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Automatic Image Tagging Using Tensor and Gaussian Filter

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Abstract- As automatic image tagging is important in commercial and research, there is a wide gap in visual representation and text generated by image. There is need to assign better quality tag to an image and remove the need of manual tagging. Gaussian filter is used to improve the quality of low-level visual features of the image and to minimize the semantic gap. All images are converted into tensors to form a group of similar features. 3-level tucker decomposition is then processed on tensors to find the better matching of the context group. Tensor formation and context estimation is used in the proposed approach to minimize the semantic gap. Sometimes irrelevant tags are assigned to the image and sometimes tags are not retrieved so this problem had been reduced through three level tensor decomposition and Gaussian blurring filter. The proposed algorithm is tested on the corel-10K dataset.

Keywords--- Tensor, Gaussian, Decomposition, Corel-10K

I. INTRODUCTION

In the last two decades a large amount of research has been carried out in automatic images tagging. Generally, the focused research part in this area is content based image retrieval system. While the current research shows there is a large semantic gap between image semantics understandable by human and content based image retrieval [1]. Distance between features that are visual in the image and the tag generated for the image is known as semantic gap [2]. Therefore, a large amount of research has been performed to minimize the semantic gap between tag generated and visual representation of image. In this paper the context of an image based algorithm is used to mend this gap. The information provided in the context can only complete the gap between the textual description and content of the image [2]. Context estimation is an essential task to incorporate the information for a better image annotation process. The context generated from the image itself with the help of visual features present in the image.

In this paper Gaussian filter based feature-independent and unsupervised context estimation is proposed for better classification and results are compared with the classical feature-independent and unsupervised context estimation method. Gaussian filters are used in this paper to improve the quality of visual representation of images and to minimize semantic gap. All the context images are converted into tensors to form a group of similar features; image.3 level tucker decompositions are then processed on tensors to find the better matching of the context group. The proposed algorithm is tested on the corel-10K dataset. Precision, accuracy, and recall are calculated for results and analysis purposes. The paper is organized as follows. Section1 deals with introduction. Section 2 deals with the related work. Problem formulation is described in the Section 3, Section 4 and its subsection deals with the estimation of the context information. Mathematical model for context estimation comes in Section 5. Section 6 deals with results and discussion. Section 7 deals with conclusion and future scope. Section 8 contains the reference part.

II. RELATED WORK

Automatic generation of image annotations has been studied for many years with the increasing popularity of social media. Several social media based approach [3,4, 5] have and been developed and proved its role in traditional applications as well as for personal needs. There are many methods in the past that are being developed for tagging but major drawback is that they are not giving appropriate tag to an image i.e. lacking the semantic gap. Machine translation of relevance models has been adapted for automatic image annotation [6-9]. The joint probability of the images with visual representation and textual description is modelled. These models are used for building a classifier that is used for tagging upcoming images. The tag refinement approach is proposed by which are based on employing random walk on a pair-wise graph, where the mined relations between tags are represented by the edge of the graph [10]. The authors of the research paper [11] have proposed metric learning based weight factor assignment to the neighbour images.

Auxiliary information can also be used with images to produce image tag. Usually, these models work with the images having news datasets. All the images available in the dataset must accompany with some news articles. In order to reduce the semantic gap between textual description and visual representation, auxiliary information based context estimation is used. The context estimation of all images must be performed for better accuracy. The video analysis tensors splitting based technique have been found suitable to recognize goals such as motion detection and action recognition. Automatic image tagging can be built using DenseNet, an advanced deep learning model [13].

AICRL model consist of one encoder and decoder. Encoder is built with ResNet 50 and decoder is built with LSTM [14]. CNN-LSTM is also used to recognize and generating the tag of images [15]. Neural network approaches are best in determining the tag of images automatically [16, 17]. Bengali tags can also be generated to tag the images [18]. AlexNet and GoogLeNet are also built for images tagging [19].Automatic annotation can also be done through mask RCNN and object can be detected through AWS [20]. The tensor based approach is used to better combine the similar context groups and 3-level tucker decomposition is used to evaluate the better correlated matrix. The variance matrix is used to better predict the tag for the testing images.

III. PROBLEM FORMULATION

The objective of this paper is to incorporate proper textual tag information for the process of automatic image annotation. For better accuracy estimation of the context information is used to incorporate the exact textual tag. Corel-10K[12] dataset is used for the training and testing purposes. First training folder contains set of training images with textual description. Let there are A training images having AxR vocabulary sets having the textual description of the image. All the training images will be filtered and form a context group. The context group must be form in such a way that all the images in one group must have some relation with the images in another group. The automatic image annotation will be performed on the testing images having M samples. The testing images will be annotated on the basis of trained samples. Estimation of the context information and context group formation are defined as in [2]. The flowchart of the proposed approach is as in fig1.

