Journal which deals with research, Innovation and Originality

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Message from IJERGS

This is the First Issue of the Sixth Volume of International Journal of Engineering Research and General Science. A total of 7 research articles are published and we sincerely hope that each one of these provides some significant stimulation to a reasonable segment of our community of readers.

In this issue, we have focused mainly on the Young Ideas. We also welcome more research oriented ideas in our upcoming Issues.

Author's response for this issue was really inspiring for us. We received many papers from many countries in this issue but our technical team and editor members accepted very less number of research papers for the publication. We have provided editors feedback for every rejected as well as accepted paper so that authors can work out in the weakness more and we shall accept the paper in near future.

Our team have done good job however, this issue may possibly have some drawbacks, and therefore, constructive suggestions for further improvement shall be warmly welcomed.

IJERGS Team,

International Journal of Engineering Research and General Science

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An experimental Investigation Study of application various shapes in Incremental Sheet Metal Forming (ISMF) Process

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Abstract- Incremental sheet metal forming is adaptable rapid manufacturing in sheet forming process that lead to cost and time effective and good quality products, more flexible and less set up cost to any complexity parts, so that it is highly versatile nowadays. Therefore, incremental sheet metal forming technology solving many problems found in conventional sheet forming. More than researchers continue in studying improvement (ISMF) process. In this work, simple and complex shapes manufacture by Single Point Incremental Forming process (SPIF) without using a dedicated die depending on helical tool path was generated by Unigraphics-NX10 (UGS-NX10) programing system. The aim of the presented work is to investigate the feasibility of the incremental forming process for different geometry shapes by using computer numerical control (CNC) depending on zero spindle speed using 1050 aluminum sheet material. The results from this work gives good indication about the complexity of using different shapes in (ISMF). Therefore, improvement of this process by using different shapes as a design tool for incremental sheet forming very important things.

Keywords: Single Point Incremental Sheet Forming, Helical Tool Path, Springback, Sheet Thickness.

1-Introduction

It is known that the traditional forming processes need a long time and very high costs because it depends mainly on the use of dies and punch depending on the dimensions of the product manufactured. In view of the development and needs of the market for more appropriate and less expensive process, it required the emergence of a technologically advanced process compared to the conventional process. [1]

With the beginning of the nineties of the last century, and depending on customers requirement a group of researchers was able to find a new method for the processing sheet metal formation namely incremental sheet metal forming (ISMF), as a new developing technique [2,3].

in recent decades, (ISMF) attracted more and more attentions and this method required simple shape of tool (single shape usually hemispherical) to produce the sheets to its final shapes using CNC machine. [4,5]

This process suitable for rapid prototyping or small shape technology process and parts can be directly formed using CAD model that mean ability of fast design shape and controlling in complexity of the design. [6,7]

Because of incremental sheet metal forming is modern technique, so its remain to be develop and study all difficulties to enhancement in industrial fields. Incremental sheet metal forming is slow process because of locally deformation through the successive points. Elastic springback, sheet thinning and shapes accuracy negative effect in this process because of sheet material attach to the clamped in frame without any dies. [8,9]

For this above reason, it is important to make an investigation for this technology in experimental fields for continues development of this process. This work aims study feasibility of the incremental sheet forming process for different geometry shapes (simple and complex shapes) by SPIF process without using a dedicated die depending on helical tool path.

2-Gometric Modling

Geometric modling is the method for represnts of an object. There are many geometric models manufactured in this study such as truncated pyramid, truncated cone, cross hexagonal, 5 lobes shape and V shaped tube as shown in figure (1). They are modeled using wire frame method by AutoCAD program through the two-dimension geometric entities. Thereafter, a model transforms into UG-NX10 program under same file extension (.dwg) to create surface for side walls within CAD system, where the wire frame models form the basis for surface models.
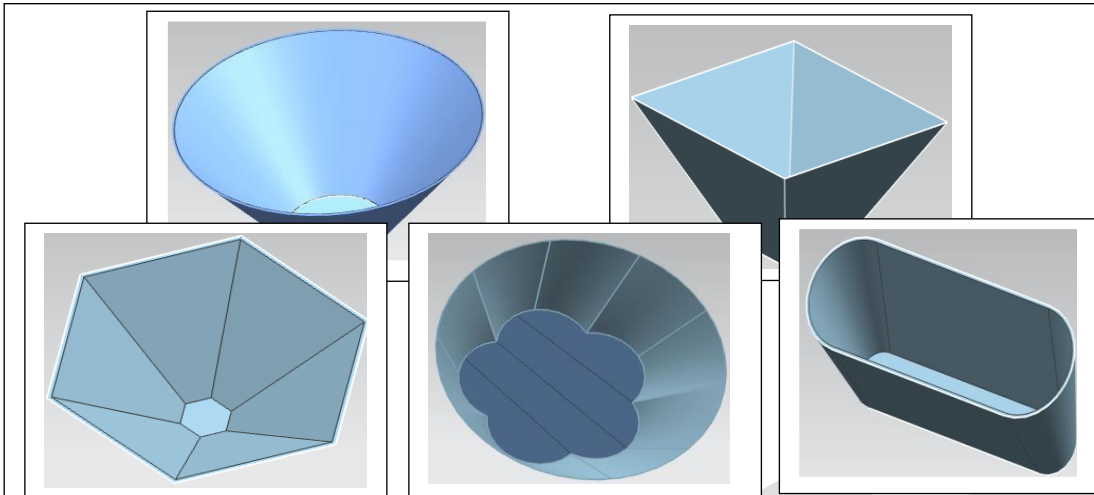
Figure (1): Geometric modeling of simple and complex parts

2.1 Tool Path Generation

According to geometry complexity tool path was applied, sheet thickness, materials of sheet, surface finish requirement and CNC [10]. UGNX10 programming system used for tool path generated, then post-processing generate G-code used appropriate 3-axis CNC milling.

Z-increment responsible in sheet forming were tool moved down in Z-direction by a stated quantity. continuous line mark by tool on the formed part not desired phenomena, if the location not shifted, this is critical when the part to be forming includes of 3D surface and artistic of all the surface is significant. So that, the increment line must be diverted along edges or corners, concealed increment location effects. Helical tool path also evades like this problem, because Z-direction increment of loop cycle is evenly circulated along that cycle and absent increment mark line. Therefore, to minimizing the increment line effect, some typical tools engage motions before beginning a cycle can be used.

If using planer forming, tool forming should remain in consistent contact with the blank sheet during forming process. highly contact is inconsistent, the spring back affected the accuracy of sheet formed parts [10,11]. Figure (2) an Scheme summarizes the integration of CAD / CAM system.
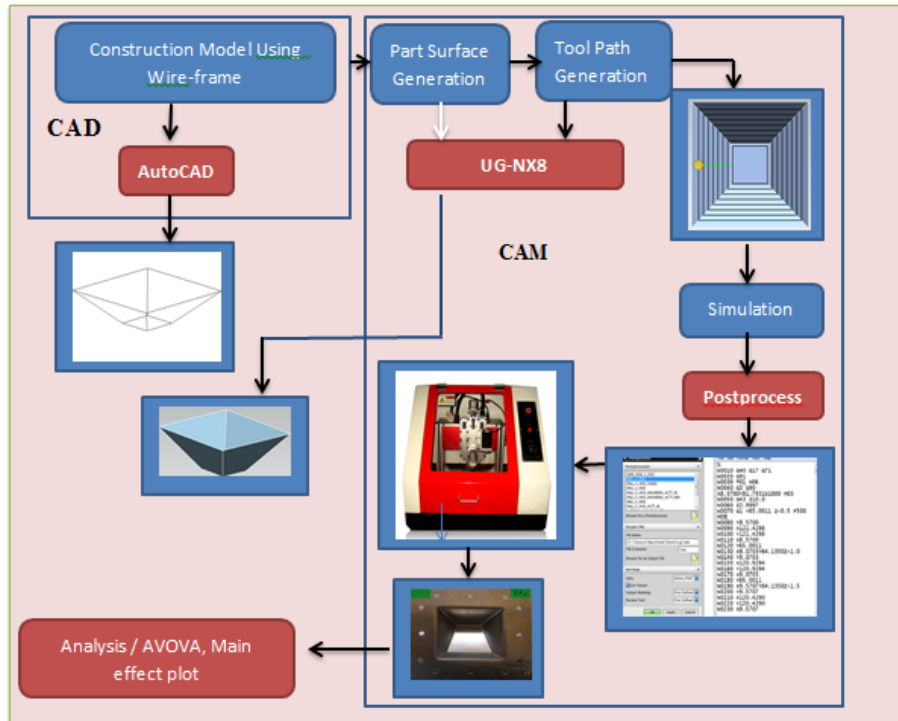
Figure (2): Scheme summarizes the integration of CAD / CAM

3-Materials and equipment's

3.1 Sheet Material

Material used in this feasibility was a 1050 aluminum of 0.5mm in thickness. A formed part produced from a square area of a blank sheet (230×230 mm^2) was investigated using SPIF process technology, while the working area is 180×180 mm^2 according to the blank holder size as shown in figure (3).
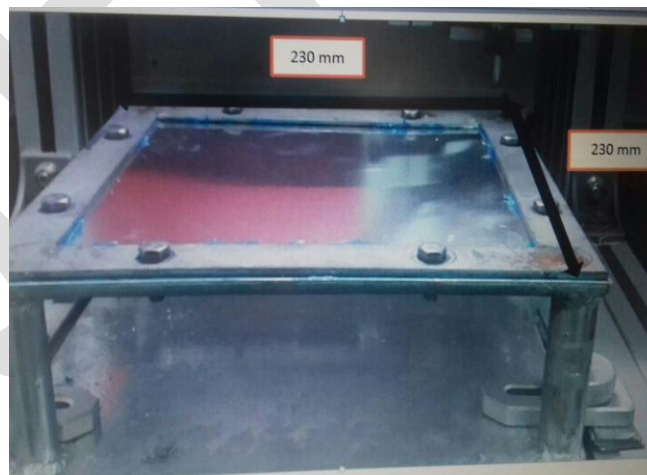
Figure (3): Aluminum blank sheet.

3.2 Forming Tool

Hemispherical head tool with diameter (6 mm) made of low carbon steel is used in this work. The tool is utilized to form or sculpture the sheet metal according to tool path generation. Several authors recognize that the formability in SPIF increase with decrease the tool size as well as the tool size of tool is the important parameter in this process [12]. In fact, large radius using tools permit gives good metal flow and reduced time of forming process, smaller tool radius on other hand is important to enhance the

geometrical features of the part to be formed. Therefore, on this basic selected this diameter. Also, application of lubricant in ISMF is important to obtain a smooth surface and to reduce the wear of the tool.

3.3 Forming Frame and Blank Holder

Based on the machine table area, the forming frame was designed and constructed as illustrated in Figures (4.a and 4.b), The frame fixed and rests on the machine table by using traditional fixture as demonstrated in figure (4.b).

(a)   (b)

Figure (4): The forming frame used for experiments, (a) physical forming frame and (b)schematic representation

3.4 Backing Plate

The backing wood plate used in this work. Backing plate is fixed between the frame and blank holder to reduce bending and springback. Figure (5) backing plate illustration.
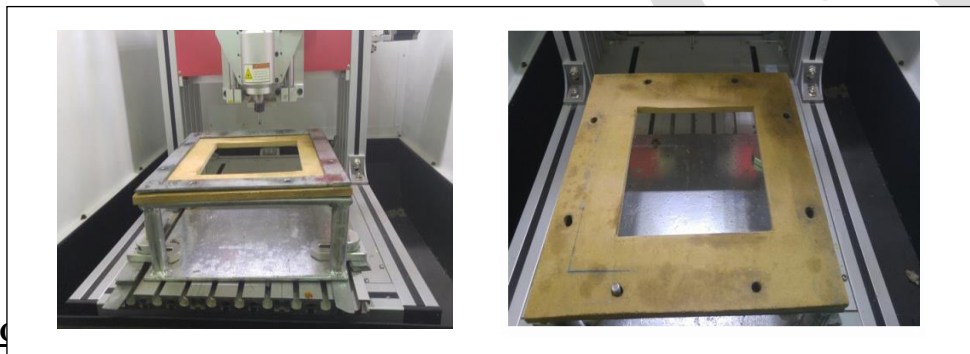
3.5 CNC

Experimental work done by using three-axis motion milling machine "CNC" in materials engineering department laboratories -University of Kufa. The experimental setup, specifications and technical parameters of the CNC milling machine being used are shown in figure (6).
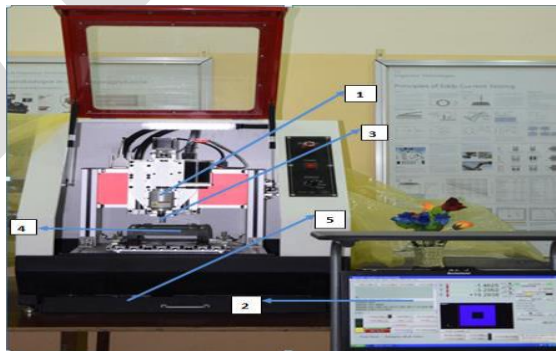
Figure (6): (CNC) milling machine used in this work; 1. Movable head, 2. Machine controller, 3. Tool holder, 4. Forming frame, 5. Machine table.

4-Plan of Experiments

The experimental study consists of the manufacturing simple and complex shape (truncated pyramid, truncated cone, hexagonal, 5 lobe shape and V shaped tube). This study included five experiments shown in table (1), after that accuracy an final sheet thickness measuring using suitable tools.

Table (1): Plane of experiments.
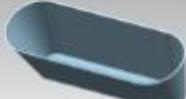
Experiments	Feed Rate (mm/min)	Z-increment (mm)	Tool Path	Geometry Shape
EX 1	1500	0.2	Helical	Truncated cone
EX 2	1500	0.2	Helical	truncated pyramid
EX 3	1500	0.2	Helical	hexagonal
EX 4	1500	0.2	Helical	5 lobes shape
EX 5	1500	0.2	Helical	V shaped tube

For all experiments in table (1) the spindle speed (N) is 0 rpm. In this work, selection the feed rate, tool diameter and Z-increment depended on previous researches. Using small tool size diameter and lower tool depth lead to a significant enhancement of the dimensional accuracy. Therefore, the best parameters should be selected to help in tool path improvement to produce desired results for geometric accuracy and thickness variation.

5-Results and Discussions

Feasibility of the incremental forming process for different geometry by SPIF process without using a dedicated die depending on helical path for machining process are tested to forming the parts. Five experiments for the shapes carried out using 3-axes CNC milling machine as earlier mentioned. Further details of the variables and measured aspects for the shapes are presented in Table (2). FR= 1500 mm/min, Día = 6 mm, N = 0 rpm.

