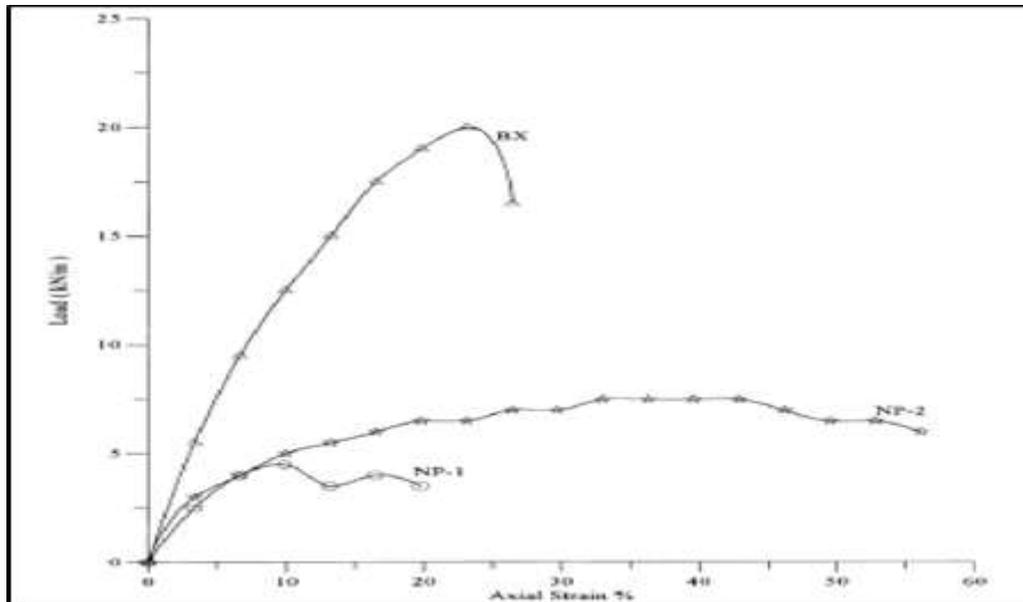


Fig. 4 Load–Strain Behaviour of Geogrids

The various types of fiber are present and listed in Fig 7. Bast Fibers are collected from the skin or bast surrounding the stem of their respective plant. These fibers have higher tensile strength than other fibers. Therefore, these fibers are used for durable yarn, fabric, packaging, and paper. Some examples are **flax, jute, kenaf, industrial hemp, ramie, rattan, and vine fibers**.

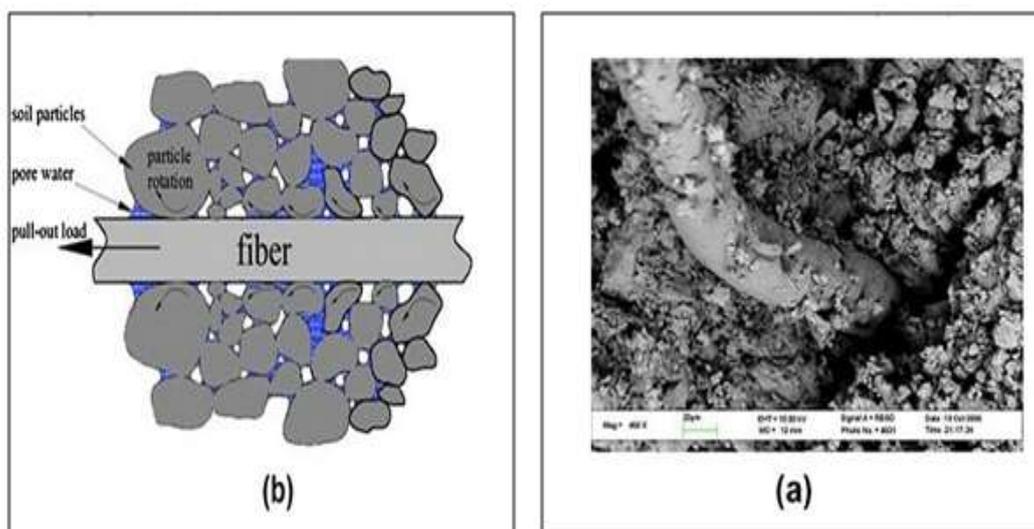


Fig. 5. (A) SEM Photomicrograph Of Soil Particles Attached On Fiber Surface After Pull-Out Test And (B) Sketch Drawing Of Interfacial Mechanical Interactions Between Soil Particles And Fiber: Tang Et Al.

2.3.2 Randomly Mix Fiber In To The Soil

This method consists of randomly mixing fibers into the soil to increase its shear strength. The fibers increase the cohesion among the soil particles. In addition the interaction of the fibers among themselves and the fibers' flexibility makes them behave as a structural mesh that holds the soil together increasing the soil structural integrity. Advantages of this method are that there are several different materials that can be used to reinforce the soil, the machinery required is minimal, the fibers can be inexpensive and environmentally friendly, and it can be implemented in all types of soils. Disadvantages of this method are that some of the fiber only last short periods of time and can only be implemented in shallow depths. However, this characteristic of the reinforcement method allows it to be easily implemented in large areas (Babu& Vasudevan, 2008).

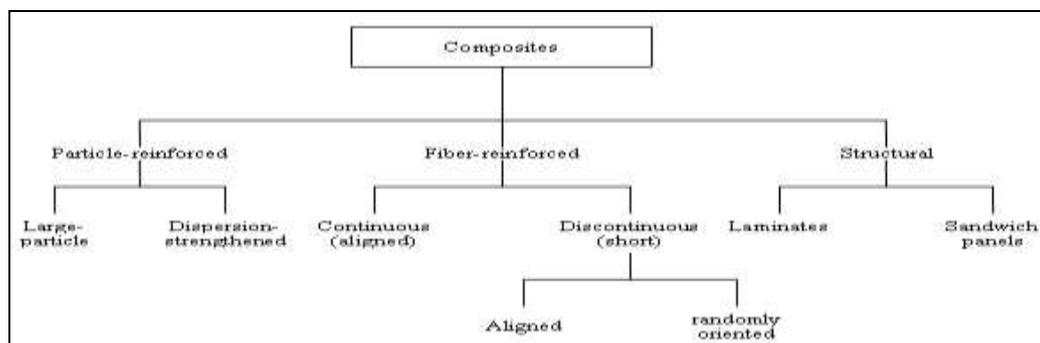


Fig 6 Composition of Soil Reinforcement

2.4 Composites: Soil Reinforcement

There are several methods for stabilizing shear strength of slopes, some of the most common ones are:

- Reinforcing compacted soil layers with steel wire mesh.
- Reinforcing compacted soil layers with geo-synthetics.
- Mixing lime with the soil.
- Randomly mixing fibers into the soil.