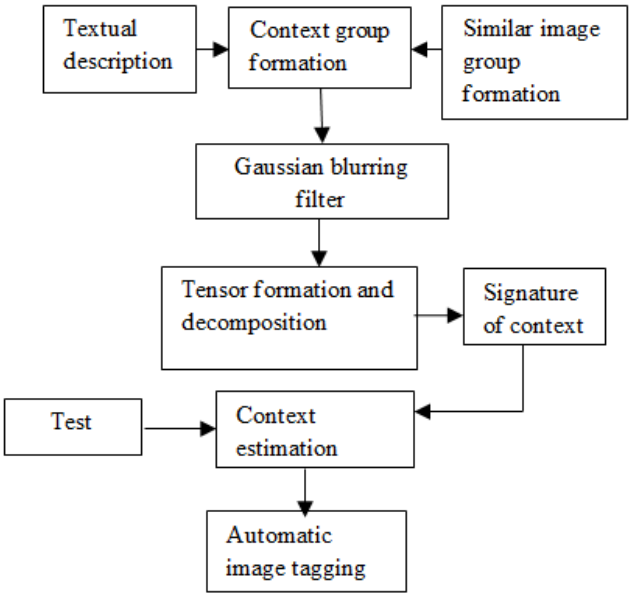


Fig 1: Proposed approach

The flowchart of proposed approach uses the major steps as:

1) Context group formation
2) Tensor Formation and Decomposition
3) Context Estimation
4) Context Based Automatic Image Annotation

IV. CONTEXT INFORMATION

Three step context estimation processes are proposed in this paper. In the first step groups having a limited number of training data are formed such that there must be some relation between images in different groups. The groups are then converted into tensors and then 3-level tucker decomposition is performed on the tensors to get better features. In the last step the textual description matrix called the label matrix is formed and assigned a number corresponding to the textual description. Example: Suppose textual description of an image are grass, water and animal then for ease of programming purposes grass will be assigned as 1, water as 2, and animal as 3.

A. Context Groups

In the first step context groups are formed that have high visual similarity between the images. The method being proposed requires two things:

1) The images should have high context similarity for better prediction for testing images.

2) Different groups must have some visual similarity for better learning and prediction purposes. The textual description of all the groups is available in the label matrix as discussed in the above section and must be highly correlated with the visual representation. Since each group contains N training images therefore tf- idf represents the X, denoted by t which is a vector having length A.

If A_{freq} is the frequency of ath word appearance in the textual description of the image X and A_{total} is the cumulative frequency of nth word in the dataset, then the value of nth sample in the vector t will be

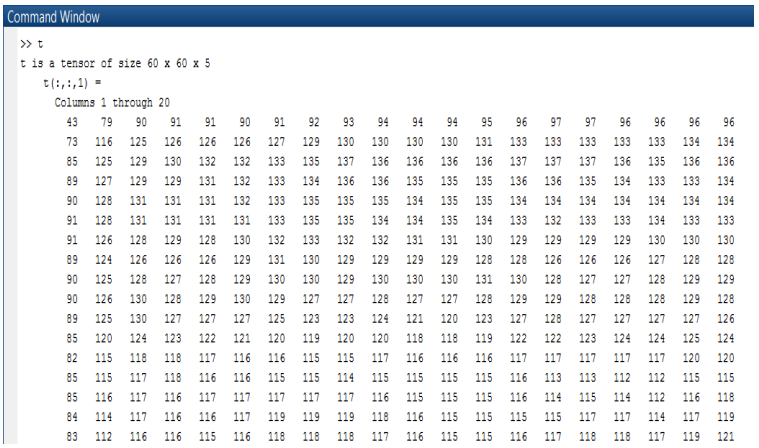
$$h_A = \frac{A_{total}}{A_{freq}} \quad (1)$$

The images are clustered on the basis of cosine similarity tf-idf vectors. This process ensures that visual similar image will come into the same context group. All the groups will be divided into two parts 1. General features based grouping and 2. Distinctive features based grouping. Each image will contain either general features or distinctive features. In the example, if the word 'water' occurs frequently in the textual description of all the images then it will be the 'general' vocabulary of the dataset. On the other hand, if 'animal' is textual description of few images then it will be 'distinct' vocabulary of the dataset.

Fig 2: Context group example based on visual similarity in the textual description

B. Tensor Formation and Decomposition

In the first step one context tensor $S\epsilon\ R^{X\times m\times n}$ is constructed for every groups of image as in the Fig. 2. The images are resize to a fixed dimension (height and width), gray-scale conversion, and passed through the Gaussian filter. Post filtering they combined to form a tensor where X, Y, and Z are width, height and number of images.



Command Window

```
>> t
t is a tensor of size 60 x 60 x 5
    t(:,:,1) =
      Columns 1 through 20
        43   79   90   91   91   90   91   92   93   94   94   94   95   96   97   97   96   96   96   96
        73  116  125  126  126  126  127  129  130  130  130  130  131  133  133  133  133  133  134  134
        85  125  129  130  132  132  133  135  137  136  136  136  136  137  137  137  136  135  136  136
        89  127  129  129  131  132  133  134  136  136  135  135  135  136  136  135  134  133  133  134
        90  128  131  131  131  132  133  135  135  135  134  135  135  134  134  134  134  134  134  134
        91  128  131  131  131  131  133  135  135  134  134  135  134  133  132  133  133  134  133  133
        91  126  128  129  128  130  132  133  132  132  131  131  130  129  129  129  129  130  130  130
        89  124  126  126  126  129  131  130  129  129  129  129  128  128  126  126  126  127  128  128
        90  125  128  127  128  129  130  130  129  130  130  130  131  130  128  127  127  128  129  129
        90  126  130  128  129  130  129  127  127  128  127  127  128  129  129  128  128  128  129  128
        89  125  130  127  127  127  125  123  123  124  121  120  123  127  128  127  127  127  127  126
        85  120  124  123  122  121  120  119  120  120  118  118  119  122  122  123  124  124  125  124
        82  115  118  118  117  116  116  115  115  117  116  116  116  117  117  117  117  117  120  120
        85  115  117  118  116  116  115  115  114  115  115  115  115  116  113  113  112  112  115  115
        85  116  117  116  117  117  117  117  117  116  115  115  115  116  114  115  114  112  116  118
        84  114  117  116  116  117  119  119  119  118  116  115  115  115  115  117  117  114  117  119
        83  112  116  116  115  116  118  118  118  117  116  115  115  116  117  118  118  117  119  121
```