Table (4.1): CAD model &final products of `different shapes

Experiments	Geometry	CAD Model	Final product
EX 1	cone		
EX 2	Hexagonal		
EX 3	5 lobe		
EX 4	V shaped tube		
EX 5	pyramid		

5.1 Feasibility of (SPIF) for different geometry

There is a good possibility to apply different shapes in SPIF process. It has been found through this work the shapes with circular sections have a better possibility of forming than square sections shapes where the decline of the bending and springback in the form of the cone for example, while increasing bending and springback in the pyramid shape (without using backing plate) as illustration in figure (7).
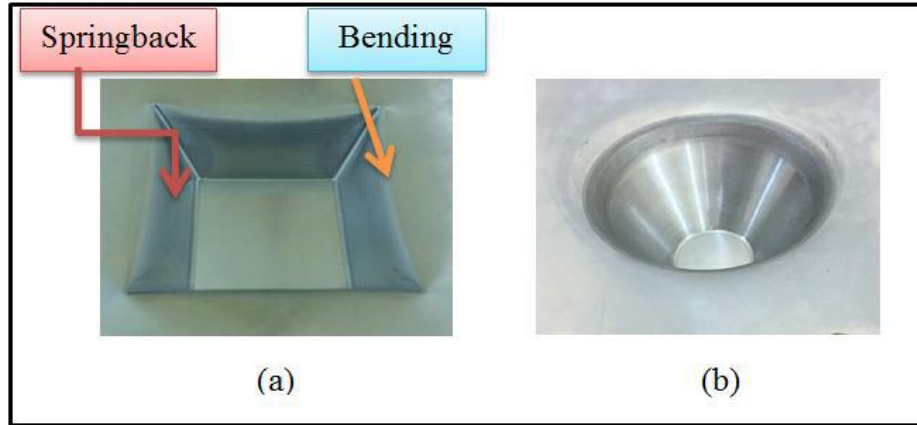
Figure (7): Difference in formability of square cross section and circular cross section; (a) pyramid (b) cone

5.2 Effect of Helical Tool Path (HTP)

Helical or spiral tool trajectory has a suitable choice for incremental forming technology, the important feature in HTP is gabs between successive cycles. The nature of helical tool path motion results in reducing the gap of a given cycle. Therefore, non-deformed regions between cycles were reduced so that the geometrical deviation will also be reduced. Figure (8) illustration generated tool path and final product using (HTP).
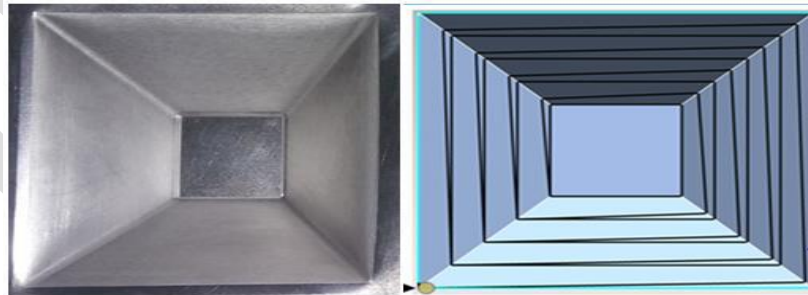
Figure (8): Generated tool path and final product.

5.3 Effect of Angle on Thickness Variation

Thickness of formed part can be measured using sin-law. This law was originally developed for the shear forming process and simply states that [13]:

$$t_1 = t_o \sin(\pi/2 - \alpha) \ \dots (1)$$

t_0 and t_1 are the initial and final thickness respectively and α is the angle of wall measured depending on horizontal direction. It describes the thickness distribution well and shows that parts with drawing angles greater than 60-80° in one stage are not achievable. So that a large angle may cause failure such as cracking as shown in figure (9) when angle of 5 lobe shape was 63°.
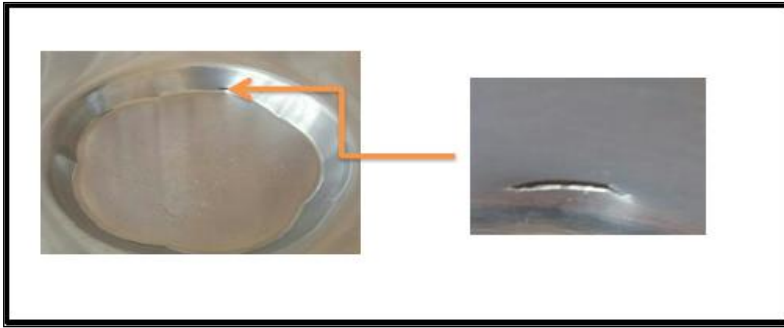
Figure (9): Effect of large angle causing failure (crack) in 5 lobe shapes.

5.4 Effect of backing plate.

Bending of sheet material during forming process resulted in sheet fixed in a frame. therefore, bending effect can be reduce using backing plate that reduce the deviation and it does not influence in pillow and springback deviation effects. As shown in figure (10) bending of the pyramid shape can be reduce when the backing plate used.
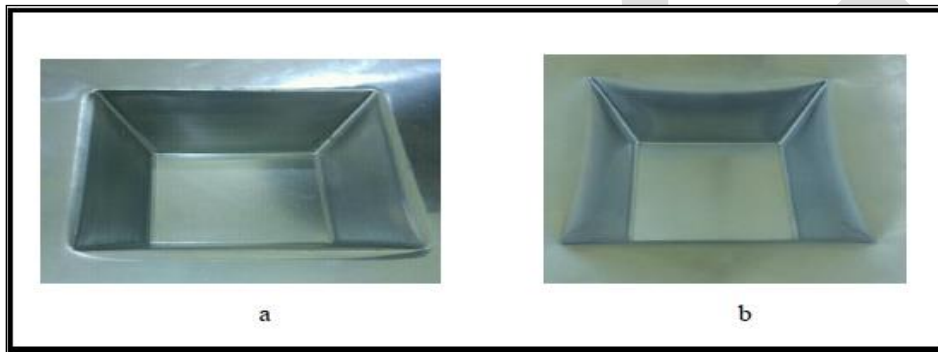
Figure (10): Effect of backing plate; (a): With using backing plate
(b): Without using backing plate

5.5 Effect of springback

Formed parts accuracy was changed because of springback effected. So that, a challenged with some manufacturing process difficulties appeared: Firstly, estimation the final part accuracy after the effect of springback and secondly, compensation this effect by using suitable tool designed for minimized the bending sheet effect close to the start tool contact location.
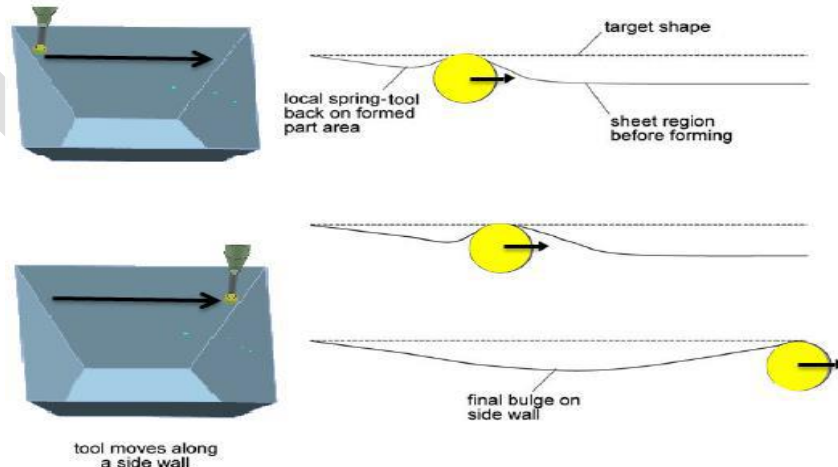
Figure (11): Illustration of local springback in ISMF. [13]

Conclusions

Development of production and prototyping technologies is becoming more important. ISMF implementation technologies of rapid prototyping and small batch production was very important in recent years. Using this technology, time needs for prototyping process can be shortened. The following remarks resulted depending on this work:

1. Helical tool path (HTP) is the suitable tool path to achieve higher geometrical accuracy for most simple and complex shapes.

2. The vertical pitch has major effects on the accuracy and thickness distribution.

3. Bending and springback Shapes with circular cross section will be lower than for square cross section.

4. There is a good possibility to apply different shapes in SPIF process that gives good indication about complexity of this technology.

5. Using of backing plate will reduce the bending and springback.

6. Using zero spindle speed can be depended on it with using effective lubrication and suitable tool path in ISMF process.

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ODM: Modelling Optimization of Datamining in e-Governnance Framework

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Abstract— Implications on datamining techniques has been more than a decade old in area of e-governance. However, at present there are various tradeoffs in the existing research work with the evolving modernization of the technologies. Performing optimization of teh data mining techniques in presence of heterogeneous data to has never being explored in past. The paper also showcase that performing datamining technique cost effectively on distributed storage system is computationally complex phenomenon. Therefore, this paper presents a model called as ODM or Optimized Datamining in e-governance, which put a special emphasis of the modern technique of storing and accessing the data in distributed storage system e.g. cloud. Adopting empirical and experimental technique, a prototype model is experiment, which shows that ODM is highly cost-effective datamining technique on existing as well futuristic distributed data storage system.
Keywords-component; e-Government, datamining, knowledge discovery, Data warehousing

INTRODUCTION

The area of e-governance is slowly gaining the pace owing to the potential advantages it renders to the citizens of the nation [1]. Such applications usually call for using ICT (Information & Communication Technology) by various government bodies for delivering the public services. It is also termed as a method of disseminating the significant information to the public using various electronic mediums. Adoption of e-governance is of significant interest to various individuals that also includes researchers owing to following merit factors viz. i) enhanced efficacies on various processes run by government, ii) allows transparency as well as minimize corruption in various government transactions, and iii) motivate the citizen for participating in the governmental processes. In a nutshell, e-governance tends to convert conventional government organization to e-organization for achieving e.g. i) better and transparent communication, ii) well structured processing of information, iii) precise ability for taking decision, iv) better flexibility on government work processes, v) efficient coordination on various citizen and government activities, vi) normalizing the complex business association, and vii) generation a pleasant platform of customer relationship management. The applications of e-governance; however is in very infancy stage and bears various tradeoffs with the existing modernization of the technological advancements [2]. There is an increasing inclination towards the implementation of various IT resources to be integrated on existing portals that are offering the public services. At present, the users are more interested to use the public services sitting at the comfort of their house or in roaming using mobile computing and mobile networks [3]. The emergence of cloud computing also offers ubiquitousness of data availability and really acted as a boon for the massive data storage. There are already various sort of public cloud applications that run on various smartphones [4]. Unfortunately, there is no such application or services in cloud that offers the public services on mobile phone as dedicated applications, which is the prime trade-off. Some of the notable obstructions towards successful implementation of e-governance framework are i) lack of online work execution and support to various government departments, ii) extracting the useful data, iii) aggregation of massive data, iv) lack of technical capabilities and its respect support to government run activities, and v) summarization and processing of useful as well as meaningful data for enabling faster decision during emergency situation or some high level complex situation in nation.

At present, various forms of organization are evaluating the existing as well as old data for recognizing the meaning patterns from the massive dataset [5]. This is done for understanding the knowledge required for confirming complex business strategies. The prime

attention is always given on interactive charecteristics of data, complexity involved in data processing, and exploratory evaluation of the massive and heterogeneous data generated from various e-governance framework. In order to solve such issues, at present, the research community is more or less working on i) datamining techniques [6], ii) data warehousing techniques [7], and iii) OLAP (Online Analytical Processing) [8]. From the last 10 years, majority of the research work are found to adopt these techniques for extracting the meaningful information to be used for e-governance model. Still, there is no standard work on datamining optimization being witnessed. This paper reviews some of the significant research work and discusses about the problems being encountered in performing datamining by introducing a novel model. Section 2 discusses about the existing literatures followed by problem identification of them in Section 3. Section 4 discusses about the proposed model followed by research methodology in Section 5. Section 6 discusses about the algorithm implementation followed by result discussion in Section 7. Finally, Section 8 summarizes the paper.

RELATED WORK

Our prior study [9] has reviewed some of the existing datamining techniques for enhancing the capabilities of e-government framework. Our study has investigated various forms of e-government frameworks on different countries and studied their applicability. The work done by Rao [10] have also significantly discussed about the software architectures of e-governance with good focus on existing theoretical frameworks. The study has also investigated about the future trends of e-government frameworks. The same author has proposed an architecture that ensures optimal security of e-government framework [11].

Rao and Dey [12] have presented a text-mining method of performing mining of the data. The authors have also studied various corpus processing using local languages of India. Study on e-governance application was also carried out by Trivedi and Dutta [13], where the authors have put higher emphasis on the adoption of datamining techniques. Desai [14] have presented a prediction based technique using datamining algorithm on e-governance considering case study of birth registration problem. The outcome of the study has claimed that the technique could be possibly used in any higher management level for planning and formulating various critical decisions. Same author has also presented a different case study of vehicle registration under e-governance framework using both mining and warehousing approach [15]. The author has adopted the deployment of clustering technique as well as conventional association rule mining technique to extract knowledge. The outcome of the study was claimed to be helpful for assisting the automobile firms to maximize their sales targets. Suresh and Mahale [16] have presented an efficient technique of datamining for enhancing the education system in e-governance. The authors have adopted decision support system to formulate the design of analytics using warehousing approach. Rajput et al. [17] has used WEKA (a conventional open source datamining tool) for exploring the best classification protocols as well as for generation of decision tree. The author has adopted qualitative methodology to collect the real-time data and process it using WEKA tool. The study was also found with adoption of j48 classifier for the purpose of training the data. JRIP rule classifier algorithm was also adopted for in-depth analysis of the data. Shen et al. [18] have presented a data extraction framework that integrates meta-search engine with content mining. Mampilli and Meenakumari [19] have also discussed the issues and scope of e-governance framework. Bhanderi [20] have exclusively investigated OLAP, data warehousing, and data mining. Garg et al. [21] has also emphasized on the implementation aspect of e-governance in education system of India. Bidgoli and Akhondzadeh [22] have presented an approach of datamining on e-government framework. The authors have adopted association rule mining on the samples of the data being generated from customer's complaints. The study has also emphasized the clustering techniques and how it can assists in performing analysis of data being generated from any e-governance framework. However, benchmarking is missing in all the studies discussed till date.

PROBLEM IDENTIFICATION

Performing error-free analysis of the data being generated in massive order has always been the great concern in distributed storage system. The existing service providers for distributed storage system are not found to provide the optimal extraction of knowledge as well as good Quality-of-Service which is originally promised to the user. This section will discuss about the problems that have been identified as follows:

- **Massive Data Generation**: Majority of the existing system is found to be carried out using a smaller size of dataset. Sometimes the datasets are downloaded from internet resources or else it is collected manually. Availability of such size of data becomes a major tradeoff as in existing system, majority of the application has become pervasive, for which purpose, user can access and share the data from multiple terminals. This phenomenon is also application on futuristic e-government application that will generate around petabytes of data in a matter of minutes. Hence, it is quite a challenging situation to perform datamining techniques on such complex and unstructured data in less period of time.

- **Conventional Storage System**: Majority of the existing e-governance application used in India and also some other countries uses a single server storage system. Adoption of such storage system frequently crashes when the number of users increases, which is unpredictable. However, at present, there is also a proliferation of distributed storage system e.g. cloud, where the data is stored in distributive manner for ensuring cost-effective storage. However, this principle may sound good for same type of data but it poses a significant problem, when the data are of heterogeneous types. Hence, if such data could be stored in multiple locations by splitting, it becomes quite a challenging task to ensure the retrieval process when the user wants to access. Moreover, performing datamining over distributed storage will lead to anomalies and also result in maximum time consumption if the data are higher heterogeneous.