Most of these methods require a lot of organization, planning, heavy machinery, qualified workers and a high monetary investment; all resources to which these communities do not have access to. We believe future development should be sustainable; therefore we want to help produce a soil stabilization method that has a positive contribution on the environment. Based on this idea and the resources the sample communities have available to them, we determined the reinforcement method that aligns the most with our objectives is the random mix of environmentally friendly fibers into the soil. Increasing the bearing capacity of the soil and the stability of soil in slopes are only two applications of reinforcing the soil with fibers. The main effect of this reinforcement is the increase of shear strength of the soil. According to Tezarghi's and Vesic's soil bearing capacity studies, the bearing capacity of the soil has a direct relationship with the shear strength of the soil. In foundation engineering the bearing capacity of the soil is defined as the maximum homogeneously distributed pressure in direct contact, a soil can withstand before suffering shear failure.

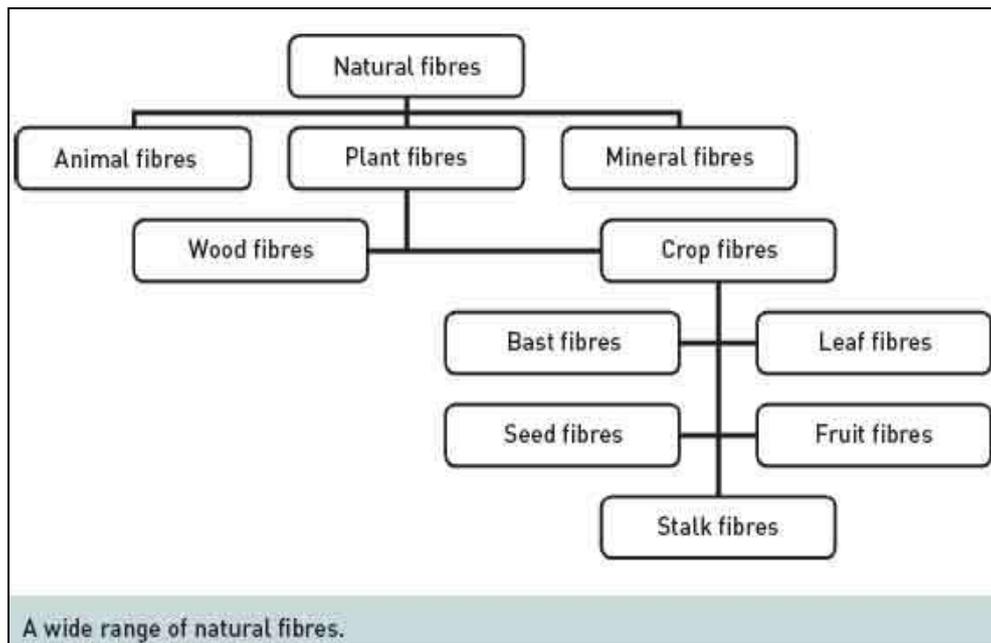


Fig 7 Types of Natural Fiber

2.5 Effect of Soil-Fiber Reinforcement on Soil Shear Strength

2.5.1 Evaluation of Fiber-Reinforcement on Shear Strength through California Bearing Ratio Test

The results of a study conducted by **Islam, Mohammad S. and Kazuyoshi Iwashita** in **2009** about **fiber reinforcement** using date palm fibers performed on a silty-sand soil clearly indicated that in the reinforced specimens where the soil grains are replaced by fibers, the fibers control the behavior of the specimen. There was a direct relationship between the fiber length and content and the bearing capacity of the soil. In this study a **California Bearing Ratio (CBR) test** was performed on 12 different wet samples: two control groups (unreinforced soil) and ten combinations of one of two different fiber lengths (20 mm and 40 mm) and one of five different fiber contents (0.25%, 0.50%, 0.75%, 1.00% and 1.50%). The CBR tests the penetration resistance of a standard plunger on a soil sample. The CBR test procedure is described in ASTM Standards D1883-05. This study ran CBR test for wet and saturated soil samples. We chose to focus on the results obtained from the wet samples because our project will focus on failure under regular conditions. A similar study, performed by **Sassa, Kyoji, and Canuti**, which evaluated the load penetration behavior of a reinforced soil, established the same relationship between the fiber content of the reinforcement and the bearing capacity of the soil. The study was performed on a soil consisting of a sand fill overlaid by soft clay which was reinforced by randomly mixing 20 mm long Polypropylene fibers (Duomix F20). The effects of the reinforcement were also evaluated through CBR testing. In conclusion this study presents that the reinforcement of a soil with natural fibers increases almost six times the shear strength of a non-cohesive soil (Yetimoglu, et al, 2004).

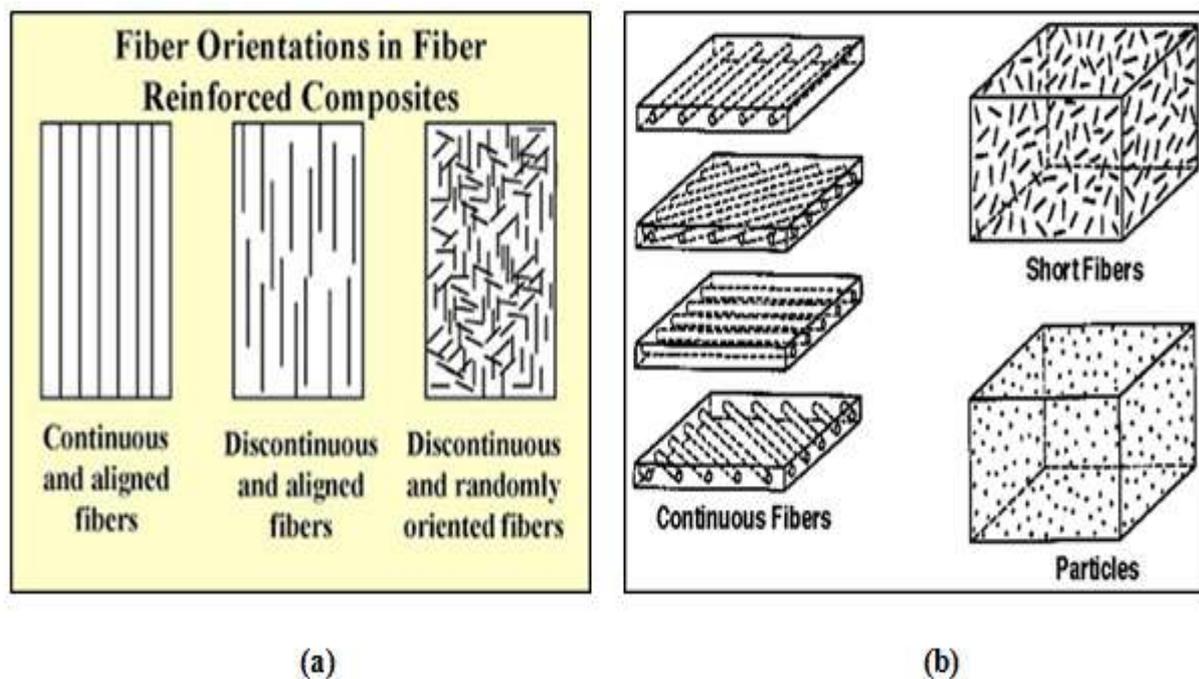


Fig 8(A) & (B). Arrangement of Fiber Reinforced Composites In Soil.