Fig 3: Tensor of context group

The tensor $S\epsilon\ R^{X\times Y\times Z}$ are decomposed into smaller core tensor S and the matrices A, B and C such that

$$S \approx S \times_1 A \times_2 B \times_3 C = \sum_{i=1}^{X} \quad \sum_{j=1}^{m} \quad \sum_{k=1}^{n} \quad g_{ijk} a_i b_j c_k \qquad (2)$$

where$A \in R^{X\times LEV}$, $B \in R^{m\times LEV}$, and $C \in R^{n\times LEV}$ are the orthogonal matrices,

$S \in R^{LEV\times LEV\times LEV}$ is the core tensor and $LEV \leq min(X, Y, Z)$.

The $\underline{\times_i}$ operator denotes the tensor namely,

$$\alpha = \underline{\beta \times_i \gamma} \ll=\gg \alpha_{jk} = \sum_{i=1}^{N} \quad \beta_{ijk} \tag{3}$$

where$A$, B, and C are the matrix having dimensions$X \times LEV$, $M \times LEV$, and $N \times LEV$. The LEV is the rank of tucker decomposition. In this paper LEV is taken as 3. X, Y, and Z are the height, width, and the size of the context group. The matrices$A$, B and C are the similarity/dissimilarity of one image to its neighbour images. Since all the images belong to the same category, it will find a high similarity between all images. The matrix C is the compact signature of the context group.

C. Context Estimation

In this process the context for the image quantifies for their matching with different signature contexts. X_0 denotes the test image. Since there is no textual description available for the testing image, the variance in the elements of data in context signature matrix C will be very minimal because of the highly correlated visual appearance. If any foreign image insert into the context group, then the variance of that image in the context signature matrix$C$will be very high and will be easily rejected after the tucker decomposition process. The divergence in variance will be directly proportional to the dissimilarity in the image from the context group. The image which needs to be tagged is inserted at the location L in a tensor t by swapping the images kept at that location.

Now the matrix C' will be computed using tucker decomposition method. $|C - C'|$is used to measure the test image association with the context of context group into the tensor T.The distribution of conditional probability of the test image for every context group is calculated as:

$$W(H|X_0) = \frac{e^{(-(C'-C)^t \Gamma^{-1}(C'-C))}}{\sqrt{2\pi|\Gamma|}} \tag{4}$$

where Γ is the covariance matrix, X_0 is the test image.

When the context groups are formed, the textual descriptions are given weight on the basis of their frequency. It is given less weight if it occurs very frequently and vice versa. Each test image X_0 is provided with the same conditional probability as the context group.

V. MATHEMATICAL MODEL FOR CONTEXT BASED AUTOMATIC IMAGE ANNOTATION

In Suppose there are n number of visual units such as V_n in an image and m number of textual description such as H_m. Let there are CC number of context categories where $T \in CC$ corresponds to one context group. Each training image will belong from the one of these T groups. By picking a context group with conditional probability over test image X_0 i.e. $W(H|X_0)$. By selecting a training image X_t within the training set TS with the probability $W(H|X_h)$

for i=1,2,…..,n

2.1 Pick a visual unit V_i having conditional probability $W_R(.|X_h)$

For j=1,2,…..,m

2.2 By selecting a word h_j from conditional probability $W_T(.|X_h)$

The main aim of the proposed approach is to enhance probability metric V and T over the training image X_h

$$P(X_h) = \sum_{H \in CC} P(H|X_h) \sum_{X_h \in HS} P(X_h|H) \prod_{j \in m} w_T(H_j|X_h) \prod_{i \in n} W_R(vI/X_t) \quad (5)$$

The $W_H(H_j|X_t)$ (Bernoulli distribution) is defined as:

$$W_H(H_j|X_h) = \frac{\mu\delta_{H_j} + N_{H_j}}{\mu + N_H} \quad (6)$$

where, A_{H_j} is the members of T with word T_j in their description

A_{H_j} is members of T_j

δ_{H_j} is set to be 1 if description of the image X_t has word T_j in it μ is empirically selected constant

$W_R(V_i|X_t)$ is the density estimate to generate the visual unit V_i for the training image X_t. Gaussian kernel is employed for this density estimate. Suppose if the visual units of the training image X_t are $\{VT_1, VT_2, \dots\dots, VT_n\}$ then

$$(V_i|X_h) = \frac{e^{(-(V_i - VH_n)^T (\sum \quad V_i - VH_n)^{-1})}}{\sqrt{2\pi|\sum|}} \quad (7)$$

where $\sum$ is the covariance matrix.

VI. RESULTS AND DISCUSSION

The proposed algorithm is tested on the Corel-10k dataset. In this paper results are compared without using filters and with using filters. In both the cases the tucker decomposition level is taken as 3. To check the effectiveness of the algorithm the comparison has been made between precision, recall, and accuracy. Since the dataset contains 10k images, the complete dataset are divided into small context groups for easy and fast analysis purposes. We have also checked the efficiency of the algorithm by taking different percentage combinations of training and testing data i.e. 70% and 30%, 50% and 50% etc.

Table I: Results analysis of different context groups

Group's name (Training images-Testing images)	No. of correct and retrieved tags in proposed approach	No. of correct and retrieved tags in base approach	Total tags that should be correct and retrieved
New 17(70-30)	59	45	60
New 19(70-30)	51	44	60
New 21(50-50)	101	83	113
New 12(70-30)	57	56	60
New 18(50-50)	92	86	100
New 32(50-50)	106	94	131
New 23(5-5)	11	11	12
New 24(5-5)	10	10	10

The results thus obtained are as in the table I-IV.