- **Conventional Mining Approach**: Applying the concept of mining over distributed dataset, there is a significant correlation between local and global Frequent Itemsets (FI). However, the problem of uncertainty arises when global FI is not able to confirm about its local FI. In order to solve such issues, majority of the existing system attempts to extract global FI by searching local FI in every repository. Such actions calls for higher expenditure of functional cost as well as transmission cost too. On the other hand, in absence of proper indexing mechanism of distributed data, it is almost absurd to analyze global FI without initially considering local FI.

Therefore, the problem statement can be given as – "*It is a computationally challenging task to optimize a datamining technique on distributed storage system retaining Quality-of-Service*" The proposed system mainly attempts to investigate the solution towards this problem statement and has evolved up with a technique that can ensure adherence to the maximum standards of the data storage much complexities being involved in it.

PROPOSED MODEL

The prime purpose of the proposed system is to design an optimized model of datamining that can be incorporated over e-government framework. Our prior study [23] has introduced a e-governance framework for public redressal data using a typical text-mining approach. With the increasing usage of the e-governance application, it is expected that it will generate a massive set of heterogeneous data, which poses a problem of both data heterogeneity as well as scalability. Hence, the present work introduces a model termed as ODM i.e. Optimized Datamining Model, which is designed for addressing the issues of heterogeneity and scalability of data in existing e-governance framework.

The prime contribution of the research work to formulate a multi-storage and highly distributed datamining architecture which can be developed to maintain the data accessibility as well as knowledge discovery of various distributed data storage applications (e.g. cloud) and to authenticate the users from performing any types of illegal activity. The objectives of the proposed system are e.g. i) *Validation of data*: The system should allow online users to get authenticated and validated by the e-government interface, ii) *Distributed Data Storage system*: The system should be able to get the user's data and be able to perform splitting of the data to chunks and store it randomly in distributed storage servers, iii) *Data indexing Mechanism*: the system will provide a indexing of distributed data for addressing the problem of data heterogeneity and retain scalability for the uploaded data. The system will provide distributed indexing mechanism for performing encoding and decoding of the uploaded and downloaded data respectively. The prime contributions of the proposed framework are as follows:

- To design a universal *e-Governance Interface* that interfaces global users with existing data mining cores.

- To develop a *File Management Server* that can assist in data management system and simultaneously acts as a bridge between the user and the cloud systems.

- To permit the system to perform *Data Ripping Process* that can split the user's data and reposit it in multiple and anonymous distributed storage.

- To develop a *Data Encoding and Decoding* mechanism using hash function that can perform encoding of the ripped data of user and reposit it arbitrarily over the distributed storage system.

- To design an *Optimized Datamining* technique that can perform knowledge discovery on larger and highly distributed samples of data.

The proposed system highlights an efficient distributed storage management for repositing the data generated from e-government application which are uploaded by the users in the pervasive environment. Efficient modelling of datamining architecture in our proposed system defines a multi storage structure where an authenticated user only can upload the data in a distributed storage system and keep it safe for his future requirement. As now a day's huge amount of data requires lots of space and that requested amount of space cannot be provided by any of a single Personal Computer. Moreover, the computing resources also have very limited amount of processing power which would be responsible for disk overhead. The uniqueness of this proposed optimization model is that it uses a very distinctive encoding and decoding mechanism with data indexing technique to address the issues of data heterogeneity and

scalability in existing e-governance framework. The application of proposed system can also enable the user to share a large amount of information that is also easy to archive, access, and perform knowledge discovery. As there are various proposed datamining and implication of association rules for knowledge discovery process has been implemented till date but it has been observed, there are very less attempted techniques to perform datamining on distributed database and on multi-storage system. Hence, we achieve it by using our optimization model.

RESEARCH METHODOLOGY

The proposed study consider mix-mode standard for research methodology by considering both empirical and experimental approach. Empirical approach [24] was deployed as the implementation of datamining technique usually follows a standard scientific and mathematical process. Experimental [25] approach was considered as the proposed model was required to be analyzed and tested in real-time for understanding the effectiveness of its outcome. The system architecture of the proposed model is shown in Fig.3. The design principle of the proposed model is mainly deputed to two significant user viz. i) user module and ii) supervisor module. The user seeks to exercise the system for archival of their data. The data to be reposited on distributed storage system could be of any forms. The supervisor module is responsible for the carrying out the file management system for incoming data. In order to clarify the operation of the proposed model, we discuss the core modules used for optimizing our datamining technique:

- *E-Governance Interface* (GI): This module generates a universal interface designed on Java environment for maximum supportability of users owing to its platform independence features. It also permits all the essential users to upload the raw data as well as access their information and see the outcomes of knowledge discovery process. Fig.1 shows the schema of e-Government interface that unite the online users with the distributed storage system.
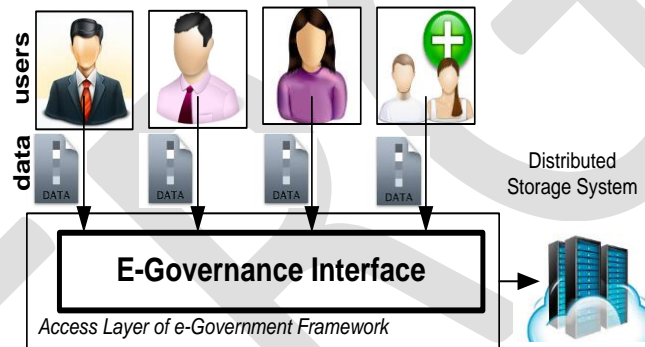
Figure 1 Representation of E-Governance Interface

The e-Governance interface permits the user to undergo a secure validation policy by checking the user ID and their respective passwords. Once the validation of the user records are accomplished than the system will permit the accessibility of the priviledge account of the user by allowing uploading their data on distributed storage. It is to be noted that e-Governance Interface runs on the access layer of the standard e-government framework. However, for incorporating the features of optimization, it is essential that every modules of ODM are highly connected and dependent with respect to core attributes. Hence, e-governance interface only allows users to upload their data, but in order to give them access to their stored data as well as knowledge (after performing our datamining technique), this module is highly dependent on next module called as File Management Server.

- *File Management Servers*: This module add more value to the data storage system when the data is of high volume and have higher degree of heterogeneity. The ODM introduces a system called as File Management Servers that runs on storage servers to create its own file types and reposit the multiple user's data in a typical order. The functionality is pictorially shown in Fig.2. The File Management Server is responsible for the self-governing data management system for multiple users on a given distributed storage system. The File Management Server is also required to perform an indexing of the user's data to normalize the heterogeneity of incoming data. Once the file is processed through this module, ODM will further perform two simultaneous operations e.g. i) performing encoding on the user's data and ii) transmitting the indexed data to the different storage systems. As direct data transmission is complex owing to large number of distributed servers in many geographical regions, hence, the system chooses to take the assistance of this module.
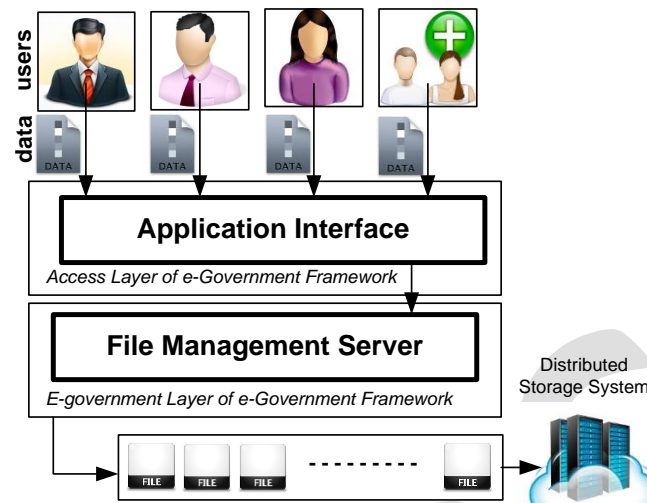
Figure 2 Schematics of Synchronous Servers

The outcome of the File Management Server module will be the indexed file with a specific file formats with a storage matrix with an ordering of the data uploaded or requested by the online users. After the data is processed by this module, it is subjected to encoding using lightweight hash function.

- *File Encoding and Decoding Process*: This module is mainly meant for performing encoding of the files that are being generated by the File Management Server. The prime objective of this module is to perform faster encoding and decoding process without occupying much memory. Interestingly, ODM doesn't directly let the indexed data generated from File Management Server for encoding. The indexed data from File Management Server is binarized to reduce the time and space complexity while applying datamining technique, which will lead to generation of an encoded key. The next step is to perform encoding of the binarized data with hash function. We choose to implement hash as i) it supports faster computation while performing the data indexing and ii) it is less vulnerable to majority of the lethal attacks on storage system. After carrying out the encoding using hash function, the system leads to the encoded binary data, which will be further subjected to Data Ripping Process.

- *Data Ripping Process*: This module is responsible for ripping the data to the different storage systems based on the availability of the memory. The core system connecting to the e-government interface also maintains a record for the distributed storage system with the availability of the memory on the cloud. The system then rips the indexed data of all the gross active users based on the number of the availability of the storage servers. This process of ripping the data will mean that if there are 20 petabytes of the processed data, the data will be splitted as 5-petabytes, 7 petabytes, 2 petabyte, 3 petabytes, and 3 petabyte, if there is availability of 5 storage servers for a particular instance of time. One of the uniqueness in the proposed system is that the generated key that is encoded with hash function is stored randomly on the designated storage servers that are found to be available on that time instance. The system also providers better service by storing the key in the network, which is completely unknown to the user as well as supervisor. Hence, the proposed system performs storage of the user data in highly distributed and secured manner.

- *Optimizing Datamining Technique*: The proposed system introduces an optimization technique that will be subjected for every data that is stored in distributed storage system. The optimization of the datamining technique is done by incorporating a novel sampling procedure for processing the indexed and encoded data stored in storage servers. In order to perform optimization, ODM initially extracts the arbitrary sample from the given dataset which is followed by extraction of minimized set of samples using proposed sampling approach. The system then filters the larger dimensions of data based on its volume and size by using entropy method. Finally, the system generates cumulative samples in storage where it is subjected to a technique of exploring the significant relationship among the variable of samples in distributed dataset. Interestingly, this module reduces the processing time by trimming less-significant knowledge from the samples and keeps on adding only strongly significant knowledge in every cycle of mining. It is mainly meant for optimizing the cost of datamining over distributed storage system.

IMPLEMENTATION

The implementation of the proposed system is carried out on 34 machines with multiple configurations. All the machines are of different operating system, processor speed, and memory with pre-installed JDK environment for running the application. choose to develop it in Java environment as it will be feasible to check the real-time evaluation of the proposed system and more over multiple machines of heterogeneous configurations can be checked at same time. The prototype development of the ODM has been carried out in highly distributed manner in MyEclipse. Out of 34 machines, 5 machines were considered for Supervisor access, ten machines for running the distributed storage server, and remaining 19 machines were for distributed users. All the users underwent a registration phase. A database has been set up in MySQL which maintains the user ID and password of the user and once the customer attempts to

access their account, the system uses standard hash function to secure the password. The implementation of the proposed study is graphically highlighted in Fig.3
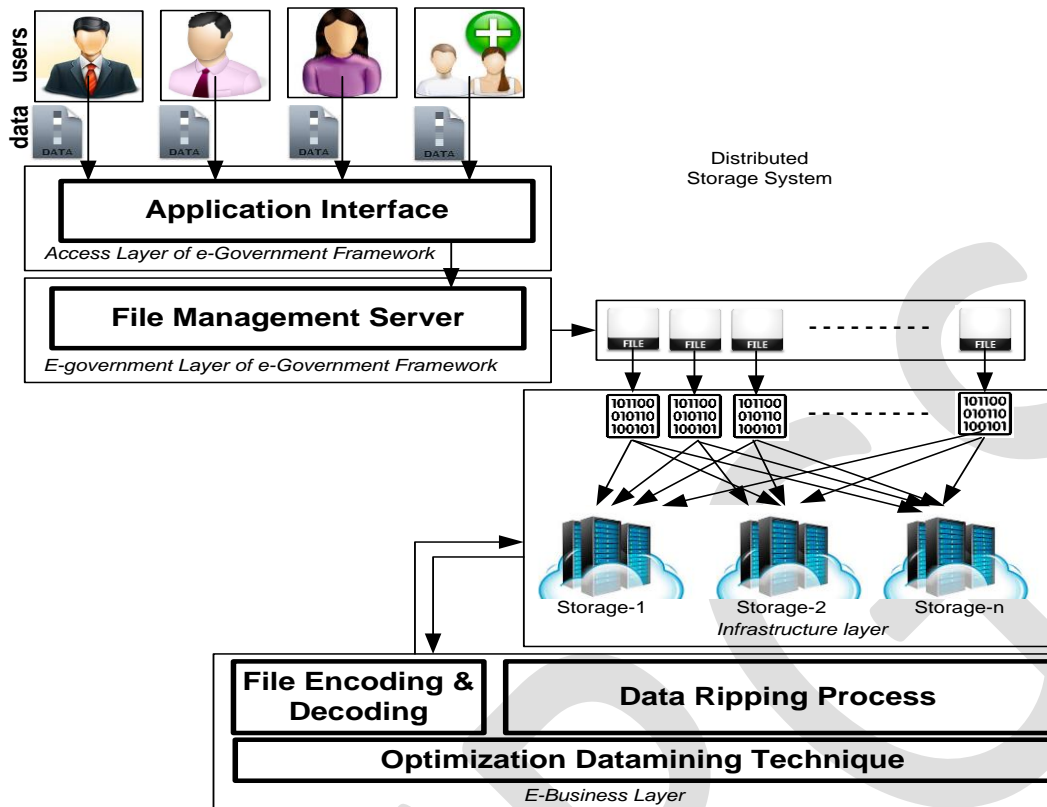
Fig.3 Schema Architecture of ODM for Implementation

The above algorithm takes the input of request of a user to store a specific set of data and checks the connectivity of the e-government interface with the storage servers (Line-1). After validating the user ID and initial password (Line-2), the system binarized the user data (Line-3). This task is also accompanied by generation of key (Line-3). The system applies hash function to further encode the generated key (Line 5-6). Therefore, the algorithm posses the capability to furnish hash encoding for both static as well as dynamic data that gives a wide supportability for the users to maintain their private data, keys, and most important, it offers ultimate data scalability. According to the algorithm, it stores the chunks of encoded data randomly on the available distributed storage server. The system also finds the availability of the storage of data based on the availability of memory (Line 7-9). Hence, ODM offers higher scalability as it is completely independent of any file types. The algorithm implementation can be seen in Fig.1 for the schematic architecture.