Table 3 Physical & Mechanical Properties of Fiber

Properties	Value
Specific gravity	0.9-0.91
Cut length	6mm, 12mm
Water Absorption (24 hours duration)	0.3%
Colour	White
P ^H value	Not applicable
Melting Point	165 C

2.6 Soil Reinforcement Using Geosynthetics Material

Common types of geosynthetics used for soil reinforcement include geotextiles (particularly woven geotextiles), geogrids and geocells. Geotextiles (Figure 1a, Bathurst 2007) are continuous sheets of woven, nonwoven, knitted or stitch-bonded fibers or yarns. The sheets are flexible and permeable and generally have the appearance of a fabric. Geogrids have a uniformly distributed array of apertures between their longitudinal and transverse elements. These apertures allow direct contact between soil particles on either side of the sheet. Geocells are relatively thick, three-dimensional networks constructed from strips of polymeric sheet. The strips are joined together to form interconnected cells that are infilled with soil and sometimes concrete. In some cases 0.5 m to 1 m wide strips of polyolefin geogrids have been linked together with vertical polymeric rods used to form deep geocell layers called geomattresses.

Types of geosynthetic material

1) Geotextiles

2) **Geomembrane:** Geomembranes are relatively impermeable sheets of plastic.

3) Geogrids

Geogrids are nothing but the open structure formed by bonding polymer strips at their cross point or punching.

Historical Development

- First used for road construction in **South Carolina** in 1930
- For erosion control in 1960 in Europe as well as U.S.A in 1969
- In Great Wall of China also used in the form of tree branches.

4) Geocomposites

- These are products manufactured by combining the superior features of various types of geosynthetics.
- The objective is to produce materials which are multi-functional and are faster to install than the individual components.
- Interface friction becomes an issue when geosynthetics are placed on slopes and bonded materials address this potential problem.

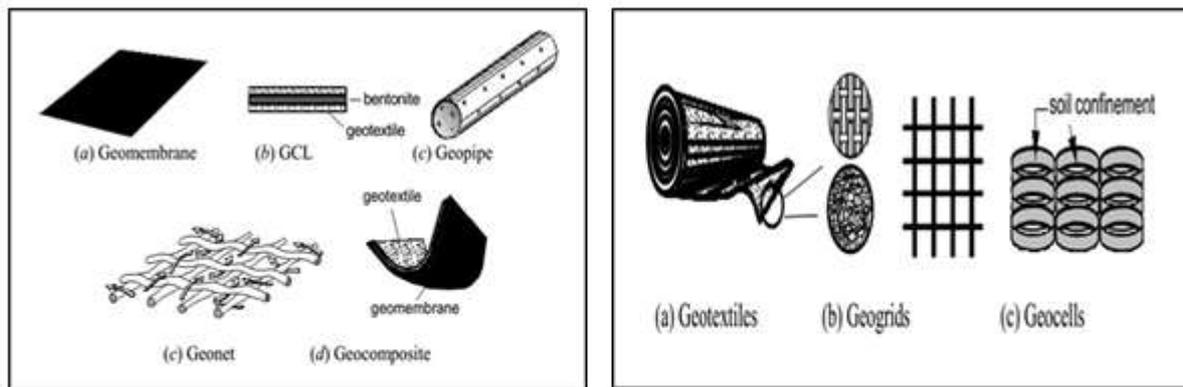


Fig 9: (A) Schematic View of Some Typical Geosynthetics Used In Environmental Protection Works (Bathurst 2007) (B) Geosynthetics Commonly Used For Soil Reinforcement (Bathurst 2007)

III. CONCLUSION

Based on the above study and literature review the study of fiber for soil reinforcement has a good scope in terms of future perspectives. There is very less research done on combining two ground improvement techniques. And even less research work on inclusion of fiber with geocell reinforcement overlaying poorly graded sand although separately there are plenty. So the usage of fiber alone and in combination reduces the increasing number of fiber that has posed a serious threat to environmental protection and public health efforts in recent years. Review of literature highlights the beneficial effect of using reinforcements to increase the load carrying capacity of the weak subgrade. Various applications as given above have suitably reduced the negative effects of fibers that are being deposited every year. Its scope in properties, suitability, applications in various

construction works and future prospective have risen considerably in recent years. Various researchers have already started studies related to its application and usage as given above. Not only its environmental damage gets reduced but also its usage in construction works creates a huge beneficial effect for future. The performance improvement in this case is primarily derived through frictional resistance between the sand with the inclusion of fibers.

It can be concluded from the geocell and fibers both have potential to improve the strength and stiffness of soil. Individual application of this reinforcement is reported by different researchers. But combined effect of the both of the reinforcement is yet to be explored. It is therefore envisaged to investigate, under this research work, if the fiber reinforcement can be used as a secondary reinforcement, in the soils, with geocell as the main reinforcement. A series of triaxial compression tests have been conducted thereof. Geosynthetics have great potential to be used as cost-effective solutions for several engineering problems. This paper presented recent advances in geosynthetic products, on the utilization of these materials in reinforced soil structures and in environmental applications. Manufacturing of geosynthetics products allows incorporating recent advances in material sciences. Therefore, the expectation is that innovations in products, types and properties will continue to take place, adding to the already vast range of applications of these materials. The use of geosynthetics has also led to major advances in environmental applications. While geosynthetics has been used in a number of applications in environmental project, this paper has described advances on the use of geosynthetics in landfills. Overall, the use of geosynthetics has led to major advances towards the construction environmental systems that are cost-effective but that provide enhanced environmental protection.

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FLORISTIC DIVERSITY OF NAGAON DISTRICT OF ASSAM, INDIA

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ABSTRACT

Nagaon district extends from 25⁰-45' to 26⁰ -45' N Latitude 92⁰ -33' to 92⁰ -6" E Longitude with total area 4435.3 Sq.Km and is bounded by Sonitpur district and the Brahmaputra river in the north, West Karbi Anglong and North Cachar Hills in the south, East Karbi Anglong and Golaghat district in the east. The major rivers are The Brahmaputra, Kalong, Sonai, Nanoi, Jamuna, Kopili and Barpani. There are several beels, marshy lands and swamps are there, these are in reality old abandoned channels of Kalong and Kopili rivers of Nagaon district. These are Marikalong, Potakalong, Haribhanga, Jongalbalahu, Samoguri beel, Urigadang and Nawbhanga. These beels are major unused resources of the district. There are nearly more than two hundred numerous marshy land exist here which should be used for development of the area.

The soil is mainly clayey loam mixed with silt. The soil is acidic and pH varies from 4.36-6.86. The average annual rainfall remains around 2000 mm and about 70% occurs during June-September. The relative humidity varies between 65-95% and is lowest during the month of March. The present paper deals with the floristic diversity of the study site. The present study reveals the presence of 373 species of Angiosperms. The dicotyledonous plants belong to 74 families, 178 genera and 267 species, and the monocotyledonous to 18 families, 80 genera and 106 species. In addition to this 16 species of ferns were identified these belong to 12 families and 15 genera. Poaceae is the largest family in the sanctuary followed by Euphorbiaceae and Papilionaceae as the 2nd and 3rd largest families respectively.