- Some tags are correct and retrieved
- Some tags are incorrect and retrieved
- Some tags are not retrieved giving some random value.

- **Precision:** Precision is calculated as a fraction of relevant tags among retrieved tags as in equation (8).
  Precision P=D/E (8)
  where D is the number of relevant images retrieved whereas E is the total number of images retrieved.

Table II: Precision table for both the cases

Group name(Training images-Testing images)	Proposed approach Precision in %	Base approach Precision in %
New 17(70-30)	98.3333	83.3333
New 19(70-30)	86.4407	81.4815
New 21(50-50)	90.9910	74.778
New 12(50-50)	98.2759	98.2456
New 18(50-50)	92.9293	88.6598
New 32(50-50)	79.6992	71.557

- **Recall:** Recall is calculated as a fraction of total relevant tags that are retrieved equation (9).
  Recall=D/F (9)
  where D is the number of relevant images retrieved. F is the number of images that are relevant in the dataset.

As it can be seen from Table I to IV that all the analysis parameters such as precision, recall, and accuracy have been improved many fold in the proposed approach as compared to the base approach.

Table III: Recall table for both the cases

Group 'name (Training images-testing images)	Proposed approach recall in %	Base approach Recall in %
New 17(70-30)	100	90
New 19(70-30)	98.0769	95.6522
New 21(50-50)	98.0583	90.2714
New 12(50-50)	96.6102	94.9153
New 18(50-50)	98.9247	97.7273
New 32(50-50)	85.4839	71.557

Accuracy is calculated as total no of correct observation divided by total no of observations.

Table IV: Accuracy table for both the cases

Group's name(Training images-Testing images)	Proposed approach accuracy in%	Base approach accuracy in%
New 17(70-30)	88.2602	74.9217
New 19(70-30)	74.6538	70.4888
New 21(50-50)	78.1253	72.8023
New 12(50-50)	87.3810	84.7413
New 18(50-50)	83.9296	81.4908
New 32(50-50)	71.9161	64.4773

The model proposed by author Tariq et.al [2] has used single level tucker decomposition while in this paper three level tucker decomposition is used to model the base case. Even in the base case the results are better as compared to the results obtained by Tariq et. al [2]. Since all the images contain Gaussian noise by default therefore adopting the Gaussian filtering technique improves the results.

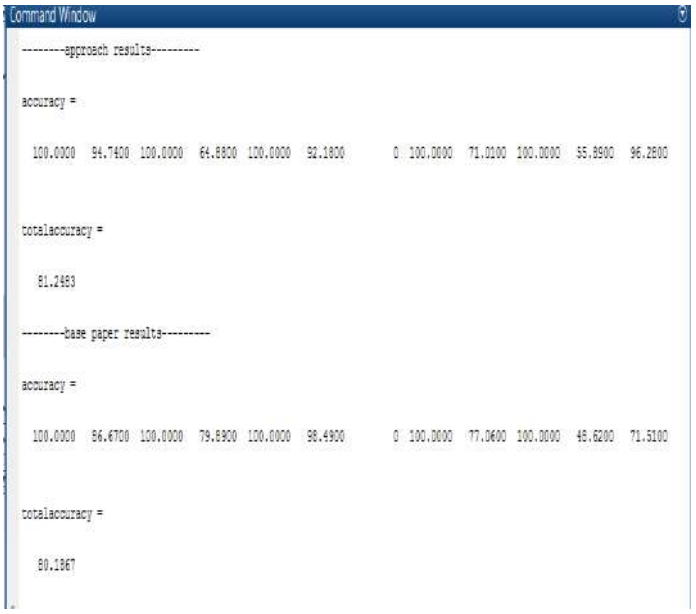


Fig 4: Snapshot of results obtained in MATLAB

The graphical representation of the above table can be seen in Fig. 5 to Fig. 7. MATLAB software is used for the simulation and analysis purposes. The results obtained during simulation are as in Fig. 4.