Algorithm for Optimized Data Mining

Input: Request of user for Storage

Output: i) Successful storage of Encrypted data, ii) Extracted knowledge

START

1. Initiate *db* connection from user to e-government interface.

2. Use MD5 to secure the password

3. Validate the user ID and password of users.

4. Binarized the incoming data→generate Key

5. Encode the data with key.

6. Apply Hash(key)→store(rand(server))

7. Estimate size (S) of indexed data

8. Size of data-remainder/cloud no.

9. Samples =Split_data (S_1) + S%Num_Storage_Server

10. Estimate minimum Support (S_P), confidence (C), Final Sample (S_F)

11. While (|S_P|>n) && (|S_F|<n) do

12. G(S_P, S_F)→disjoint(min(k, |S_P-S_F|)

13. If d(S_F+{t}, S_P)>d_{max} do

14. d_{max}=d(S_F+{t}, S_P), α=t

15. If d(S_P-{t},S_P)<d_{min} do

16. d_{min}=d(S_P-{t}, S_P), β=t

17. S_F=S_F+(α), S_P=S_P-β

END

Hence, the algorithm can encode any forms of data of user with less complexity of the management of key or index attributes. The decryption stage of the algorithm is just inverse of the encoding stage. Hence, it can be said that ODM resists even the supervisor, webmasters, root or any illegitimate member to the generated data samples (Line-9). After extracting the samples, the system estimates the minimum support (S_P), confidence (C), as well as quantity of the final samples (S_F) to generate the global rule for mining (Line-10). Considering if the initial samples bearing S_P are found more than total chunks of bitstreams and final samples are within the limit of size of bitstreams (where n represents total number of distributed storage) (Line-11), the system divides both the minimum support (S_P) and final sample (S_F) into number of disjoint group G (Line-12). Based on the two conditions in Line-13 and Line-15, ODM estimates the minimum and maximum distance (d_{min} and d_{max}). The estimation of distance d is done by subtracting support of final sample (S_F) to minimum support in initial level (S_P). Along with this, the system also monitors the values of transaction t (α for d_{max} and β for d_{min}) being done in each condition (Line-14 and Line-16). Therefore, ODM offers a cost-efficient datamining with lightweight indexing technique that can perform extraction of knowledge from distributed database and also furnishes a faster accessibility of data without any significant impact on the networking performance of distributed database.

RESULT ANALYSIS

The outcome of the proposed system ODM has been evaluated for its effectiveness with respect to transmission rate, encoding time, decoding time, and delay. All the outcomes were observed for test-data size of 1-10 GB. For better effectiveness of the study, the outcomes were also observed for existing studies of Mujawar [26] and Milic [27] who have also performed the similar type of research work most recently considering their own technique. Similar environments were selected for performing the data analysis.
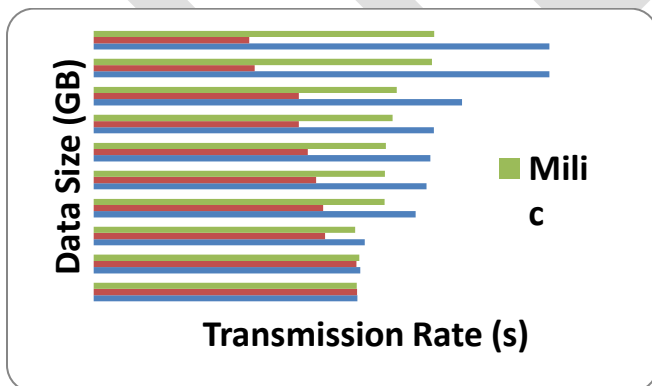
Figure 4 Analysis of Transmission Rate

The transmission rate were observed for test-data size of 1-10GB using network protocol analyzer called as WireShark. The outcome of Fig.4 shows that the proposed system is capable of sustaining the increasing load of the data request of the user. The curve for Mujawar [26] is found with lower peaks as it performs recursive fuzzy processing on every data request, whereas Milic [27] curve is

found with minimal peaks as compared to Mujawar [26] owing to less complicated structure using association rule mining. The proposed system adopts the process of ripping the data where the number of generated keys are highly dependent on the ripped data. Hence, the rate of transmission for proposed system can process higher datasets in shortest ranges of time.
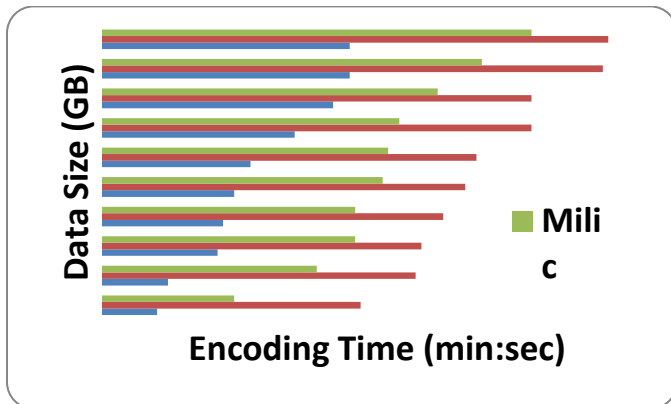
Figure 5 Analysis of Encoding Time

Fig.5 highlights the analysis of encoding time with respect to the increasing data size. It is quite obvious that after performing encoding, the size of the encoded data do increase in size to some extent which also affects an encoding time. The outcome shows that the encoding time for conventional scheme e.g. Mujawar [26] and Milic [27] is quite higher compared to proposed ODM scheme. One more thing to note that the proposed system performs the datamining on the random samples considering conventional support and confidence level of the data. The adoption of this process also makes the process to operate faster not only for the storage of the date but also for the knowledge discovery process. The entire complexity of the heterogenity of the massive data is also significantly minimized owing to the typical indexing policies incorporated by File Management Server and Data Ripping process
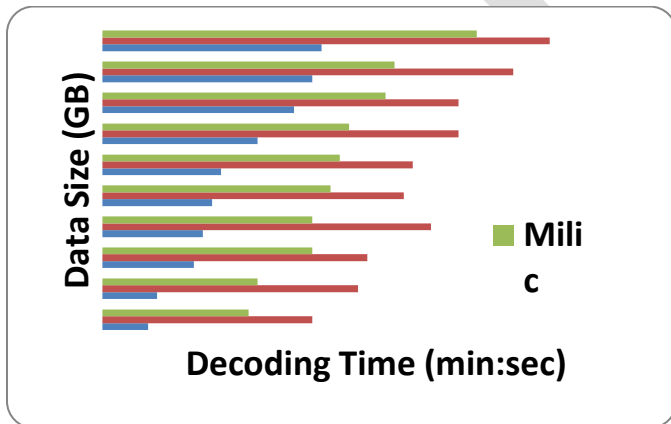
Figure 6 Analysis of Decoding Time

Fig.6 highlights the decoding time of the ODM system along with the conventional system of Mujawar [26] and Milic [27]. Decoding time is required to be analyzed for measuring the effectiveness of accessing the knowledge from the encoded file from the distributed storage system. It is also required to understand the success rate in accessibility of the uploaded file from the storage servers. A closer look into the curve will shows that decoding time is approximately minimized compared to the encoding time for almost all the techniques. However, proposed ODM scheme is witnessed with reduced decoding time, which is also in aggrement with the transmission rate that is increasing order.
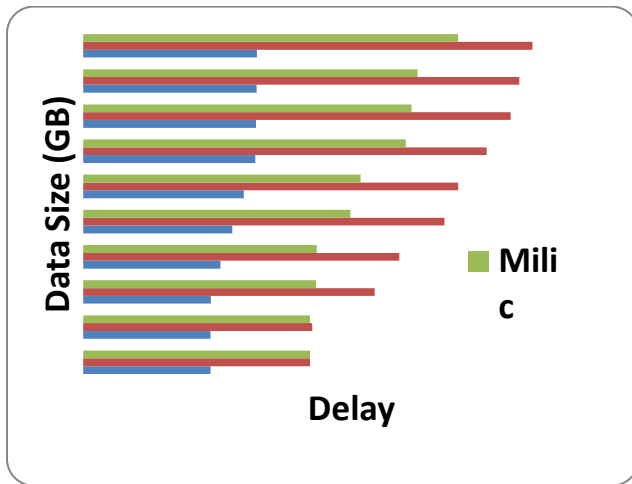
Figure 7 Analysis of Delay

Fig.7 shows the outcome of analyzed data propagation delay in case of large number of data rips on multiple storage systems. It could be expected that more the ripping process of user's data takes place on multiple storage system; more delay could be expected in the peak hours of operation over distributed storage environment. However, the outcome shows that Mujawar [26] as well as Milic [27] approaches are found with increasing trend of delay curve, which is due to increasing steps of fuzzy processing and iterative pattern analysis of data during the request or response of the user. However, the proposed ODM scheme performs lightweight indexing mechanism for which reason the decoding time is found to be quite lower as compared to encoding time. Moreover, the adoption of File Management Servers and Supervisor module assists in proper indexing mechanism of the massive chunks of data along with evaluation of the availability of the server. Therefore, although the proposed system exhibit increasing delay with increasing data size, but still it outperforms the conventional techniques of datamining found most recently in context of e-governance framework.

CONCLUSION

This paper has discussed about the problems that are associated with the existing data that are being generated from the e-government applications. Although, the adoption of e-government applications is poor in some countries, but still it can be expected that there will be a drastic change in this sector with the frequently launching new technologies. This paper has highlighted that it is not easy to perform datamining especially of the data are stored in distributed storage servers (like in cloud). As in such scenario, the data will be growing in volume as well as the data will be of different types. Hence, the existing datamining algorithm fails in extracting knowledge in this case. We show in this paper that heterogeneity problem in data can be minimized if a precise data indexing policy can be introduced. Hence, by adopting hash function, the size of the data doesn't only become less but also solves the problems of data discretization. Hence, our system can identify the data heterogeneity as well as it can store the data in its own file format. Our optimization technique is also highly cost effective as it is designed based on simple support and confidence level that can be found in association rule mining. But inspite of using association rule mining, our model shows better discovery of the rule set thereby solving the optimization problem in performing datamining over heterogeneous samples of data. By comparing the outcomes of the study with the most significant and recent work in similar area, we find that our model ensures highly reduced processing time and delay that is in compliance of the massive data processing or futuristic data analytics application on e-governance framework.

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CATEGORY MODEL OF LOGISTICS INFORMATION MANANGEMENT SYSTEM OF COMMERCIAL ENTERPRISE

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Abstract: In recently becoming more common logistics information management system (LIMS)such systems are created to coordinate the production and business activities, financial and economic support and information services units integrated set of interrelated organizational technological systems. The logistics informational management systems have the following subsystems:

Logistics store of raw materials and components production of finished products.
Thus, it becomes possible to increase productivity and minimize production costs due to operational processing information on the status of individual elements of the object management.
In this paper the preliminary survey of the control object can be represented as an instance of the model formation (6), that is forming element object class subcategories L^S, L^P, and L^u , the transition from the general form morphisms (7) to their specific filing defined sequencing of morphisms by establishing the type of law of forming (8) and verification of the results obtained on a specific way of formation of commutative diagram (chart) (9) and verification of all the relevant condition of equality works of morphisms.

Keywords: logistics, computerization activities, morphisms, category, relationship, processing.

Introduction:

In recently becoming more common logistics information management system (LIMS)such systems are created to coordinate the production and business activities, financial and economic support and information services units integrated set of interrelated organizational technological systems[1]. The logistics informational management systems have the following subsystems:
Logistics store of raw materials and components production of finished products.
Thus, it becomes possible to increase productivity and minimize production costs due to operational processing information on the status of individual elements of the object management.
This approach allows for a fresh look at the problem of computerization activities such a large class of object management, as commercial enterprises. Allowing the majority of commercial facilities objects management can be regarded as a consistent implementation of logistics subsystems: procurement of goods, storage of goods, transportation and storage of good in temporary storage warehouse (for object management with distributed structure), processing of goods (production), the final distribution goods.

While the share of the processing of goods (production), which is the most complex in computerization, is subject to trade controls are fairly small. In most cases these process are considered together and implementation with storage process of goods [2, 3, 4].

At the same time there is a model establishment and operation of an information management system undirected and used in the design and operation of logistics information management systems. So the task of developing a set of models of the creation process and operation of such systems, invariant with respect to the subject areas of the management – object is important enough studies have shown[4,5,6,7]. Most preferred mathematical apparatus for a formalized description of the creation and operation of the system invariant with respect to the domain a management objects is a

$$M^C = (B, AB, A, E, R, T, \mathrm{F}_{AB}^B, \mathrm{F}_E^{AB}, \mathrm{F}_R^{AB}, \mathrm{F}_T^{AB}, \mathrm{f}_E^A, \mathrm{f}_R^A, \mathrm{f}_T^A, \mathrm{f}_{AB}^A), \qquad (1)$$

Where B- number of subsystems information management systems;

AB – many typical tasks subsystem component from variety of B;

I.   Many tasks subsystem component from a variety of B;

E- set of software needed to meet the challenges of a variety of A, as follow:

$$E = <E_C, E_M, E_A, E_P, E_T>, \qquad (2)$$

E_C – information support, necessary for solving problems of plurality of A;

E_M – mathematical support, necessary to solve the problem of plurality of A;

E_A – algorithmic support, which necessary to solve the problem of a plurality of A;

E_P – software which necessary to solve the plurality of A;

E_T – technical support which necessary to solve the problem of plurality A;

R – Many specialists, necessary to solve problem of plurality of A;

T – a lot of time required for solving the problem of plurality of A;

$F_{AB}^B, F_E^{AB}, F_R^{AB}, F_T^{AB}$ - Distribution of many of types of tasks, software, specialists and among the elements of time for many subsystem, types of tasks respectively, as injective mapping of the form:

$$F_{AB}^B : \begin{cases} B \to 2^{AB} \\ b \to AB_b \end{cases}, F_E^{AB} : \begin{cases} AB \to 2^E \\ ab \to E_{ab} \end{cases}, F_R^{AB} : \begin{cases} AB \to 2^R \\ ab \to R_{ab} \end{cases}, F_T^{AB} : \begin{cases} AB \to 2^T \\ ab \to T_{ab} \end{cases}, \qquad (3)$$

$2^{AB}, 2^E, 2^R, 2^T$ - The sets of all subsets of AB, E, R, T, such that

$$F_{AB}^B(b) = AB_b, F_E^{AB}(ab) = E_{ab}, F_R^{AB}(ab) = R_{ab}, F_T^{AB}(ab) = T_{ab}; \qquad (4)$$

$AB_b, E_{ab}, R_{ab}, T_{ab}$ - Many types of tasks included to the specific subsystems, provision of a specific type of task, specialists, required to address a particular type of task, required solving time for a specific type of task, respectively, such that

$$AB = \bigcup_{b \in B} AB_b, E = \bigcup_{ab \in AB} E_{ab}, R = \bigcup_{ab \in AB} R_{ab}, T = \bigcup_{ab \in AB} T_{ab}, \qquad (5)$$

$f_{AB}^A, f_E^A, f_R^A, f_T^A$ - Injective mapping, prescribers each task certain type of problems, support, specialist and the required time for decision accordingly.