Keywords: *Biodiversity, Floristic Diversity, Nagaon District*

I. INTRODUCTION

Biodiversity is the characteristics of nature and is the basis for ecological stability. Biodiversity refers to the variety and variability among living organization, the ecological complexes in which they occur, and the ways in which they interact with each other and their environment. At present, biodiversity is a result of a series of turnovers in the rate of evolution and extinction since the geological past. One of the greatest challenges facing society today is the need to address the unsustainable use of natural resources. In an ideal world, all biodiversity conservation needs should be addressed without jeopardizing human aspirations for social and economic development. Thus, conservation is becoming the crisis discipline. Deciding what, where and for whom to conserve is an essential first step in managing the crisis. India has a rich and varied heritage of biodiversity, encompassing a wide spectrum of habitats from tropical rain forests to alpine vegetation to coastal wetlands. India figured with two hotspots - the Western Ghats and the Eastern Himalayas – out of 25 biodiversity hotspots

identified by Myers (1988). In addition, India has 26 recognized endemic centers that are home to nearly one third of all the flowering plants identified and described till now.

The North –Eastern region and Assam in particular is a part of one of the global 25-biodiversity hot spot (Myers et al., 2000) and there is urgent need to study the status of biological diversity in this region with main emphasis on protected areas. In northeast India, the forests are still worse from the management point of view.

Vegetation with its varied floral contents is a basic entity of nature. The paucity of scientific data on the vegetation, the current growing awareness or rapid changing environment, and the close interaction of vegetation with animal life which remains unemphasized make the botanist of all over the country to launch exploration programmes to study the vegetation of Sanctuaries / National Parks which is a prerequisite for any other detailed study. Taxonomic study on smaller areas has more important value. In comparison with the larger areas smaller areas can be explored thoroughly with critical spot observation to find out the additional and exotic species, which has been left out from the floristic study of comparatively much larger areas for various reasons.

Nagaon district extends from 25^o-45' to 26^o -45' N Latitude 92^o -33' to 92^o -6" E Longitude with total area 4435.3 Sq.Km and is bounded by Sonitpur district and the Brahmaputra river in the north, West Karbi Anglong and North Cachar Hills in the south, East Karbi Anglong and Golaghat district in the east. The major rivers are The Brahmaputra, Kalong, Sonai, Nanoi, Jamuna, Kopili and Barpani. There are several beels, marshy lands and swamps are there, these are in reality old abandoned channels of Kalong and Kopili rivers of Nagaon district. These are Marikalong, Potakalong,/ Haribhanga, Jongalbalahu, Samoguri beel, Urigadang and Nawbhanga. These beels are major unused resources of the district. There are nearly more than two hundred numerous marshy land exist here which should be used for development of the area.

Like other parts of Assam, The climate of the study site is characteristically monsoonal with rhythm of changing season. It changes with respect to the changing climatic elements, which effectively controls the biodiversity of the area. The climate of the Sanctuary can be treated as sub-tropical monsoon type climate. Annual temperature of the Sanctuary varies between 9.6^oC (min) and 33.8^oC (max). Average annual rainfall remains around 2000 mm and about 70% rainfall occurs during June to September. The relative humidity varies between 65-95% and is lowest during the month of March.

A number of floristic works have been carried out in Assam i.e. Some of the recent floristic studies of Assam are the outcome of Ph.D. works viz. “Angiosperms of Kamrup District” by I.C. Barua (1992), “Systemic studies on the Dicotyledonous plants of Lakhimpur District” by R. Singh (1993), “Herbaceous plants of Karbi- Anglong District” by S.Sarkar(1993), “Floristic composition of Tinsukia District” by A.B. Gogoi(1997), etc. National Parks and Wildlife Sanctuaries of Assam in different period. Hajra (1978) conducted floristic study on Kaziranga and Manas National Park. In the latter period, Nath and Choudhury (1994), Nath (1999), Bora (1999) made some remarkable contribution on Orang Wildlife Sanctuary and Pabitora Wildlife Sanctuary of Assam respectively, which included primarily floristic works. Barua (1998), worked on the vegetation dynamics and periodic migration of animal population in relation to flood and fire in Kaziranga National Park. Bujarbarua (2002), worked on the ecological study of Gibbon Wildlife Sanctuary. Baishya and Bora (2002), worked on the flora of Dibru-Saikhowa Biosphere Reserve. In this context with vast and biodiversity rich areas, these works

appeared to be significant. Keeping this view the Nagaon of Assam is selected to study its floristic diversity. The present contribution is the outcome of the extensive field study in the study site.

II. METHODOLOGY

To record the vegetation of the study site, several collection trips were undertaken at monthly intervals throughout the year covering the study period. The specimens were collected, pressed and dried. After proper chemical treatment species were pasted into the herbarium sheets. Collected specimens were identified and confirmed at Botany Department Herbarium, G.U. and Regional Herbarium "ASSAM" of Botanical Survey of India, Eastern Circle of Shillong. The lists of species are arranged according to the system of Bentham and Hooker's Genera Planetarum (1862-83) with slight modification as proposed by Hutchinson (1959, 1973).

III. OBSERVATION

3.1 Floristic Diversity

A. The present study includes Angiospermic flora from the study site. Among these, the Dicotyledons occupy the major portion. The angiospermic members in the present study include 949 species of Angiosperms. The dicotyledons belong to 117 families; 416 genera and 734 species, and the monocotyledons belong to 23 families, 109 genera and 215 species. The statistical analysis of the plant elements is shown in Table 1.

B. The most dominant families of the study area is Poaceae (66 species) followed by Papilionaceae (53 species), Euphorbiaceae (48 species), Rubiaceae (47 species) Asteraceae (34 species), Cyperaceae (32 species) and Verbenaceae (31 species) as shown in Table 2.

Table 1. Statistical Analysis of Families, Genera and species of Angiosperms and Pteridophytes of Nagaon district of Assam

Group	Families		Genera		Species	
	No	%	No	%	No	%
Dicotyledons	117	83.57	416	79.23	734	77.34
Monocotyledons	23	16.42	109	20.76	215	22.65
Total	140	99.99	525	99.99	949	99.99

Table 2. Ten Dominant Families of Nagaon District of Assam

Sl. No.	Family	Genera	Species
1.	Poaceae	45	66
2.	Papilionaceae	25	53
3.	Euphorbiaceae	23	48
4.	Rubiaceae	30	47
5.	Asteraceae	27	34
6.	Cyperaceae	7	32

7.	Verbenaceae	16	31
8.	Caesalpiniaceae	6	18
9.	Acanthaceae	10	18
10.	Moraceae	3	8

3.2 Rare Plants

The District is the home of several endemic plants. These plants are vulnerable to extinction, so these are as important focus of conservation efforts. Plant species viz. *Angiosperis evecta*, *Holorhena antidysentrica*, *Rauvolfia serpentina*, *Helminthostachya zeylanica*, etc are rare in distribution in the study site and also in this region.

3.3 Economically Important Plants

The district has many species of economically important plants but their sustainable use still remained untrapped as the sanctuary is not properly explored till date. Majority of the plants are useful in different aspect of life of the common people. Some of them are mentioned below.