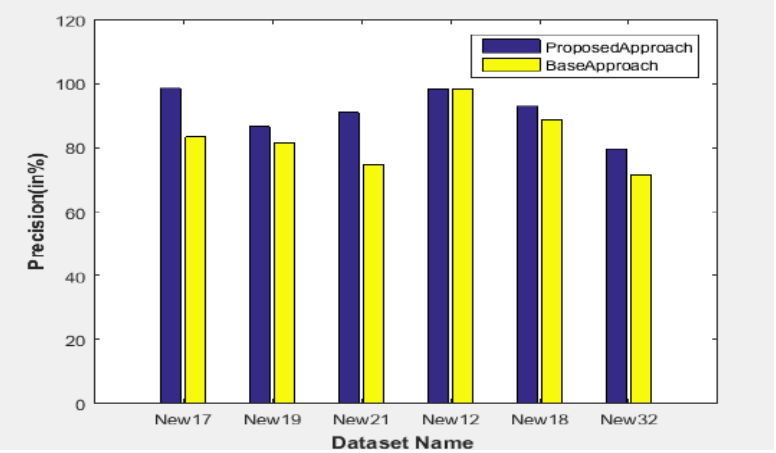


Fig 5: Precision graph for different context groups of dataset

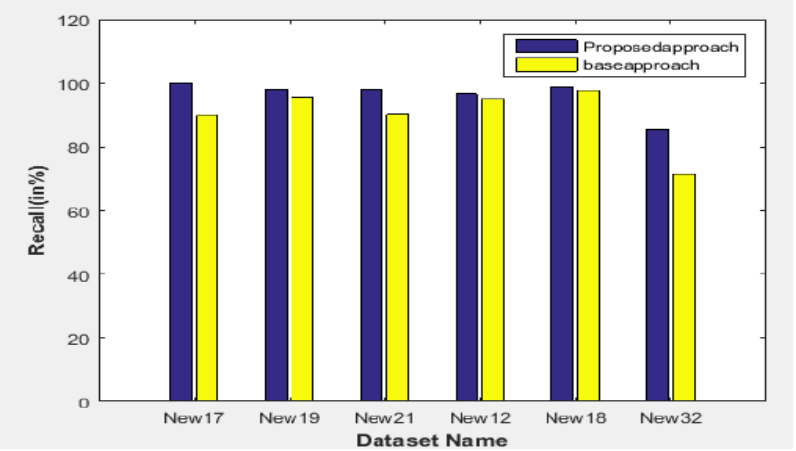


Fig 6: Recall graph for different context groups of dataset

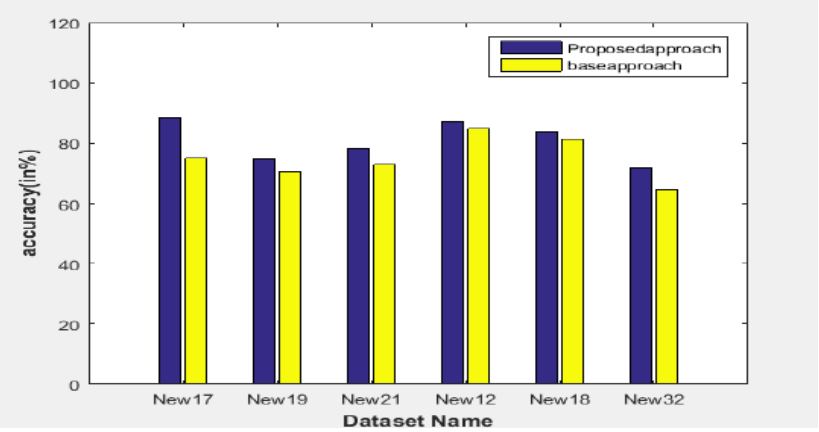


Fig 7: Accuracy graph for different context groups of dataset

VII. CONCLUSION AND FUTURE SCOPE

Gaussian filtering based novel context estimation and tensor decomposition system is proposed. Tensor formation and context estimation is used in this research paper to minimize the semantic gap while the tensor decomposition

is used to find the best correlation between the context group images. Due to minimization of semantic gap the accuracy improves significantly.3-level tucker decomposition is adopted to model the framework for better correlation among the context groups. The results are compared between filtered context groups and unfiltered context groups. The evidence of the effectiveness of the proposed algorithm can be seen from the results and discussion section. In future, deep learning techniques can be used for better accuracy as well as to reduce the searching time.

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Dynamic Operational Time Traffic Light System

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Abstract - The process of detecting, tracking, and counting moving vehicles is crucial for traffic flow monitoring, control, and planning. In comparison to other solutions, video-applicable solutions are simple to set up and do not obstruct traffic flow. This paper provides a video-based system with the help of advanced methods implemented in python language and OpenCV computer vision kits, indicating that the outlined approach can effectively perform detection, tracking, counting of moving vehicles, and calculate the operational time for traffic lights by examining the traffic flow video series recorded from a video-based source (camera).

Keywords--- Tensor, **OpenCV, traffic, operational time, detect, vehicle, count.**

I. INTRODUCTION

With the growing number of automobiles, expressways, highways, and roadways are becoming increasingly congested. Smart Transportation Systems are being developed around the world to gather, process, and organize data from diverse sources to improve the efficiency and reliability of transportation flows and render them increasingly effective, smarter, and safe. As a result, the process of detecting, following, and counting the number of passing vehicles is becoming increasingly crucial for traffic control. Infrared detectors, inductive loop detectors, radar detectors, and video-based systems are used in the traditional method of vehicle detection. Surveillance cameras are highly influenced by the external environment, such as harsh weather conditions, shadows, sun- light, and so on, therefore video-implemented systems have an advantage. Moreover, video-based surveillance systems can provide many benefits such as easy setup, conveniently modified, do not disturb the traffic flow etc. As a result, they have attracted researchers all over the globe [1]. Road congestion is a significant concern that impacts many regions throughout the world. Numerous factors contribute to the heavy traffic situation.

The population of citizens settling in cities has increased significantly, resulting in a surge in the number of automobiles. Roadway infrastructure, on the other hand, has developed slowly and is now insufficient. As a result, there is a mismatch between the number of cars and the number of roads, leading to traffic, particularly in large cities. Inadequacies in public transit networks contribute to the same issue. Another reason is that the traffic management system is flawed and does not provide real-time traffic updates. If the traffic issue is not addressed, it appears to become worse in the future. Intelligent transportation systems are adaptive, intending to increase vehicle flow (the number of vehicles passing in a given time-frame) and decrease the average wait time interval for all cars in a system-controlled area. As a result, the purpose of this model is to build and implement a traffic control system based on real-time data sources using appropriate and favorable algorithms. The real-time vehicle data is acquired from traffic cameras installed at a four-way intersection. For this purpose, we have used a powerful tool OpenCV that is Open Source Computer Vision Library in Python. By using OpenCV, we were able to develop real-time computer vision applications. Road congestion issues have also been solved using computer vision. Take, for example, a video stream of the road that may be analyzed to identify and measure the total number of vehicles on the road. Computer vision can also be used to calculate additional information such as a vehicle's speed or traffic density. This will also benefit two categories of people: commuters and traffic management personnel. Moreover, if commuters are already aware of real-time traffic data, one can utilize it to determine the optimal mode of transportation and avoid traffic congestion. Furthermore, traffic authorities can include information on traffic density flow into their traffic control systems, resulting in improved traffic control. On real-time traffic film, numerous approaches for vehicle detection and counting have been developed. We must first detect the blobs in the movie before counting them. This is done by a series of processing on every frame of the video such that the blobs can be detected precisely.