The creation of information management system in accordance with the model (1) implies consistent implementation of model element (1) in accordance with steps standards of information technology. Like this pre-project survey corresponds to the implementation the element B, stages of formation of the complex system requirement (requirement specification) – implementation elements AB, A, E, R, T, and display $F_{AB}^B, F_E^{AB}, F_R^{AB}, F_T^{AB}$, stages engineering design implementation of the element E and display F_E^{AB}, detailed design stages a adjustment element E and implementation of maps $f_{AB}^A, f_E^A, f_R^A, f_T^A$.

Model (1) can be used when creating logistics management systems. For logistics systems becomes important to identify the presence of subsystems and their relationship, and the law that govern the system in the whole and separately subsystems at different levels of granularity. Given the above element B of model (1) in the construction of logistics information management system can be described category G_E (B), which consists of three subcategories

$$G_E(B) = \left(L^S, L^P, L^U, \Phi_{L^P}^{L^S}, \Phi_{L^U}^{L^P}\right) = [a, b, c, \varphi_b^a, \varphi_c^b], [d, e, g, \varphi_e^d, \varphi_d^e], [r, s, t, \varphi_s^r, \varphi_t^s], \phi_{L^P}^{L^S}, \phi_{L^u}^{L^P}] \quad (6)$$

Where L^S- subcategory describes a subsystem for purchasing goods;

L^P- subcategory describes a subsystem of storage and handling of goods;

L^u- subcategory describes a subsystem of consumption sale goods;

a, b, c – objects subcategory L^S, is structured sets and describe respectively many of bill of goods to provide all required object management trading services, many of product line to specify certain types of commercial services and a variety of product line to provide specific trade services;

φ_b^a, φ_c^b – Morphs, describes the relationship of object subcategory L^S, injective maps f_b^a, f_c^b, for which fair conditions, similar (4) and (5)

$$F_b^a : \begin{cases} a \to 2^b \\ a_j \to b_a \end{cases}, F_c^b : \begin{cases} b \to 2^c \\ b_j \to C_b \end{cases}, F_R^{AB} \qquad (7)$$

j- Indicator identifying the corresponding element structured set;

d,e,g – objects subcategory L^P, are structured sets, and describes a number of process, respectively storage and handle all the product line, many processes of storing and processing of certain types of product line and many process of storage and processing of a particular product line.

φ_e^d, φ_g^e – Morphisms, describes the relationship of object subcategory L^P, the provision of which is generally similar to the representation (7);

r, s, t – objects subcategory L^u, is a structured sets and describe respectively a lot of consumers of all products line, certain set of consumer products line and many consumers specific product lines;

φ_s^r, φ_t^s – Morphisms, describes the relationship of object subcategory L^u, the provision of which is generally similar to the representation (7);

$\phi_{L^P}^{L^S}, \phi_{L^u}^{L^P}$ - Functors, describe the relationship of subcategory L^u.

Changes the contents of objects of $G_E(B)$ can be represented by sequence Morphisms $\varphi_a, \varphi_b \varphi_c \varphi_d \varphi_e \varphi_g \varphi_r \varphi_s \varphi_t$ display the item object class subcategories L^s, L^P, and L^u.

Similar elements related subcategory and the structure element of the class of the objects, generally remains unchanged, but affected only possible content of these elements sequence data morphisms designed to describe the operation of the law of the logistics information system, which generally represents a nonlinear stochastic programming[1].

$$S^* = \arg extr E\left\{ \sum_{j=1}^k \lambda_j \left[Q_j(S) - Q_j^* \right] / Q_j^* \right\}, \qquad (8)$$

Where S^*- the desired state of the logistics system.

S_D – the range of the permissible states of the system (feasible region), satisfying the material balance equation conversion sequence information, stage of development of quasioptimal plans and management decision; S- the current state of the logistic system.

Q_i – the current value of the i criterion of efficiency, used for evaluating the received transition from the current state to the desired;

Q_i^* - Desired efficiency criterion;

λ_i - weight performance criteria in which $\sum_i^K \lambda_i = 1$;

E{.}- Expectation operator communication is read defined morphism subcategories and morphism $\varphi_a, \varphi_b \varphi_c \varphi_d \varphi_e \varphi_g \varphi_r \varphi_s \varphi_t$, submitted commutative diagram

$$\begin{array}{ccc} A_1 & \xrightarrow{\varphi A_1} & A_1' \\ f_{A_2}^{A_1} \downarrow & & \downarrow f_{A_2'}^{A_1'} \\ A_2 & \xrightarrow{\varphi A_2} & A_2' \end{array} , \qquad \begin{array}{ccc} A_2 & \xrightarrow{\varphi A2} & A_2' \\ f_{A_3}^{A_2} \downarrow & & \downarrow f_{A_3'}^{A_2'} \\ A_3 & \xrightarrow{\varphi A_3} & A_3' \end{array} ,$$

$$\begin{array}{ccc} B_1 & \xrightarrow{\varphi B_1} & B_1 \\ f_{B_2}^{B_1} \downarrow & & \downarrow f_{B_2'}^{B_1} \\ B_2 & \xrightarrow{\varphi B_2} & B_2 \end{array} , \qquad \begin{array}{ccc} B_2 & \xrightarrow{\varphi B2} & B_2' \\ f_{B_3}^{B_2} \downarrow & & \downarrow f_{B_3'}^{B_2} \\ B_3 & \xrightarrow{\varphi B_3} & B_3' \end{array} , \qquad (9)$$

$$\begin{array}{ccc} C_1 & \xrightarrow{\varphi C_1} & C_1 \\ f_{C_2}^{C_1} \downarrow & & \downarrow f_{C_2'}^{C_1} \\ C_2 & \xrightarrow{\varphi C_2} & C_2' \end{array} , \qquad \begin{array}{ccc} C_2 & \xrightarrow{\varphi C2} & C_2' \\ f_{C_3}^{C_2} \downarrow & & \downarrow f_{C_3'}^{C_2} \\ C_3 & \xrightarrow{\varphi C_3} & C_3' \end{array} ,$$
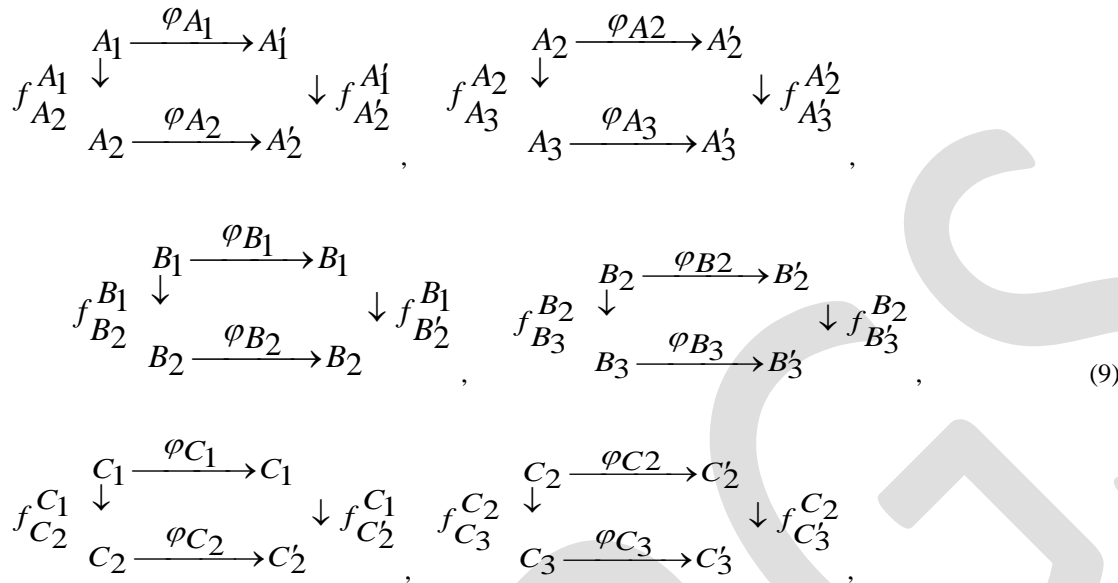
In this case shall be observed for the condition that the product of the corresponding two morphisms for example ($\varphi_A \cdot f_b^{a_1} = \varphi_{b_2}^{a_1} \cdot \varphi_{b_2}$, and so on).

Result:

In this way, stage of the preliminary survey of the control object can be represented as an instance of the model formation (6), that is forming element object class subcategories L^S, L^P, and L^u , the transition from the general form morphisms (7) to their specific filing defined sequencing of morphisms by establishing the type of law of forming (8) and verification of the results obtained on a specific way of formation of commutative diagram (chart) (9) and verification of all the relevant condition of equality works of morphisms.

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A Study on the Concept of Reutilization of Litter in Broiler Poultry Farms

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 Abstract— Broilers are known to offer the cheapest source of protein among the non-vegetarian diet and it is widely accepted by everyone. The short incubation time, low risk and quick yield has made many animal agriculture farmers to adopt rearing broilers. The rapid growth in this sector makes it inevitable to address the environmental issues that arise due to it. The inefficient management of wastes from the poultry farms poses serious threat to our environment. Poultry litter is the major solid waste generated from a farm. There has been an increasing demand in obtaining the raw material for bedding as well. This paper is a collection of methodologies that could be adapted to re-use poultry litter.

Keywords— Poultry litter, coconut fibre, reutilization, chemical treatment, composting, windrowing, environmental pollution

INTRODUCTION

Chicken is the cheapest source of animal protein that is being widely accepted and consumed in our country. Poultry industry is the fastest growing sector of Indian agriculture and proves to be a lucrative enterprise for farmers. According to the Poultry and Poultry Products Annual 2016 report, from Global Agricultural Information Network, India's chicken meat consumption for the year 2017 is projected as 4.49 million metric tonnes which is 7% higher than the year of 2016.

As the industry continues to expand and increase in concentration, the need to address environmental issues is more critical. Though the need for chicken is inevitable, livestock production in India poses a grave environmental concern in terms of carbon emissions, land and water usage and pollution. It is high time that we ensure that the infrastructure, rearing processes and waste disposal techniques in poultry farms are economical and environmentally sustainable.

POULTRY INDUSTRY IN INDIA

The global market for poultry meat has been rapidly growing as it is more versatile, cheaper and has more health benefits than red meat. [4] Historically, attributes such as high protein and energy, rapid turnover rate and short incubation rate proved to be advantageous than other livestock animals and paved way for the growth of poultry sector. [3]

Poultry Industry in India, is the largest livestock group contributing to about 30% of animal protein [8]. It is one among the fastest growing sectors in India with about 8% growth rate per annum. [11] Indian poultry industry is concentrated to certain specific areas of the country such as Andhra Pradesh, Telangana, Tamilnadu, Maharashtra, Punjab and West Bengal.

The 5000 year old industry offers one of the cheapest sources of protein, providing nutritional security to the poor and also employment opportunities to large mass of people. [7] Farmers have started to depend mostly on poultry farm for their livelihoods, thereby, playing a major role in alleviation of poverty in India. [10]

A study conducted on the growth of poultry industry in the year of 2020 estimates that the consumption of total poultry meat to increase from 687 million kilograms to 1674 million kilograms. [13]

ENVIRONMENTAL IMPACT OF POULTRY SECTOR

The environmental impact of this sector has grabbed an ever growing attention. Animal production aims to produce animal proteins in a sustainable manner. Sustainability is a complex phenomenon, which includes integration of economic, social, and environmental dimensions of the certain production, within a given socio-economic context. The increased consciousness of environmental pollution of livestock rearing poses a challenge to animal and agricultural scientists to expand and improve the waste disposal systems or to recycle the waste nutrients wherever possible.

Poultry provides affordable dietary item for consumers and profit for producers. Its sustainability in terms of environment is

questionable Research shows that broiler meat production stage poses a great burden on the environment in comparison with the entire life cycle of a chicken [15].

Poultry sector has rapidly grown and made several changes to meet the demands. The intensification and concentration of the operations has laid huge impact on our environment. Poultry production seems to be an environmentally friendly process. However, it still contributes to eutrophication, acidification and global warming. Manure management in farms contributes to about $40 - 60\%$ of eutrophication and acidification potential [5]. Poultry production is associated with a variety of pollutants, such as oxygen-demanding substances, ammonia, solids, nutrients (specifically nitrogen and phosphorus), pathogens, trace elements, antibiotic residues, pesticides, odour and other airborne emissions. Accumulation of nutrients and trace elements from animal manure can become toxic to plants. Other indirect impacts are ecosystem destruction and biodiversity erosion associated with the expansion of feed crop production into natural habitats and the overexploitation of non-renewable resources for feed production [9].

The massive amount of nitrogen, phosphorous, and potassium generated by poultry litter has a serious detrimental impact on the environment. Inefficient management of wastes can cause these chemicals to be washed away by surface runoff. High concentration of these chemicals in lakes and ponds can cause excessive algal growth causing taste, odor, and aesthetic problems and decreasing the value for water supply and recreation.

Gaseous pollutants of poultry farms originate from the breakdown of fecal matter present in the litter. Their concentrations depend on the rate of ventilation, ventilation efficiency, the stocking density and movements of the animals. The most common air pollutants are ammonia, nitrous oxide, methane, and carbondioxide. Modification of housing and manure handling is the primary action for reducing such emissions.

The antibiotics are extensively used in animal farming. The waste residues from farms will contain antibiotic resistant genes that can contaminate our environment as well.

The most prominent need of area of research are: Identification and calculation of various generic environmental indicators that are used in meat chain and a research on the existing environmental practices regarding consumption of water and energy, waste water quality and amount of waste generated.

Overall the major environmental issues of poultry meat industry can be narrowed down into:
- air quality concerns due to emission of greenhouse gases, particulate and volatile compounds including volatile organic compounds (VOC) and ammonia;
- aesthetic concerns regarding emissions of odour, pathogens, endotoxins, noise, light and pests;
- soil and water quality concerns as nutrient moves from production facilities and storage areas and heavy metal, pathogen and anti-microbial contamination from application of poultry litter to soil.

BEDDING MATERIAL IN POULTRY FARMS

Organic materials such as corn cobs, corn stalks, straw, peat moss, peanut hulls, wood shavings, oat hulls, pine shavings are known to be used as bedding for rearing broilers.

The quality of bedding material is of great concern in broiler production as it affects performance, health, carcass quality, and the welfare of broilers. Bedding materials can influence the prevalence and severity of footpad dermatitis in broilers. This effect is associated with the ability of bedding to protect footpads from continuous contact with moisture, thereby minimizing footpad softening and susceptibility to irritation and inflammation.

A good bedding material can be identified with the following factors:
- It should be highly absorbent acting like a blotting paper providing dry comfortable space for broilers and also absorbing all the moisture;
- The drying time should be reasonable;
- Easily available;
- Cost-effective
- Non-toxic to poultry as the birds consume up to 4% of litter in their diet.
- Litter material should be free from dust, with no more than 15% of it consisting of particles smaller than 2 mm.
- Insulates chicks from the cooling effects of the ground and provides a protective cushion between the birds and the floor.
- Litter should not contain oversized particles as this may let the litter to form cakes within the first two weeks.

An alternative, economical and efficient source of bedding material with favorable, environmentally-friendly characteristics that allows recycling or reducing waste is of prior concern for broiler producers.