Local people use many species of plants as medicine. Some of them are *Acacia farnesiana*, *Achyranthes aspera*, *Aegle marmelos*, *Asparagus racemosus* *Callotropis gigantean*, *Cassia sophera*, *Cassia tora*, *Crataeva magna*, *Cuscuta reflexa*, *Cynodon dactylon*, *Ocimum sanctum*, *Rauvolfia serpentina* etc. Some of the timbers yielding plants are *Gamelina arborea*, *Albizia procera*, *Alstonia scholaris*, *Lagerstroemia reginae*, *Terminalia arjuna*, *Toona ciliata* etc.

IV. CONCLUSION

It is evident from the above study that the Nagaon district of Assam is rich in plant wealth, which indicates the importance for biodiversity conservation. It has been observed that maximum plant species are important. The frequent flood, grazing, fishing etc. are some of the factors, which is responsible for the depletion of the biodiversity. The vegetation pattern of the study site are mainly alluvial plain area, mostly dominated by grasses viz *Imperata cylindrica*, *Saccharum spontaneum*, *Sterostachya fusca*, *Vertiveria zizaniodes* etc, deciduous trees like *Albizia procera*, *Bombax ceiba*, *Lagerstroemia reginae*, *Trewia nudiflora* etc. in the woodlands. The presence of alluvial grassland and swampy vegetation and the dominance of the members of Poaceae prove the suitability of the area for good habitat for domestic and wild herbivores. But there is also need to give attention for conservation of the plant resources in the study site because without undisturbed characteristic flora of the area it is simply not possible for the native fauna of the study site to persist for longer period.

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UBIQUITOUS CLONES AND ITS MANAGEMENT DURING MAINTENANCE OF SOFTWARE

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ABSTRACT

Now a day's various types of software are easily and readily available in the market. Many types of software are quite similar in nature because they contribute to a similar problem or enhancement of earlier problem by different developer's team. This similarity among the software is termed as cloning and fragment that are similar are known as clones. There are various types of clones but we restrict ourselves to ubiquitous clones. Ubiquitous clones are the short clones that are present in many pieces of software and occur in a very high frequency across the software. This paper deals with the management of ubiquitous clones on basis of the type of ubiquitous nature they possess.

Keywords: *Permanent Clones, Software, Ubiquitous Clones, Volatile.*

I. INTRODUCTION

The copy and paste activity is a very common practice among the software where a part of functionality of the software is same within particular software or between the software [1]. This practice introduces redundancy and thus results in form of an original fragment and others as duplicate fragment (that exists as a result of copy and paste approach from original fragment) [2]. These duplicated copies are also known as cloned copies [3]. There are various types of clones that are detected during the clone detection phase such as exact clones, renamed clones, near miss clones and semantic clones [4]. Along with these clones we can further classify them as gapped clones, contiguous clones, ubiquitous clones [5] etc. Our study is focused on ubiquitous clones.

Ubiquitous clones: - These are short clones that occur in high frequency among the software or within particular software [5].

However we can further classify the ubiquitous clones in two types.

1. Volatile clones
2. Non-volatile clones

1. **Volatile Clones:**-These are those ubiquitous clones that are temporary in nature that is they disappear as soon as the software is further evolved in maintenance phase [5]. They are changed frequently during the software maintenance phase.

2. **Non-Volatile Clones:**- These are those ubiquitous clones that are permanent in nature that is unlike volatile clones they will not disappear but will remain in all the versions of the software [5]. They will not be changed frequently during the software maintenance phase.

II. MANAGEMENT OF UBIQUITOUS CLONES

Management of clones is a process of dealing with the inconsistencies [6] that arises in software due to cloning. Since we are considering ubiquitous clones so we will limit our study to only ubiquitous cloning management.

The management is based on the type of ubiquitous clones that further depends on the past history of the clones. Example – In past histories during maintenance clones remains in existence even after the updating then it falls under the category of non- volatile clones otherwise if clones changes themselves in such a way that now they are no longer clones then it falls under the categories of volatile clones as shown in figure 1.

Volatile clone management: - Since these clones disappears with the modification of the software. So, being optimistic that these clones had been changing from past histories so, will certainly disappear automatically and will not leave any adverse effect in form of inconsistency during maintenance phase. Thus such types of clones are avoided by the developer [7].

Non- volatile clone management:- Such type of clones always remain in the software so being pessimistic that these clones will surely be causing problems in form of inconsistencies, the developers should use clone removing [7] technique by using refactoring approach [8]. Garg et al. [7] describes the techniques how this avoiding and removing of clones takes place.

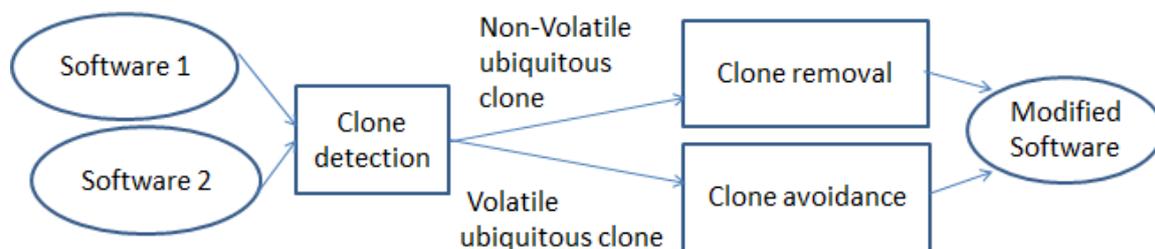


Figure 1: Management of ubiquitous clones

III. CONCLUSIONS AND FUTURE SCOPE

Here we have discussed the ubiquitous clones and their classification in form of volatile and non- volatile clones. Also the different methods of managing both these types of clones are also taken into account. This can be further extended to the process of clone presentation and visualization.

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ECO FRIENDLY TEXTILES AND CLOTHING

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ABSTRACT

Eco friendly fabrics are made from fibers that do not require the use of any pesticides or chemicals to grow. They are naturally resistant to mould and mildew and are disease free. Hemp, linen, bamboo and ramie are eco friendly fibers. Eco-clothes are high quality and last a long time. Because of this people need fewer clothes, less raw materials and energy are used, and there is less waste. To ensure standards a system of eco-labelling is being established to show that clothes have been made from organic materials and manufactured in an environmentally-friendly way.

Keywords: Clothing, Eco Friendly, Fibre, Organic, Textiles

I. INTRODUCTION

Textiles could be one of the most un-sustainable products in the world. In their entire lifecycle from growing the raw material or creating it from oil to manufacturing, selling and final disposal they can create a serious problem. There are benefits at different life-cycle stages of the organic and eco-friendly fabrics trade, both for consumers and producers. In the larger scale of effects it is important to see that Eco-Friendly textiles and clothing may travel half way around the world to reach the ethical customer. As the demand of such eco friendly garments is increasing there exists a great scope for new entrepreneur to enter into this field. Textile and clothing is a labour-intensive industry. It has many working procedures which form flow processes. Each process makes various influences on the environment and human health. There are increasing numbers of cases of people experiencing health problems such as rashes, allergies, respiratory and concentration problems due to chemical sensitivities.¹ Many have found organic clothing to be helpful in reducing exposure to the vast amount of toxic chemicals we are unknowingly exposed to on a daily basis. Fabrics and textiles those are truly sustainable and eco-friendly is essential these days.