The whole process of detection involves 3 major steps: Background Subtraction followed by vehicle detection and then finally counting them. Firstly, we take the grayscale background image of the road and calculate the grayscale difference between the current grayscale frame and the average of the scene so that the background is masked out and the blobs are detected. Then the frame is applied to various filters such as Gaussian Blur to smoothen the

image so that detecting whole blobs as one unit becomes easy. Secondly, by performing a binarization process to obtain a foreground area, and then with the help of morphological operations to eliminate noise and shadow. Once the blobs are detected the next thing is to count them in such a way that no blobs are counted more than once. It is ensured by a calculating distance of blobs in consecutive frames and if it turns out to be less than a threshold value it's considered as the same vehicle. Once all the vehicles in the lane are calculated for each road in the junction and lastly based on traffic density the operational time gets calculated for each traffic light. The paper is organized as follows:

I. Related Work
II. Data Collection
III. Methodology
IV. Experimental Results
V. Conclusion and Future scope.

II. RELATED WORK

In September 2012, Vivek Tyagi, Senior Member, IEEE with his team published their research. The weightings of the mixture in the accumulated signal vary based on the traffic density conditions [6], in which the identified occupancy is based on the noise from vehicles, which contains numerous noise signals. They collected the spectral components of the roadside acoustic data utilizing Gaussian mixture concepts and modeled the class conditional probability distributions of these feature vectors conditioned on broad traffic density states: jammed, medium-flow, and free-flow traffic (GMMs). The GMM parameters are created by manually labelling 2.5 hours of roadside acoustic data traffic density levels. When 20 to 30 seconds of audio input proof is supplied, a Bayes' model is used to classify traffic density groups based on these dispersions, with approximately 95 percent accuracy. A radial basis function (RBF) kernel classifier based on a support vector machine (SVM) was often used. [7]. CHEN Wenjie, CHEN Lifeng, and CHEN Zhanglong of Fudan University [8] submitted their work on developing a dynamic traffic signal model based on traffic detection utilising sensors. The traffic density was calculated using a range of sensors, thus it was a traditional and costly technique to deal with the problem. In 2007, Erhan Bas¸ published a detection technique for counting the volume of traffic in surveillance video. They proposed an innovative transportation video analysis method that takes into account the architecture of the scene and employs adaptive bounding box dimensions to identify and detect vehicles based on their approximate distance from the camera. Throughout the rest of the study, they recommend algorithms for vehicle detection and tracking and present results obtained by applying these algorithms to various video footage gathered at various time periods at one place in Istanbul [9].

Luis Unzueta and colleagues submitted a paper in 2012. They developed an adaptive multi-cue segmentation method which distinguishes between pixels associated with mobile and stopped cars. First, an adaptive threshold is applied to a mixture of brightness and chrominance discrepancy charts between the learned backdrops and the present frame. It tends to add additional information derived from gradient distinctions to aid in the classification of shadowy automobiles of rendered shadows, as well as the removal of roadside headlamp reflections. The segmentation is then approached in two steps, combining the ease of a linear 2-D Kalman filter with the difficulty of a 3-D volume approximation using Markov chain Monte Carlo (MCMC) methodologies. Experiments show that technology can number and categorize objects in real- time with performance comparable to inductive loop detectors in a variety of environments [10].

III. DATA COLLECTION

The data collected can be from any video source such as webcam, CCTV-cam, mobile cam etc. The model can work on live video feed from the traffic junction. For demonstration purposes the video data is collected from: https://s3-eu-west- 1.amazonaws.com/jamcams.tfl.gov.uk some video samples are as in Fig.1.

Fig.1. (a) Day time CCTV footage (b) Night time CCTV footage

IV. METHODOLOGY

This Section is all about the detection and counting of vehicles in the video footage. This section is further divided into three subsections giving the details of each step.

A. Foreground Extraction Or Background Subtraction

Foreground extraction is the process using which we can extract the foreground components of any frame. In particular, a background image of the road, which contains no vehicle, and the current frame in the video are converted from color (RGB) to HSV image. The recorded frame's valuation is then subjected to a non-linear bilateral filter. It converts each pixel's intensity to grayscale by replacing it with a weighted average of intensity values from neighbouring pixels. The gray concentration of the backdrop picture is then deducted from that of the current frame for each pixel (x, y). The absolute result is saved in the same position in another image, which is referred to as a different image.

B. Vehicle Counting

Once the traffic density is counted using OpenCV, the final thing is to calculate the operation traffic light duration and compare the results with the static duration of traffic lights. Before jumping to calculation part, we made some assumptions:

- No. of Vehicles in each road is a random value between 25-200.
- Rate at which vehicle leaves the traffic signal: Heavy Traffic: 25 vehicle/second, Medium Traffic: 20 vehicle/second, Low Traffic: 15 vehicle/second
- Static timed traffic signal duration is 6 seconds. For each cycle, the traffic signal with highest operational time will glow first then next turn will be in clockwise direction.