POULTRY LITTER

Litter is defined as the combination of bedding material, excreta, feathers, wasted feed and wasted water formed as a result of intensive poultry production. Litter quality determines the quality of the in-house environment.

The two factors that influence litter conditions most are manure and moisture. Excess moisture in the litter increases the incidence of breast blisters, skin burns, scabby areas, bruising, condemnations and downgrades in the birds and also acts as an active medium for proliferation of pathogenic bacteria and molds. Dry and dusty litter can lead to problems such as dehydration of new chicks, respiratory disease and increased condemnations. [2]

Considering that each bird produces an average of 1.8 kg of waste during its lifetime, approximately 10 Mg yr^{-1} of poultry litter is generated.

COMPOSITION OF POULTRY LITTER

Understanding the microbial community and composition of animal wastes such as poultry litter is essential to manage animal disease and limit the impact of animal waste on the environment and human and animal health. (Jingrang Lu et al., 2003)

Litter waste predominantly consists of water, carbon (C), nitrogen (N) and phosphorus (P), and lower levels of chlorine (Cl), calcium (Ca), magnesium (Mg), sodium (Na), manganese (Mn), iron (Fe), copper (Cu), zinc (Zn), and arsenic (As). These levels vary among broiler houses and regions, based on the bedding material used, number of flocks reared, drinking systems, hygiene status, cleaning method, and storage principles [14]

The litter also contains pesticide residues, pharmaceuticals such as coccidiostats, endocrine disruptors and microorganisms. As with other organic wastes, the moisture content, pH, soluble salt level, and elemental composition of poultry manure and litter have been shown to vary widely as a function of Poultry litter, types of poultry, diet and dietary supplements, litter type, and handling and storage operations. [11]

The composition of broiler litter within a poultry farm was found to vary spatially and seemed to be associated with its varying degree of decomposition.

Ammonia

The free ammonia will be in one of two forms: as the charged form of uncharged form of ammonium ion (NH4), or uncharged form of NH3 (ammonia) depending on the pH of the litter. The ammonia concentration increases with increase in litter pH. There is a substantial increase in the concentration when the pH is above 8. Ammonia levels above 25ppm can cause respiratory problem to birds and allow the attack of pathogens.

Moisture

A microaerophillic to anoxic microenvironment can be observed underneath the surface of wet litter especially near the drinker. On an average the Moisture content of dry litter samples should range from 10–25% and wet litter from 43–67%. (Michael D. Dumas et al, 2011) The water content of the poultry waste will depend on the hygroscopic capacity of the organic materials used in the beds, season of the year, and management of the birds in the barn, mainly related to the kind and position of drinkers and the ventilation system.

Carbon Content

The amount of C in poultry litters varies according to the material used for bedding, the number of flocks produced in the same bed, and the environmental conditions (temperature, moisture, ventilation, etc.), which affect the decomposition rate of the wastes in the barns. As the poultry grow, the amount of excreta over the bed increase and this promotes a decrease in the C/N ratio.

Phosphorous

Broiler diets contain Phosphorus to ensure rapid animal growth. Consequently, litter contains phosphorous in a variable amount generally ranging from 9.8 to 27.1g/kg, with the majority in a soluble form. [6]

Microbial Content

Poultry manure contains a large and diverse population of viruses, bacteria, fungi and protozoa. Their concentration can exceed 10^{10} cells/g of poultry litter. The litter may contain several zoonotic pathogens, such as *Escherichia coli, Salmonella spp., Campylobacter jejuni, Listeria monocytogenes, and Clostridium perfringens*. [11]

GENERAL USES OF POULTRY LITTER

Several opportunities for usage of poultry litter as an efficient way to manage wastes have been implemented. Poultry litter can be used as cattle feed, as a fuel source and as a fertilizer for plants.

Poultry litter is often used as an organic nutrient source in forage, cereal and fibre crop production. Excessive application can cause undesirable effects on forage crops and animals consuming the forage [11]. However, for environmentally and economically sound applications of poultry litter, it is crucial to know the decomposition rate of and nutrient release from the litter. [3]

Litter when effectively managed can be used as a fuel source for a gasification furnace. However, prolonged usage of the litter will lead to formation of slag thereby, reducing the efficiency of furnace.

The litter management approaches that could be adopted are single use litter and multiple use litter. The multiple use of litter can further be done as a complete reuse or partial reuse in the broiler farms. [15]

RE-UTILIZATION OF BROILER LITTER

Broiler litter reutilization refers to the usage of the same bedding material to cover the house floor for several batch of broiler flocks. [14]

Reuse of litter also has a nutritional advantage. In the bacterial action that takes place, there is a considerable synthesis of B-complex

vitamins, including vitamin B12. Except when the ration has an ample supply of these vitamins, the growth of chicks or the egg production of hens may be appreciably increased by keeping them on reused litter. Such responses may only be obtained with a definite determination that the litter is clean and has no disease organisms.

There are certain perceived inconveniences on re-using litter. They are:

- Increased risk of odor emissions.
- Increased dust emissions.
- Increased concentration of ammonia in shed, particularly during brooding.
- Increased pathogens of food safety significance.
- Increased risk of poultry disease transfer to subsequent batches. [15]

Litter can be composted through windrow composting in-house to reduce the bacterial and viral loads. In this methodology, temperatures of 130 F or greater are created to reduce bacterial numbers and kill or reduce most viral pathogens. A period of three to five day in-house composting program between flocks would be a useful way to reduce the microbial load and improve bird performance.

Downtime between each batch of flocks needs to be 10-14 days to allow growers to complete the composting and still have time to prepare for chick delivery.

Composting methodology too could be implemented via., different techniques. One such technique is piling the litter and composting in house. This technique was more effective in reducing the nitrogen content, humidity and pH in the litter. [14] The heat created during the composting process can kill the pathogens that may be present in the litter. [15]

Windrowing: In this method the litter is scraped into long rows within the poultry house and allowed to sit for five days maintaining a temperature of +54°C.This is said to reduce the pathogen load on the litter [2]. Heaping litter for the subsequent batch lead to the control of pathogen levels within the reused litter. The levels of Salmonella, E. coli and Campylobacter levels were shown to decrease through the process. Pathogen levels in reused litter that was heaped for 6 days were found to be below the detection limit, while being used for the next batch of chicks. The result shows that infectivity of most pathogens was reduced in litter treatments that generated higher temperatures. Hence, heaping may be more effective than windrowing and that turning of heaps did not improve the effectiveness of the treatment in inactivating disease agents. [15]

CHEMICAL TREATMENT OF LITTER

Sodium bisulphate: Sodium bisulphate is a non-hazardous and easily available chemical that could be used in litter treatment. The usage of this chemical is found to lower the pH of litter and ammonia levels. It eliminates ammonia by converting ammonium in the litter to ammonium sulfate. The beetle populations and bacterial populations of Salmonella and Camphylobacter were also lowered.

Addition of acidifiers to litter is found to convert ammonia to ammonium which is a relatively stable form and does not get converted to gaseous state easily. [1]

The extract of *Yucca schidigera*, a natural feed additive can be added to the diet of poultry to reduce the level of ammonia formation within the poultry house.

The ammonia concentration (should not exceed 25ppm) could be controlled by increasing the ventilation and the using litter additives such as urease inhibitors, clinoptilolite forms of zeolite, acidifying agents and microbes that have the ability to tie up nitrogen. [15]

Aluminium sulphate: Aluminium sulphate is another dry acid salt which could lower the litter pH and bind to phosphorous making it less reactive in the litter. Aluminium sulphate should be applied 3 - 4 days before placement in the house when the litter is wet, and 6 - 7 days before placement when the litter is dry. [1]

Feed Grade Salts: Feed grade salt can be applied to destroy organisms that may be present even after clean out and disinfection. The salt is highly corrosive hence; it should be lightly wet and made to dissolve before application. [1]

CONCLUSION

On reusing litter the solid waste generated from the poultry farms could be minimized. The pressure on obtaining raw materials for bedding will be reduced. Owing to the inefficiency in the waste disposal methods, the concept of reducing the waste from its point of generation by reusing it is alluring. This study would open a new gateway for poultry litter management in India thereby lowering the stress of waste disposal on our environment.

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Botnet Detection Based on Passive network traffic monitoring

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Abstract: Botnets have become one of the main threats to Network security. Botnets have been used to stage denial of service attacks, spam campaigns, stealing user passwords and other malicious activities. Detecting botnets has become an important priority for network security. The proposed paper is going to focus on three techniques namely Signature based detection, Firewall IP Blocking and Anomaly based detection to detect bot and give the comparison of these techniques and also try to give better efficient result.

Keywords- signature based detection, firewall IP blocking , Anomaly based detection

I.   Introduction

Nowadays, the most serious manifestation of advanced malware is Botnet. to create distinction between Botnet and different kinds of malware, we've to comprehend the thought of Botnet. For a better understanding of Botnet, we've to understand 2 terms initial, bot and BotMaster and then we can properly define Botnet. bot - bot is actually short for robot that is also known as as Zombie. it's a new form of malware [1] installed into a compromised computer which can be controlled remotely by BotMaster for executing some orders through the received commands. after the bot code has been installed into the compromised computers, the computer becomes a bot or Zombie [2]. Contrary to existing malware like virus and worm which their main activities focus on attacking the infecting host, bots can receive commands from BotMaster and are used in distributed attack platform.

BotMaster - BotMaster is also referred to as BotHerder, is a person or a group of person that control remote Bots. Botnets- Botnets are networks consisting of large number of Bots. Botnets are created by the BotMaster to setup a private communication infrastructure which might be used for malicious activities like Distributed Denial-of-Service (DDoS), sending large amount of SP AM or phishing mails, and alternative nefarious purpose [3] [4] [5]
[6].

The main difference between Botnet and other kind of malwares is that the existence of Command-and-Control (C&C) infrastructure. The C&C allows Bots to receive commands and malicious capabilities, as devoted by BotMaster. the first generation of Botnets utilized the IRC (Internet Relay Chat) channels as their Common-and-Control (C&C) centers. The centralized C&C mechanism of such Botnet has made them vulnerable to being detected and disabled. Therefore, new generation of Botnet which might hide their C&C communication have emerged, Peer-to-Peer (P2P) based Botnets. The P2P Botnets don't suffer from a single point of failure, because they do not have centralized C&C servers [6][7]. Recently researches have proposed some approaches and techniques [8][9] [10] [11] [12] [13] for detecting Botnets. Majority of these approaches are developed for detecting IRC or HTTP based Botnets [8][9] [13].

II.   Problem Definition

The botnet has become a most threatening phenomenon and shown its harmful effect on network communities over the last decade. Researchers, law-enforcement authorities, businesses, and individuals have started to discover methods to combat this malicious threat. Botnet detection is currently an ongoing challenge for researchers and organizations. Botnets are considered moving targets, which means all the aspects of botnets including detection, mitigation, and response are changing over time; therefore, no mitigation or detection technique offers a permanent solution. Similarly, different types of stakeholders, for instance, enterprises, governments, networks, and Internet service providers (ISPs), have different ways and goals to address the issue of botnets. Moreover, with the

advent of new technologies and increase in the knowledge base, the expertise of bot masters is improving in evading botnet detection techniques and trying to rally sophistication for the command and control (C&C) architecture. [14]

The objective of Botnet Detection is to provide security against bot. In both centralized and distributed botnets, bots are coordinated through the C&C channel which is control by BotMaster. The BotMaster sends the pre-programmed command to the Target Machine, and then Target (victim) Machine starts sending its periodic information to the BotMaster via Command and Control (C&C) infrastructure. To make the botnet detection more difficult BotMaster started use of low latency anonymous communication to hide botnet with a C&C server. Currently active Bots are hiding their identity. So it is necessary to detect and deactivate Botnet to provide secure network service to the internet users.

In this project, we focus on three techniques to detect bots: Signature Based Detection, Firewall IP Blocking and Anomaly based detection in order to provide secure network services to the users. This project is based on client server architecture. Initially in the first technique named signature based detection we are checking that whether the internal bot is infecting our system or not. For that purpose, signature of some known bots calculated from the content of bot file and that signatures are store in the database. When the technique scans for detecting bot, it computes the signatures of file that present in the system according to contents of the file and compare that signature with the signature present in the database. If signature of calculated file is match with the database present, then it declares that file as an infected file and delete that particular file. The way to create signature for bot is to use hash algorithm (md5).

There are some blacklisted sites which may damage our system. The organization named IANA (Internet Assign Number Authority) has considered some of the sites as blacklist. For that purpose, in the second technique named firewall IP blocking, a HTTP request coming through firewall is a bot then we are blocking that IP.

In the third technique we are checking whether the network traffic is high and if so we analyze the source and if the source is invalid we are blocking it. In this we are applying port scan attack ie the IP will be scanned and log reports will be generated.

III.   Proposed System Architecture

Following fig(1) shows the proposed system architecture for an efficient technique to detect botnet.
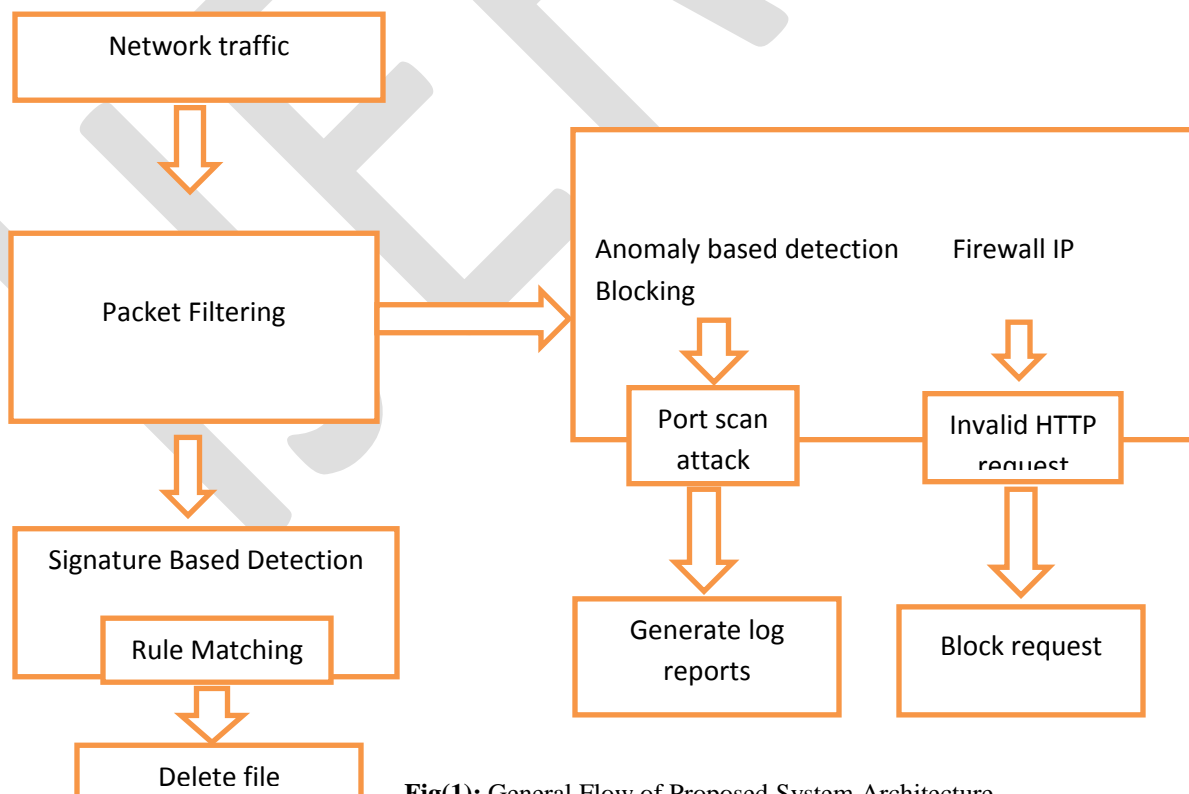
Fig(1): General Flow of Proposed System Architecture

In the proposed system architecture, we have implemented three techniques to detect bot. Signature based detection is very simple and is used to detect known bots. Signature based detection is implemented using MD5 algorithm as compared to SHA algorithm. In this technique signature of some known bots calculated from the content of bots file and that signatures are store in the database. When our script scans the system, it computes the signatures of file that present in the system according to contents of the file and compare that signature with the signature present in the database. If signature of calculated file is match with the database present, then our script declares that file as an infected file and delete that particular file. The simple way to create signature for bot is to use hash algorithm (md5, sha). Mainly setup includes Virtual Network Environment Using MS Virtual PC and installed Windows 7.