II. ECO-FRIENDLY TEXTILES AND CLOTHING

2.1 Organic Cotton

Organic cotton is grown without chemicals and does no harm to either environment or workers, but it is more labour intensive and furthermore fields must be free of chemicals for three years before the crop can be certified organic. Organic cotton farming has a lower carbon footprint than traditional cotton farming, as organic farming uses less energy and fuel, emits fewer greenhouse gases into the air and reduces water consumption and toxic run-off. Organic cotton is grown under fair trade guidelines and is biodegradable and composite.² It There have

been huge global increases in the demand for organic cotton. Clothing made from organic cottons has the feel of linen without the weight.



Fig 1: Cotton Fibre

2.2 HEMP

Hemp is another eco-fabric that is grown without the use of chemicals, pesticides, herbicides or fertilizers and is harvested using a traditional harvester machine. The long fibres of the hemp plant are separated from the short and then washed to break down the natural glue that binds the hemp strands together.³ The hemp is then combed, spun, knitted and weaved, completely pesticide- and chemical-free. Hemp has been used to make clothing for thousands of years and it is in recent times that it has become controversial. Hemp is an extremely durable fabric.



Fig 2: Hemp Fabric

2.3 BAMBOO

Bamboo is a highly renewable grass, and it is probably this property that has resulted in its being classified as "eco-friendly". Bamboo is one of nature's most sustainable resources. Bamboo is chemically, by regenerating the cellulose fibre, which make Bamboo Viscose. All fabrics manufactured with cellulose, whether its bamboo, plants or trees are rayon (viscose). Bamboo Viscose is considered eco-friendly, as the primarily source is naturally regenerative. Bamboo fabrics can be produced without any chemical additives but ensure that it is eco certified look for Oeko-Tex, Soil Association, SKAL, KRAV or similar organic or sustainable certification body.



Fig 3: Bamboo Yarn

2.4 RAMIE

Ramie is a highly sustainable eco friendly fiber. It is very strong and durable and is 8 times stronger than cotton and even stronger when wet. Ramie is a flowering plant, and when the fibers are extracted from the plant for spinning, it can be harvested up to 6 times in a successful year.⁴ Ramie is naturally resistant to bacteria, mould and mildew rot or insect attack. It does not require pesticides. Ramie fabrics are good choice for warmer climates. Good Stain resistance, does not shrink.



Fig 3: Ramie Fibre

2.5 SOY SILK

Soy silk is made from the by-products of the tofu-making process. The liquefied proteins are extruded into fibres which are then spun, and used like any other fibre (woven, knitted, etc.). Fabrics made of soy silk has high protein content and are receptive to natural dyes, so can create own colours.



Fig 4: Soya Bean

2.6 TENCEL

Tencel fabric is an eco-friendly fabric that created a revolutionary in the development of environmentally sustainable textiles. It is certified by the international Forest Stewardship Council and is 100% biodegradable. Variety and exceptional comfort are the greatest benefits of tencel clothing. Lyocell fibre is made from biodegradable wood pulp using chemical-free processes from Tencel.⁵ Non-toxic solvents are used in its production and then recycled, creating a manufacturing process with very little by-product. It can be blended with other fibres to create fabrics like Sea Cell and Hemp cel.



Fig 5: Tencel Tree



Fig 6: Lyocell Yarn

III. CONCLUSION

In the current scenario, the demand for Eco- textiles have continued to grow. To meet this demand without sacrificing the human health and the planet health, one must find sustainable textile solutions. Those sustainable solutions are there in the form of organic cotton, hemp, Tencel, silk, bamboo, etc. It is just up to ultimate consumers to make the conscious choice of selecting organic textiles and clothing.

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TEXT MINING APPROACH TO EXTRACT KNOWLEDGE FROM SOCIAL MEDIA DATA TO ENHANCE BUSINESS INTELLIGENCE

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ABSTRACT

In recent years, organizations are facing numerous challenges in dealing with the tremendous volumes of unstructured texts available in social media. Internet has become world-wide famous and important for content sharing, until now, the content that is generated from these websites remains largely unused. Social media data largely contains unstructured text which is not precise and complete. If the incomplete text data is considered for business decision making, then uncertainty is propagated to the results. Text mining refers to the process of extracting interesting and non-trivial information and knowledge from unstructured text. Business Intelligence is one of the applications where we can apply text mining effectively. Business Intelligence (BI) increases the competitive advantage of a business by intelligent use of available information collected from the users to make wise decisions. This paper presents a text mining approach to extract valuable information from social media content to predict real-world decisions that enhance business intelligence.

Keywords-Business Intelligence, Information Extraction, Social Media, Text Mining, Unstructured text.

I INTRODUCTION

Social networking sites like Facebook, Twitter, LinkedIn, Google Plus or Pinterest are increasingly used to provide value to have online conversations and mainly good at promoting discussion and events, connecting with like-minded organizations and the media and an interesting way to network with potential new supporters[1]. There are multiple sources of data for businesses in the form of web pages, emails, video and image files, news and reports which are called semi structured or unstructured data. They are in different formats and searching, analyzing such data is a time consuming activity and may lead to poor decisions.

Business Intelligence (BI) refers to applications of techniques for collecting, storing and analyzing business data that finally helps the enterprise to make better decisions [2]. Mostly, BI techniques are computer based, they help in analyzing past, current and future trends of the enterprise. Analyzing the data plays a major role in decision support system, query and reporting, data mining, complex event processing, online analytical processing, process mining, business performance management, text mining, statistical and predictive analysis.

In addition to traditional data found in databases, other sources of information found in non-traditional sources can be equally, if not more, valuable. For instance, organizations can pool customer sentiment information from

CRM applications and gather relevant information from external sources. An important aspect of BI is knowledge management that helps companies in making good strategies through proper insight and experiences. BI helps companies to analyze their tremendous volumes of data for decision making but unfortunately not all data is structured and simple to understand as some data exists in unstructured or semi-structured form which results in time consuming search and interpretation.

The dominant tool for business intelligence is text mining. The concept of text mining may seem to be complicated, but understanding the process is easy if the task is broken down step by step. Using a simplified approach that breaks down the overall process into steps offers insight into how text mining works. Also, organizations can identify which areas best suit their requirements and how to best apply text mining within their current processes. Text mining is generally defined as the process of deriving high quality information from text.

II TEXT MINING - AN EFFICIENT TOOL FOR BUSINESS INTELLIGENCE

The aim of text mining is to collect huge amounts of unstructured data available in any form from enterprises or from the internet, and use it to gain insights to solve real-world problems[3]. The available sources of data for businesses can be gathered from web pages, emails, video and image files, news and reports. These data are either semi structured or unstructured. Since they are in different formats, searching and analyzing such data is a time consuming activity and this would lead to poor decisions. To solve this problem, application of techniques of text mining for information extraction, automatic categorization or summarization of documents has become mandatory [4]. The Text Mining Process involves the following steps:

2.1 Text Pre-processing

This is a step-by-step method involving following mechanisms.