Fig.2. (a) Image of the road with no vehicles (b) After applying Bilateral Filter (c) Foreground Extraction (d) Foreground Extraction after Gaussian blur

After each Fig. 3 (a) Mean thresholding on starting frames (b) Mean thresholding on frames after sometime (c) Merging blobs after removal of noise and hole filling (d) Setting up region of interest complete cycle, the traffic signals will reset themselves and start operating in the similar fashion before.

Fig.4. Final output screen counting and tracking each vehicle in Region of Interest (ROI).

C. Time Calculation

For the operation of traffic lights, we need to define some variables to store the required information needed for proper working of traffic lights. Using the python library numpy, we will create an array by the name of ‘total’ which will contain the total number of vehicles present in each lane for the respective traffic light, then we will create another array by the name of ‘rate’ which will contain the rate of vehicles arriving per second, after that another array by the name of ‘dept’ will contain the departure rate for every lane and two more arrays will be created by the name of ‘old vehicle’ contains the total number of vehicle from the beginning for each lane and ‘new vehicle’ which will contain the number of vehicles remaining after each second during operational time of each traffic light . Another variable ‘active’ is defined which will tell us the highest operational time required by a particular traffic light. Some functions we have to define in order to implement the working of traffic lights in an orderly manner.

1. **time cal** : It will calculate the operational time for each traffic light, that is the time interval till which each traffic light will be green during their respective turn and store it in an array by the name of ‘time’.
2. **time dec:** Responsible for decreasing the operational time, that is for how much duration a particular traffic light will be switched to ‘green’ signal by unity.

3. **car dec:** It will calculate the number of vehicles re- maining after each second for the respective traffic light which had been set to indicate 'green' signal.
4. **light sat:** It is used to change the signal of a particular traffic light according to its operation.
5. **light operation:** It is used to operate all the traffic lights in an appropriate manner, that is by diverting the traffic flow in descending order. In order to maintain the stability along all the paths. This function is also responsible for calling the above functions by fulfilling their conditions

By implementing nested for loop, in order to call the light operation function and by updating the value of 'active'. when operational time of one traffic light has been completed by deleting the highest operational time present in 'time' till all elements are used. The execution of all the traffic lights will take place in such a way that traffic lights with the highest traffic density will be diverted first, then second highest traffic lights will be diverted and so on. Till all traffic lights have diverted the traffic flow and the cycle resets itself to be implemented again.

V. EXPERIMENTAL RESULTS

To achieve the desired result from the proposed model, first we have to take into consideration the required information for its implementation. As a result, we have taken into consideration a set of assumed data which is as follows. Initially, all the traffic lights display's 'RED' lights, from the beginning, we have taken the maximum number of vehicles in a frame to be 200 and minimum number of vehicles in a frame to be 25. In order to have efficient detection of vehicles, we divided the traffic density into three parts namely Low, Medium and Heavy.

The respective number of vehicles required to differentiate between each type of traffic is as follows, Greater than 140 (Heavy), Less than 140 but greater than 70 (Medium) and Less than 70 (Low).The departure rate that is number of vehicles entering in a particular frame per second for each type of traffic is assumed to be 25 vehicles/sec for Heavy traffic, 20 vehicles/sec for Medium traffic and 15 vehicles/sec for Low traffic. Hence, the operational time in dynamic system is calculated with the help of above information.

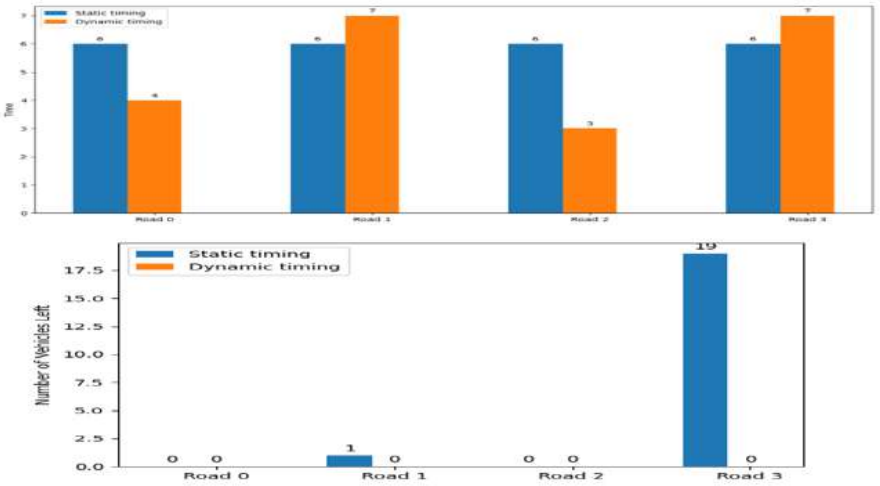

Fig.5. (a) Comparison between static and dynamic operational time (b) Comparison between total numbers of vehicles left out after implementation of static and dynamic operational time system

Finally, in order to compare our results with the static system, we have assumed the operational time (Time interval till which 'GREEN' light is displayed) of each traffic light to be 6 seconds and departure rate is same as in case of dynamic system. Hence, the experimental results displayed above are calculated, as in Fig 5(a) and Fig5 (b).