In our experiments we have used md5 hash algorithm as compared to sha_1. Table 1 shows the comparison between MD5 and SHA.

Keys For Comparison	MD5	SHA
Speed	Faster	Slower
Iterations required	Only 64	80 iterations
Successful attacks so far	Attack reported to some extent	No such attack reported yet
Security	Less	High
Length	128 bits	160 bits

Table 1: Comparison between MD5 and SHA
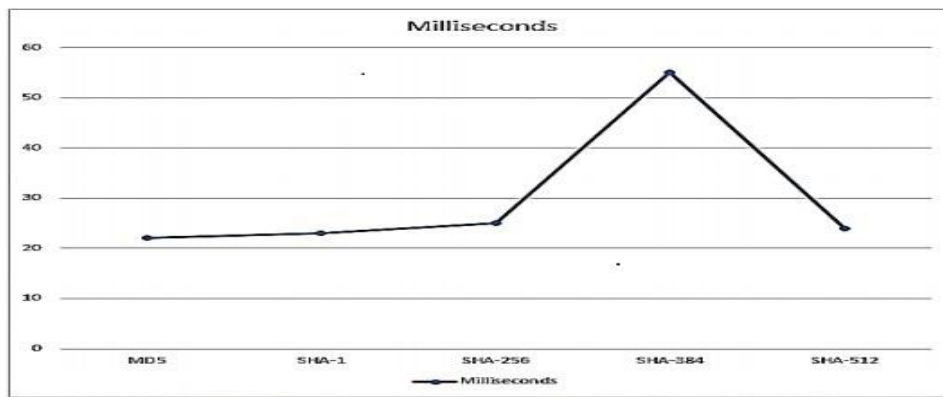
Fig(2): Performance chart of hashing algorithms [15]

The next technique to detect bot is blocking IPs through firewall. Network firewalls are devices or systems that control the flow of traffic between networks employing different security postures. The network traffic flow is controlled according to a firewall policy. Basically in this technique firewall acts as a doorkeeper which does not allows the access to blacklisted IPs. Client observes the traffic coming through firewall and if the firewall gets to know that if the incoming request is blacklisted IP then that IP is blocked.
In the third technique we are observing whether the ports are performing some malicious activities or not that is the port is attacked by botnet and an alert message and log reports are generated. Nmap (Network Mapper) well known tool is used for port scanning.

IV.   Hardware and software details used for impelementation of proposed system

Python is an interpreted high level programming language for general purpose programming.
Python has a design philosophy that emphasizes code readability and a syntax that allows
programmers to express concepts in fewer lines of code notably using significant whitespace.
It provides constructs that enable clear programming on both small and large scales.

1. Python 3.5 (64 bit)
2. Windows 7 (VMWARE) operating system
3. Intel Core i5 processor
4. 64 Bit system bus
5. 8 GB RAM

V.   Result Analysis

In this section I would like to discuss result of proposed system. We have defined three techniques namely signature based detection, firewall IP blocking and anomaly based detection to detect bot. Result of it as follows.
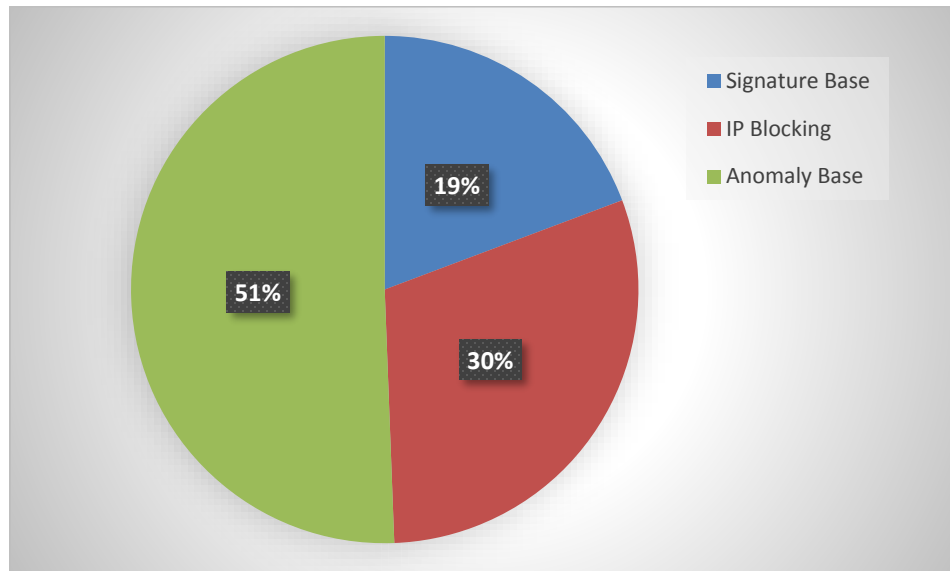
Fig(3) : comparison of proposed system with existing system

Fig(3) shows the results of our research work. According to our research our existing technique signature based detection gives 19% efficiency whereas our other technique named firewall IP blocking gives 30% more efficiency compared to existing technique and anomaly based detection gives 51% more. Hence we can say that our research work gives better efficiency and provides secure network service to users.

VI.   Conclusion

Botnet detection is a relatively new and a very challenging research area. In this paper we presented three techniques to detect bot. The efficiency of these techniques gives much better results compared to existing techniques. But if we connect two or more number of systems then the speed of our project will decrease. So in the future purpose concept of multithreading should be used to resolve this problem.

VII.   Acknowledgments

 I owe a deep gratitude towards my honourable guide, Dr J. W. Bakal. He rendered his valuable guidance with a touch of inspiration and motivation. I would like to thank Prof.K. Jayamalini, my co-guide who extended every facility and helped me for completing this paper. I would also like to thank my principal, Dr. S. Ram Reddy for his moral support.

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Machining of Aluminium Metal Matrix Composites

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Abstract— Metal Matrix Composites (MMC) have become a large leading material in composite field and particle reinforced aluminium MMCs have received considerable attention due to their excellent engineering properties. These materials are known as the difficult-to-machine materials, because of the hardness and abrasive nature of reinforcement element like alumina, silicon carbide particles. One of the most common problems encountered in drilling is that the continuous chips curl up on the body of the tool, which might damage the drilled hole. In process we are taking 6061 grade of Aluminium and adding some of the reinforcement materials like Graphite (Gr) and Alumina (Al2O3) to improve the properties of Aluminium. Here we are adding the Graphite (Gr) and Alumina (Al2O3) to Aluminium 6061 in different percentages .Graphite (Gr) is added for the purpose of smoothness, so that we can get a smooth surface finish and machining is made easier. Alumina (Al2O3) is added to improve the strength of the aluminium. The sample pieces are going to run some of the tests to find the hardness, impact strength. By using of some tests we can gather the information about the changes in property of the aluminium metal matrix composites.

Keywords— Metal Matrix Composites (MMC), Reinforced aluminium, Silicon carbide particles, Alumina (Al2O3), Graphite (Gr), Aluminium 6061.

INTRODUCTION

Composite materials are made from two or more constituent materials with significantly different physical or chemical properties, that when combined, produce a material with characteristics different from the individual components. The individual components remain separate and distinct within the finished structure. The new material may be preferred for many reasons com mon examples include materials which are stronger, lighter or less expensive when compared to traditional materials. Composites are made up of individual materials referred to as constituent materials. There are two main categories of constituent materials: matrix and reinforcement. At least one portion of each type is required. The matrix material surrounds and supports the reinforcement materials by maintaining their relative positions. The reinforcements impart their special mechanical and physical properties to enhance the matrix properties.

Many commercially produced composites use a polymer matrix material often called a resin solution. There are many different polymers available depending upon the starting raw ingredients. There are several broad categories, each with numer ous variations (Surappa, 2003). The most common are known as polyester, vinyl ester, epoxy, phenolic, polyimide, polyamide, polypropylene, PEEK, and others. The reinforcement materials are often fibres but also commonly ground minerals. The various methods described below have been developed to reduce the resin content of the final product, or the fibre content is increased. As a rule of thumb, lay up results in a product containing 60% resin and 40% fibre, whereas vacuum infusion gives a final product with 40% resin and 60% fibre content. The strength of the product is greatly dependent on this ratio.

METAL MATRIX COMPOSITES

A metal matrix composite (MMCs) is composite material with at least two constituent parts, one being a metal. The other material may be a different metal or another material, such as a ceramic or organic compound. When at least three materials are present, it is called a hybrid composite MMCs are made by dispersing a reinforcing material into a metal matrix. The reinforcement surface can be coated to prevent a chemical reaction with the matrix. For example, carbon fibers are commonly used in aluminu m matrix to synthesize composites showing low density and high strength.

The matrix is the monolithic material into which the reinforcement is embedded, and is completely continuous. This means that there is a path through the matrix to any point in the material, unlike two materials sandwiched together. In structural applications, the matrix is usually a lighter metal such as aluminum, magnesium, or titanium, and provides a compliant support for the reinforcement (Rosso, 2006). In high temperature applications, cobalt and cobalt-nickel alloy matrices are common.

The reinforcement material is embedded into the matrix. The reinforcement does not always serve a purely structural task (reinforcing the compound), but is also used to change physical properties such as wear resistance, friction coefficient, or thermal conductivity. The reinforcement can be either continuous, or discontinuous. Discontinuous MMCs can be isotropic, and can be worked with standard metalworking techniques, such as extrusion, forging or rolling. In addition, they may be machined using conventional techniques, but commonly would need the use of polycrystalline diamond tooling (PCD) Continuous reinforcement uses monofilament wires or fibers such as carbon fiber or silicon carbide. Because the fibers are embedded into the matrix in a certain direction, the result is an anisotropic structure in which the alignment of the material affects its strength. One of the first MMCs used boron filament as reinforcement. Discontinuous reinforcement uses "whiskers", short fibers, or particles. The most common reinforcing materials in this category are alumina and silicon carbide.

ALUMINIUM MATRIX COMPOSITES (AMCs)

In AMCs one of the constituent is aluminium/aluminium alloy, which forms percolating network and is termed as matrix phase. The other constituent is embedded in this aluminium/aluminium alloy matrix and serves as reinforcement, which is usually non-metallic and commonly ceramic such as SiC and Al_2O_3. Properties of AMCs can be tailored by varying the nature of constituents and their volume fraction.

The major advantages of AMCs compared to unreinforced materials are as follows:

II.   Greater strength

III.   Improved stiffness

IV.   Reduced density(weigh)

PRIMARY PROCESSING OF AMCs

Primary processes for manufacturing of AMCs at industrial scale can be classified into two main groups.

[1] Solid state processes.
[2] Liquid state processes.

Solid State Processes

Powder blending and consolidation (PM processing)

Blending of Aluminium alloy powder with ceramic short fibre/whisker particle is versatile technique for the production of AMCs. Blending can be carried out dry or in liquid suspension. Blending is usually followed by cold compaction, canning, degassing and high temperature consolidation stage such as hot isostatic pressing (HIP) or extrusion. PM processed AMCs, contain oxide particles in the form of plate-like particles of few tens of nm thick and in volume fractions ranging from 0.05 to 0.5 depending on powder history and

processing conditions. These fine oxide particles tends to act as a dispersion-strengthening agent and often has strong influence on the matrix properties particularly during heat treatment.

Diffusion bonding

MFAMCs are mainly produced by the diffusion bonding (foil-fibre-foil) route or by the evaporation of relatively thick layers of aluminium on the surface of the fibre. 6061 Al-boron fibre composites have been produced by diffusion bonding via the foil-fibre-foil process. However, the process is more commonly used to produce Ti based fibre reinforced composites ,The process is cumbersome and obtaining high fibre volume fraction and homogeneous fibre distribution is difficult. The process is not suitable to produce complex shapes and components.

Liquid state processing

Stir casting

This involves incorporation of ceramic particulate into liquid aluminium melt and allowing the mixture to solidify. Here, the crucial thing is to create good wetting between the particulate reinforcement and the liquid aluminium alloy melt. The simple st and most commercially used technique is known as vortex technique or stir-casting technique. The vortex technique involves the introduction of pre-treated ceramic particles into the vortex of molten alloy created by the rotating impeller .Subsequently several aluminium companies further refined and modified the processes which are currently employed to manufactur e a variety of AMCs on commercial scale.

Microstructural in homogeneities can cause notably particle agglomeration and sedimentation in the melt and subsequently during solidification. In homogeneity in reinforcement distribution in these cast composites could also be a problem as a result of interaction between suspended ceramic particles and moving solid-liquid interface during solidification. Generally it is possible to incorporate upto 30% ceramic particles in the size range 5 to 100µm in a variety of molten aluminium alloys. The melt–ceramic particle slurry 11 may be transferred directly to a shaped mould prior to complete solidification or it may be allowed to sol idify in billet or rod shape so that it can be reheated to the slurry form for further processing by technique such as die casting, and investment casting .The process is not suitable for the incorporation of sub-micron size ceramic particles or whiskers. Another variant of stir casting process is compo-casting. Here, ceramic particles are incorporated into the alloy in the semi-solid state.

REASON FOR CHOOSING 6061

Condition	Tensile strength (PSI)	Shear strength (PSI)	Yield strength (PSI)	Elongation (%)	Brinell hardness
Al 6061	45000	30000	40000	17	95
Al 6063	27000	17000	21000	12	60

Comparison of Al 6061 and Al 6063

Reason for choosing Al 6061

Fig. 1.   Al 6061 is slightly (~30%) Stronger in tensile yield compared to Al 6063.
Fig. 2.   The Al 6061 would absorb more energy when subjected to a shock load.
Fig. 3.   It is more corrosion resistant than Al 6063.
Fig. 4.   This means that Al 6061 is superior in mechanical properties to Al 6063.