- a. Noise Removal- this process involves removal of stopwords and punctuation marks from text data so that the resultant text is free from redundancy and unwanted symbols.
- b. Tokenization- it is parsing of unstructured text in which the text is split into sets of tokens on the basis of words, sentences or paragraphs.
- c. Parts of Speech Tagging- in this process, grammar rules are applied on the text with their corresponding parts of speech.
- d. Word-sense Disambiguation- it allows finding different meanings or sense of a word implied in different situations.
- e. Text Transformation/ Attribute Generation- Attribute generation generates labels/ attributes from the text based on their features.

2.2 Text Representation

It allows representation of text by features and their occurrences using approaches of “Bag of words” and “Vector space” where each word is represented as an individual variable having numeric weight.

2.3 Feature Generation and Feature Selection

- Feature Generation This process selects features of a document so as to improve its representation which may be earlier misleading or redundant. It uses approaches of selection before use or selection based on use.
- Feature Selection- It involves reduction in text dimensionality and irrelevant attributes to deal with issues of scarcity of resources and feasibility. It is used to improve text representation by selecting a subset of features either before using them in a classifier or how well they perform in classifier. Though the approach of selection before use is independent of many classifiers and has low costs in computation but it is less effective in comparison to the approach of selection based on use as it evaluates on performance.

2.4 Interpretation/ Evaluation

It is the final step in text mining process which could lead to either termination or iteration. Text mining process could be finally terminated if well-suited results are achieved for business intelligence or the process could be finally iterated if the results are not up to the mark or are used as a part of further inputs.

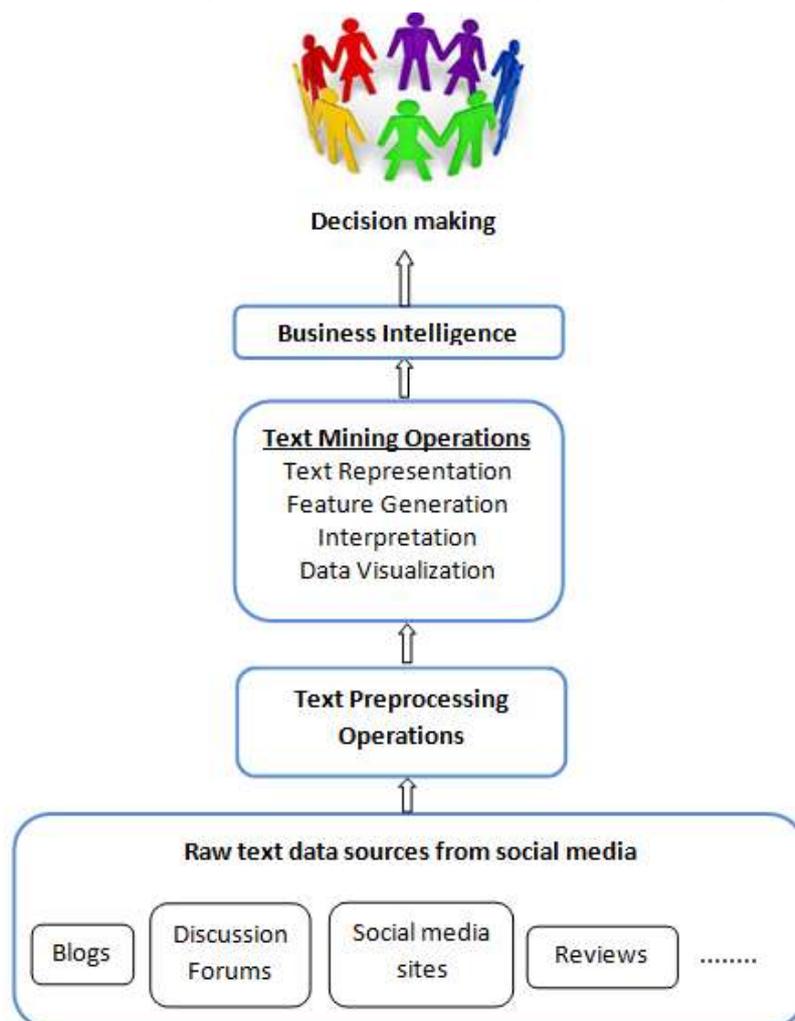


Fig.1: Functional Architecture of Text Mining for Business Intelligence System

2.5 Data visualization

For text-based information in a way that can be analyzed by organizations is becoming more important as organizations increasingly mine this data. Business intelligence tools offer organizations a wide array of visualization options to present mined text results in a user-friendly way that will identify trends and report on findings to benefit planning. Beyond the actual presentation of this data, business intelligence allows organizations to store the data in a data warehouse. Also, data can be combined with other data to draw an overall picture of both structured data and unstructured data combined [5].

Fig.1 highlights the Text Mining approach to extract information from social media sites. Text mining is an important aspect of Business Intelligence that helps users and enterprises in analyzing stored text in an improved way to enable better decisions, resulting in customer satisfaction and gaining competitive advantage[6], [7]. Text Mining is better than data mining as it provides deeper insight into the expanding business domain and extracts more fruitful data for business intelligence from unstructured information sources. Its main objective is to derive new information from multi sources of raw text information, an attempt for which was rarely thought of before. There are many business intelligence applications of text mining system like Scientific data analysis, marketing, identifying potential customers and market, segmentation, biomedical Sciences, document warehouse for SAP, fraud detection and various other relevant fields[8].

Text mining uses a number of software and technologies to help decision support system of an enterprise and keeps on generating alerts on market changeovers, mergers, poor performance and competition that in turn help the business to take corrective, measurable and preventive steps and be the leader.

III CONCLUSION

This paper presents a text mining approach to extract information from voluminous data sources to enhance business decisions. As businesses understand how text mining can be employed and its associated benefits, the transition to adoption becomes quite realistic. Forward thinking organizations are now at the threshold of identifying how text mining fits within their current business intelligence framework.

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COMPARISON ON TWO WELL KNOWN TECHNIQUES FOR CHARACTER RECOGNITION

Survey paper

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ABSTRACT

Character Identification is Offline-Handwriting Recognition that is enables a person to write something text on a piece of paper and identify each text or letter from written text. Character may be written in different styles by different person. So, there are enumerable styles in which character may be written. If we combined two styles then it generates new different writing style. But create new form of writing style is problem that is solved by computational method. Here we choose Particle swarm optimization which is applied in recognition part of the system. In this paper we compare two different algorithms that is Genetic algorithm and Particle swarm optimization & their work on image field by the help of their result.

Keywords: Particle swarm optimization; Genetic algorithm; Character recognition.

I. INTRODUCTION

Character Identification refers to identification of hand written characters and printed characters. Character detection, extraction and recognition have been an active field of research for many years. It still remains an open problem in the field of Pattern Recognition and Image Processing. The problem can be viewed to classify most appropriate character to the given figure. There are mainly three phases of a character recognition system: Preprocessing, Segmentation, Recognition. The preprocessing technique such as noise removal etc. aims to irrelevant and unwanted data. In Recognition module, system has to recognize the object in predefined way [1] [2].