REINFORCEMENT SPECIFICATIONS

Since this hybrid metal matrix composites the number of reinforcements used here is more than one. One reinforcement improves the strength and another one to improve the ease of machinability of the composite material that is being manufactur ed. The two reinforcements are,

[1] Alumina (Al_2O_3)
[2] Graphite (Gr)

Reinforcement details

Reinforcement	Hardness (GPa)	Grain size (μm)	Density (g/cm^3)
Al_2O_3	77-93	20	3.9-4.1
Gr	7-11	75–80	2.09–2.23

MANUFACTURING METHODOLOGY

There is a variety of manufacturing processes available for discontinuous metal matrix composites; stir casting is generally accepted as a particularly promising route, currently practiced commercially. The simplest and most commercially used technique is known as vortex technique or stir-casting technique. The vortex technique involves the introduction of pre-treated ceramic particles into the vortex of molten alloy created by the rotating impeller. 6061 the alloy has an excellent combination of mechanical properties in the cast condition. This Aluminium alloy is maintained at a temperature of 700°c. Then reinforcements were added in the liquid me lt and the slurry was consciously stirred using a stirrer. The two blade Stirrer was designed in order to produce the adequate homogenous particle distribution throughout the matrix material. The Argon gas was supplied into the near the crucible during the stirring to avoid the formation of oxide layer on the surface of matrix melt. The Stirring speed 450 -475 rpm was maintained throughout work. The mixture is allowed to solidify in the steel die.

SPECIMEN PREPARATION

In this project we are using aluminium 6061 as the major component and we also add the reinforcement materials like alumina and graphite in the correct ratios as mentioned in the percentage ratio chart. Here the aluminium is cut into small pieces and they are dropped into the furnace and they are maintained at a temperature of 700°C with the help of control unit. Aluminium 6061 and the reinforcement materials are calculated on the basis of 700gms. The reinforcement materials Alumina and Graphite are added and they are stirred well up to 5mins in the in the furnace with help of the stirrer weight calculation of different composites with their percentage.

Weight calculation of different composites with their percentage

Specimen number	Al-6061 (Grams)	Alumina (Grams)	Graphite (Grams)	
S1	658 (94%)	42 (6%)	-	
S2	651 (93%)	42 (6%)	7 (1%)	
S3	644 (92%)	42 (6%)	14 (2%)	

ROCKWELL HARDNESS TEST

Rockwell hardness test is to check the hardness of the composite material, these tests are done to check the mechanical property of the composite material. In Rockwell hardness test for aluminium alloy scale B is used and ball indenter is used in the experiment. Diamond indenter is only used foe iron products.

Scale Used: B (For Aluminium alloys)

Type of indenter: 1/16 inch diameter ball indenter

IMPACT TEST – CHARPY

Impact test is done in the composite material to check the impact strength of the composite material, here charpy test is done to check the impact strength of the material. The specimen is to machine in the shape of 9mm thickness and 65mm of height, and a notch should be taken at the Centre of the specimen up to 5mm depth.

Formula used

Cross section area = L × (b – depth of notch)

To find impact strength = $\dfrac{300(\text{for Al}) - \text{scale value}}{\text{Cross section area}}$

RESULTS AND DISCUSSION

HARDNESS TEST RESULTS

Hardness test serves an important need in industry even though they do not measure a unique quality that can be termed hardness. The tests are empirical, based on experiments and observation, rather than the fundamental theory. Hardness is the one of essential property of a material that supports it to resist plastic deformation, penetration, indentation, and scratching.

Hardness values for specimen 1, 2, and 3

Specimen number	Values taken in specimen	Average value (Hardness value)
S1 (Al (94%), Al2O3 (6%))	49 , 52 , 54	52
S2 (Al (93%), Al2O3 (6%), Gr (1%))	48 , 50 , 52	50
S3 (Al (92%), Al2O3 (6%), Gr (2%))	46 , 49 , 50	48

**Comparison of Hardness Value**

IMPACT TEST RESULTS

Impact test is done in the composite material to check the impact strength of the composite material, here charpy test is done to check the impact strength of the material. The sample with 6% reinforcement of Alumina and 1% graphite is found as the optimal composite and the impact strength of this sample at cast condition, along with the unreinforced material is tabulated and compared below in table

SPECIMEN NUMBER	COMPOSITION (%)	IMPACT STRENGTH
SPECIMEN 1	(Al (94%), Al2O3 (6%))	76
SPECIMEN 2	(Al (93%), Al2O3 (6%), Gr (1%))	82

SPECIMEN 3	(Al (92%), Al2O3 (6%), Gr (2%))	46

Impact strength of Specimen 1, 2, 3

Comparison of Impact Strength
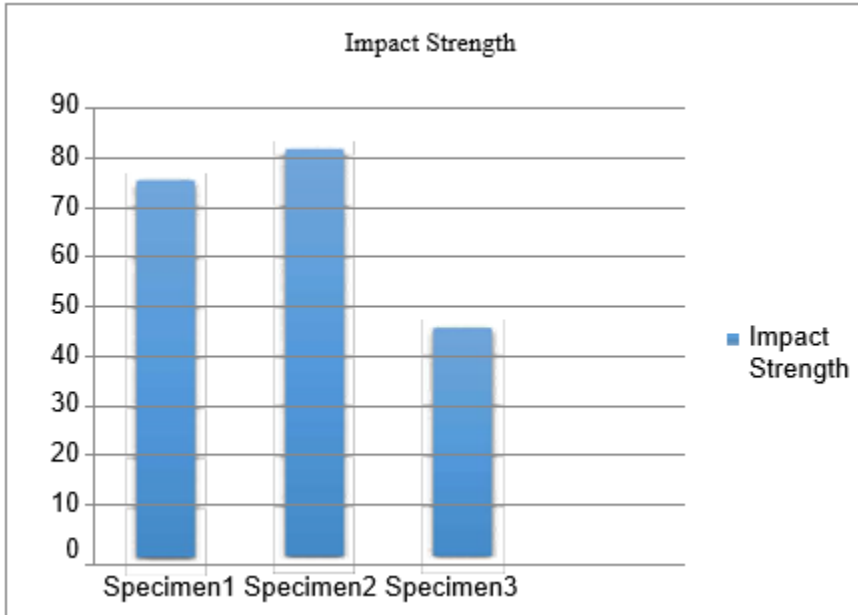
CONCLUSION

The following conclusions were drawn from the aluminium matrix composites after conducting the experiments and analysing the resulting data, they are as follows. When machining of Al_2O_3-Gr particulate reinforced with Al 6061 based MMC, HSS drill bits were used for present study and machining of MMC is carried out. Chips produced by HSS drills were in powdered form of alumina reinforced composite and in graphitic composite results in both continuous and partially broken form. Thus graphitic composite material possessed good machining properties due to the presence of graphite reinforcement in the Al-Al2O3 material.

From the impact test results, it can be seen that addition of graphite reinforcement up to 2% decreases the impact strength of the material, but addition of graphite up to 1% which increases the impact strength up to $6N/m^2$. And also addition of graphite above 1% reduces the impact strength. This shows that the presence of graphite up to 1% can increase the impact strength.

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DESIGN AND FABRICATION OF GYRO MONO RAIL

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Abstract— The gyro monorail, gyroscopic monorail, or gyro-stabilized monorail are terms for a single rail land vehicle that uses the gyroscopic action of a spinning wheel to overcome the inherent instability of balancing on top of a single rail. A monorail is a railway in which the track consists of a single rail, typically elevated. The dynamic stabilization of a mono rail or two wheeler automobile requires that a torque acting on a car from an outside be neutralized by a torque produce within the car by a gyroscope. The vehicle runs on a single conventional rail, so that without the balancing system it would topple over. a spinning wheel is mounted in a gimbals frame whose axis of rotation (the precession axis) is perpendicular to the spin axis. The assembly is mounted on the vehicle chassis such that, at equilibrium, the spin axis, precession axis and vehicle roll axis are mutually perpendicular. The Sweeney-Ferreira Gyro-Dynamics Monorail, like many other monorail concepts, never made it beyond the test track.

Keywords—Mono Rail,Gyro Mono Rail, Gyroscope Mono Rail, Single Track Rail.

INTRODUCTION

The purpose of this project is to establish the feasibility of implementing this schematic concept using available technology. If feasible the gyroscopically stabilized platform will be made at the most practical and economic size. The stable platform uses four interconnected gyroscopes that react to the tipping movement of an inherently unstable external body. In this system configuration, the gyroscopes act as actuators (commonly known as moment gyro's) and not as sensors, meaning they produce the torque that stabilizes the system. The proposed system has the gyroscopes arranged in such a way that it will stabilize an external body in the horizontal pitch and roll. Research has revealed that no such interconnected multi-gyroscopic system currently exists for stabilizing objects in both pitch and roll directions.

The single track gyroscopic vehicle problem is first considered in 1905 by Louis Brennan . Many extensions were later developed, including the work by Shilovskii and several prototypes were built . The differences in the various schemes lie in the number of gyroscopes employed, the direction of the spin axles relative to the rail, and in the method used to produce the acceleration of the spin axle. The online Museum of Retro Technology cites many articles and examples of gyro cars, including a 1961 Ford Gyrocar concept called the Gyros and a concept from Gyro Transport Systems of Northridge, California that was on the cover of the September, 1967 issue of "Science and Mechanics".

Other important application of gyroscopic stabilizers include to ships and ocean vehicles, as discussed in and robotics .Mathematical analysis of the two-wheeled vehicle gyroscopic stabilization problem first appears in and more recently in without derivation, or in where the derivation is by use of bond graphs. Our work is different in that we derive the equations of motion using Lagrangian mechanics, and in that we study several configurations, and propose linear controllers and stability analysis for the system based on the derived model. The control problem is to roll-stabilize an unstable cart. In the cart design, destabilizing forces are resisted by a gyroscope, which is driven by a motor. The gyroscope here is used as an actuator, not a sensor, by using precession forces generated by the gyroscope. When torque is applied to an axis normal to the spin axis, the gyroscope reacts by producing a reaction moment about a third axis, orthogonal to both the torque and spin axes.

The paper is organized as follows. In section II, we start by developing dynamic equations for a gyroscopically stabilized cart. We model the nonlinear dynamics of the cart and gyroscope using Lagrange's method. We study different configurations, including the single and double gyroscope cases. In section III, we develop a linearized model, and perform stability analysis of the closed-loop feedback system. The control problem is to roll-stabilize the cart. In section IV, we show simulation results. Finally, we discuss a scaled model that was built in section V.

Gyroscope Principles

Rigidity is the ability of a freely rotating mass to maintain its plane of spin when any external force is applied to it.

First Law of Gyroscopes

If a rotating wheel is so maintained as to be free to move about any axis passing through its centre of mass, its spin axis will remain fixed in space.

Second Law of Gyroscopes

When a torque acts on a spinning mass with an axis perpendicular to that of spin, then the latter will process about an axis perpendicular to both aforementioned axes, at an angular velocity.

WORKING PRINCIPLE

The vehicle runs on a single conventional rail, so that without the balancing system it would topple over. Basic principle of operation: rotation about the vertical axis causes movement about the horizontal axis. A spinning wheel is mounted in a gimbal frame whose axis of rotation (the precession axis) is perpendicular to the spin axis. The assembly is mounted on the vehicle chassis such that, at equilibrium, the spin axis, precession axis and vehicle roll axis are mutually perpendicular. Forcing the gimbal to rotate causes the wheel to process resulting in gyroscopic torques about the roll axis, so that the mechanism has the potential to right the vehicle when tilted from the vertical. The wheel shows a tendency to align its spin axis with the axis of rotation (the gimbal axis), and it is this action which rotates the entire vehicle about its roll axis.Ideally, the mechanism applying control torques to the gimbal ought to be passive (an arrangement of springs, dampers and levers), but the fundamental nature of the problem indicates that this would be impossible The equilibrium position is with the vehicle upright, so that any disturbance from this position reduces the height of the center of gravity, lowering the potential energy of the system. Whatever returns the vehicle to equilibrium must be capable of restoring this potential energy, and hence cannot consist of passive elements alone. The system must contain an active servo of some kind. If constant side forces were resisted by gyroscopic action alone, the gimbal would rotate quickly on to the stops, and the vehicle would topple. In fact, the mechanism causes the vehicle to lean into the disturbance, Resisting it with a component of weight, with the gyro near its unperfected position.

Inertial side forces, arising from cornering, cause the vehicle to lean into the corner. A single gyro introduces an asymmetry which will cause the vehicle to lean too far, or not far enough for the net force to remain in the plane of symmetry, so side forces will still be experienced on board.

In order to ensure that the vehicle banks correctly on corners, it is necessary to remove the gyroscopic torque arising from the vehicle rate of turn.

A free gyro keeps its orientation with respect to inertia space, and gyroscopic moments are generated by rotating it about an axis perpendicular to the spin axis. But the control system deflects the gyro with Respect to the chassis, and not with respect to the fixed stars. It follows that the pitch and yaw motion of the vehicle with respect to inertial space will introduce additional unwanted, gyroscopic torques. These give rise to Unsatisfactory equilibrium, but more seriously, cause a loss of static stability when turning in one direction, and an increase in static stability in the opposite direction. Encountered this problem with his road vehicle, which consequently could not make sharp left hand turns.

Brennan and Sheryl were aware of this problem, and implemented their balancing systems with pairs of counter rotating gyros, processing in opposite directions. With this arrangement, all motion of the vehicle with respect to inertial space causes equal and opposite torques on the two gyros, and are consequently cancelled out. With the double gyro system, the instability on bends is eliminated and the vehicle will bank to the correct angle, so that no net side force is experienced on board.

When cornering, the counter-rotating gyros avoid instability on corners .Shilovsky claimed to have difficulty ensuring stability with double-gyro systems, although the reason why this should be so is not clear. His solution was to vary the control loop parameters with turn rate, to maintain similar response in turns of either direction. Offset loads similarly cause the vehicle to lean until the center of gravity lies above the support point. Side winds cause the vehicle to tilt into them, to resist them with a component of weight. These contact forces are likely to cause more discomfort than cornering forces, because they will result in net side forces being experienced on board. The contact side forces result in a gimbal deflection bias in a Shilovsky loop. This may be used as an input to a slower loop to shift the center of gravity laterally, so that the vehicle remains upright in the presence of sustained non-inertial forces. This combination of gyro and lateral cg shift is the subject of a 1962 patent. A vehicle using a gyro/lateral payload shift was built by Ernest F. Swingy, Harry Ferreira and Louis E. Swingy in the USA in 1962. This system is called the Gyro-Dynamics monorail.

DESIGN OF GYRO MONO RAIL
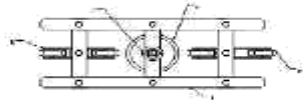
CONCLUSION

From the data collected as per the report and discussion made with the people about the project we got idea for development of made in the future and our project has a good scope in future. This is new development of made in our project gives as idea for future development. To reduce the energy to run the vehicle to reduce the Pollution, fuel consumption level demand to run vehicles of gyroscope make this project most successful in the future.

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