Various techniques are available in literature for character recognition. This paper compares two well known with their advantages and disadvantages.

Rest of the paper is organized as follow:

Section II describes the principle of PSO, Genetic Algorithm & their comparison. Implementation of techniques is in section III. Results of the techniques are indicated in section IV. Finally, section V consists of results.

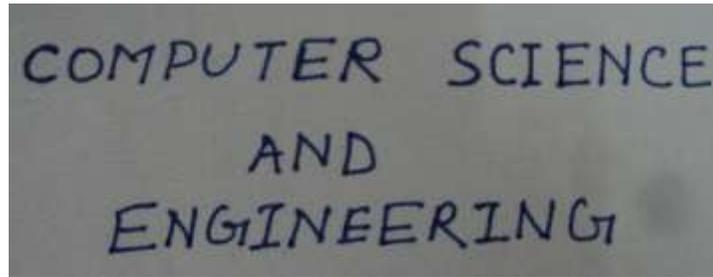


Figure 1. Sample for Character Recognition.

II. METHODOLOGY

There are two techniques in detail and comparison between them:

2.1 Particle Swarm Optimization

Particle swarm optimization (PSO) is a population based stochastic optimization technique ,inspired by social behavior of bird flocking or fish schooling [5]. PSO learned from the scenario and used it to solve the optimization problems. In PSO, each single solution is a “bird” in the search space. It is called “particle”. All of particles have fitness values which are evaluated by the fitness function to be optimized for better solution, and have velocities which direct the flying of the particles in problem area. The particles fly through the area that is problem space by following the current optimum particles [6].

2.2 Genetic Algorithm

The Genetic Algorithms (GAs) is inspired by the principles of genetic and mimics the reproduction behavior, and evolution observed in biological population. In a genetic algorithm, a population of candidate solution to an optimization problem is evolved toward better solutions. Genetic Algorithms generates solutions to optimization problems using technique inspired by natural evolution.

At each generation, each individual is evaluated and recombined with others on the basis of its fitness. The expected number of times an individual is selected for recombination is proportional to its fitness relative to the rest of the population. New individual are generated using crossover and mutation.

- Crossover operates by selecting a random location in the genetic string of the parents (crossover point) and concatenating the initial segment of one parent with the final segment of the second parent to create a new child. A second child is generated at the same time using the remaining segments of the two parents.
- Mutation provides for time to time disturbances in the crossover operation by inverting one or more genetic elements during reproduction [7][8][9].

2.3 Comparison between PSO and GA

PSO shares many similarities with evolutionary computation techniques such as Genetic Algorithms (GA) that means these two evolutionary heuristics are population-based search methods. They both depend on information sharing among their population members to enhance their search process using a combination of deterministic and probabilistic. The system is initialized with a population of random solutions and searches for optima by updating generations

Most of evolutionary techniques have the following procedure:

1. Random generation of an initial population in starting.
2. Reckoning of a fitness value for each subject which is uses. It will directly depend on the distance to the optimum.
3. Reproduction of the population based on fitness values.
4. If requirements are met in procedure, then stop. Otherwise go back to 2.

From the procedure, we can learn that PSO shares many common points with GA. Both algorithms start their procedure with a group of a randomly generated population. Both algorithms have fitness values to evaluate the population. Both techniques update the population and search for the optimum with random techniques. Both systems do not guarantee that their procedures will success.

However, PSO does not have genetic operators like crossover and mutation. PSO has only particles. Particles update themselves with the internal velocity. They have memory, which is important to the algorithm.

Compared with genetic algorithms (GAs), the information sharing mechanism in PSO is crucially different. In GAs, each chromosomes share information with other. So the whole population moves like a one group towards an optimal area search space. In PSO, only *gbest* (or *lbest*) brings out the information to others. It is a mechanism for sharing information in one way. The evolution only is used for the best solution. Compared with GA, all the particles arrive to converge to the best solution quickly even in the local version in most cases [5] [6] [11] [12].

III. IMPLEMENTATION

PSO is initialized with a group of random particle (solution) and then searches for optima by updating generations. Each particle is updated by following two “best” values in every iteration. The first one is the best solution (fitness) it has achieved so far. The fitness value is also stored, this value called *pbest*. Another “best” value that is tracked by the particle swarm optimizer is the best value, obtained so far by any particle in the population. The best value is a global best and called *gbest*. When a particle takes part of the population as its topological neighbors, the best value is a local best and is called *lbest* [4]

After finding the two best values, the particle updates its velocity and positions with following equation (a) and (b).

$$v[] = v[] + c1 * \text{rand}() * (pbest[] - present[]) + c2 * \text{rand}() * (gbest[] - present[]) \quad (a)$$

$$present[] = present[] + v[] \quad (b)$$

$v[]$ is the particle velocity, $present[]$ is the current particle(solution). $pbest[]$ and $gbest[]$ are defined as stated before. $\text{rand}()$ is a random number between (0,1). $c1$, $c2$ are learning factors [6]. Usually $c1=c2=2$.

The pseudo code of the PSO procedure is as follows:

For each particle

 Initialize particle

End

Do

For each particle

 Calculate fitness value

 If the fitness value is better than the best fitness

 value ($pbest$) in history

 Set current value as the new $pbest$

End

Choose the particle with the best fitness value of all the particles as the $gbest$

For each particle

 Calculate particle velocity according equation (a)

 Update particle position according equation (b)

End

While maximum number of iterations or minimum error criteria is not acquired.

Particle's velocities on each dimension are clamped to a maximum velocity v_{\max} . If the sum of accelerations would causes the velocity on that dimension to exceed v_{\max} , which is parameter defined by the user. Then the velocity on that dimension is limited to v_{\max} [6].

The pseudo code of the standard GAs procedure is as follows [9][10]:

Begin GA

$g=0$ generation counter

 Initialize population

 Evaluate population $P(g)$ i.e., compute fitness values

While not done do

$g=g+1$
Select $P(g)$ from $P(g-1)$
Crossover $P(g)$
Mutate $P(g)$
Evaluate $P(g)$

End while

End GA

VI. RESULT

PSO has successfully applied for image enhancement application and demonstrated that PSO gets better results in a faster, cheaper way compared with GA evolutionary method. Also PSO is more attractive than GA is that there are few parameters to adjust compared with the large number of parameters adjusted when GA is run [3].

Table 1. The fitness value of both PSO and GA using 200 generation [3].

Image/Fitness	PSO-based	GAs-based
Cameraman	128.821	102.988
Tire	136.398	130.030
Pout	10.450	2.972
House	250.345	240.342

The above table shows the difference between PSO and GA when it applies in image enhancement. So the result is PSO may chance to give better result than GA in Character Identification.

V. CONCLUSION

In this survey, Character Identification is having process that is necessary to follow for extracting and identifying character from the input handwritten text on piece of paper. In recognition problem is solved by these evolutionary techniques such as PSO and GAs. By using them, identifies unknown character in given image. Also improve the efficiency of the system when they are applied on the system.

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