VI. CONCLUSION AND FUTURE SCOPE

In this paper, we proposed a real time object detection approach for calculation of vehicles, and then estimated the required time for the traffic flow. After that, we used the estimated time and operated the traffic lights accordingly depending upon the traffic density in a sequential manner. Image Processing played an important role in extracting the information from images. After the processing approach, we implemented the object

detection techniques using OpenCV like frame differencing to notice the changes in coordinates of the vehicles under consideration in under consecutive frames and using thresholding technique to separate the vehicles and the unwanted objects from the images in order to increase the efficiency of the detection of vehicles and thus increased the accuracy for counting process of vehicles and as explained in detail in section 4. After completion of the detection process, we counted the total number of vehicles in our frame using user defined functions in python. Once the counting was completed, the operation of traffic lights was handled by the user defined functions and thus traffic lights were operated accordingly depending upon the live traffic density in an orderly manner. In the present day scenario, implementation of such a model requires a lot of different types of physical components like Arduino, camera, light bulbs, storage unit, durable structure build etc. Moreover, a GPU is also required for processing of images in real time for implementation of object detection process. A storage unit is also required, since the count of vehicles has to be stored in order to calculate the implementation time for each traffic light. An interconnected wired system has to be implemented in order to operate each traffic light accordingly. A reliable power source is also required for reasonable and error free working of the system. The requirement of a power source can be fulfilled in one way by using a solar cell and a rechargeable battery installed along the system which can be used during day as well as at night. At last, a powerful computer system is also required in order to handle execution of all the processes in a reasonable time frame so that the operation of traffic lights can be in sync with each other and thus the proposed system can work efficiently and at a reasonable fast pace in order to cope up the increasing traffic density without dealing with any problem. By fulfilling all the stated requirements, the proposed system can work efficiently in any environment and thus eliminating the problem of unsupervised traffic flow in the world.

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A Multi-Hierarchical Clustering on Topic Modeling using Latent Dirichlet Allocation

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Abstract- With the economic crisis, it is expected that credit and down payment growth will average later on. Credit score growth will be led by spending on the infrastructure while retail credit will display an average growth. Margin demands due to lag effect of quantity cuts between attention quantity on deposits and advances, reduced treasury gains and core fee earnings and improving in conditions for NPAs is likely to put pressure on the main point here of the financial organizations. In the light of above aspects the present document tends to analyze sectoral distribution of credit in Native India Financial industry. The document studies the styles in credit growth with a perspective to project upcoming courses of growth in bank credit.

Key words: Unsupervised learning, K-Means Clustering, MALLET, WEKA

I. INTRODUCTION

Topic modeling is the technique utilized in the area of text analysis. It is used for finding the abstract topics occurring in an assortment of documents, which provides us with strategies to arrange, comprehend, and sum up enormous assortments of text based data. It is unique in relation to rule-based text analysis approaches that utilize regular expressions or word reference based keyword-finding methods. It additionally helps in finding hidden topical patterns available across the assortment of data. Topic models have numerous applications in natural processing dialects. Many papers have been published using topic modeling approaches in different subjects like online social media stages, software engineering, Cognitive science and many more. Latent Dirichlet Allocation (LDA) [1], a generative probabilistic topic model is an amazing asset of topic modeling that permits a set of perceptions to be clarified by unobserved groups. The instinct behind LDA is that data archives exhibit numerous topics. Each record shows the topics to various extent; each word in each archive is extracted from one of the topics, where the chosen topic is taken from the per-report dissemination over topics [1], [2].

The unsupervised learning via probabilistic topic model [3] has been successfully developed for document categorization[3] [1], image analysis [4], text segmentation [5], speech recognition [6], information retrieval [7], document summarization [8], [9], and many other applications. Using topic models, latent semantic topics are learned from a bag of words to capture the salient aspects embedded in data collection. If the number of clusters is considered as a number of topics and the probabilities as the extent of cluster participation, then LDA is used as a way of soft-clustering. Cluster analysis is an errand of grouping a set of objects so that objects of the same group are more similar in any sense to one another than to those in other groups. In LDA, the order of archives doesn't make any difference except hyper-parameters which rely upon whether Dirichlet distributions are assumed to be symmetric or asymmetric. For the symmetric distribution considering on alpha value, a high alpha-value is considered means that each corpus is probably going to contain a combination of maximum number of topics, not any single one explicitly [10].

On the other hand, low alpha value puts less such constraints on corpus with the meaning where it is more likely that a corpus contains the combinations of a few or even one topic. Whereas If considering beta values, a higher beta-value represents that each and every topic is likely to have a combination of maximum number of words, not any word explicitly, while a low beta value represents that a topic contains a combination of just a few of the words [1].

Table I. Parameters of LDA and their relevance with respect to documents and topics

Hyper-parameters	Relevance	> values	< values
Alpha	Document-topic density	Documents composed of large number of topics	Documents contain fewer number of topics
Beta	Topic-word density	Topics composed of a large amount of words in the document	Topics composed of few words

With the reference of parameters of LDA as in Table I, LDA model searches for rehashing term designs in the whole Document-Term framework while K-Means grouping relies a lot upon the determination of starting point of convergence [11]. So, in contrast with LDA, K-Means belongs to one cluster for each entity. So, to perform Clustering on the document containing the topics probabilities present in the corpus we are using WEKA. The algorithms can either be applied directly to a dataset or called from your own Java code. WEKA contains devices for information pre-handling, classification, regression, grouping, affiliation rules, and representation. Presently, Applying K-means clustering on output generated from LDA for example, the text record which is showing the breakdown, by rate, of every topic inside every unique text document we imported or we can say the points that form our archives. The next section begins with a review of current studies related to LDA. In Section2, discusses the Literature review, Section 3 discusses the proposed methodology. Section 4 elucidates the experimental setups and Results and Analysis has been presented in Section5. In section 6 we conclude the paper along with suggestions for future research opportunities.

II. LITERATURE REVIEW

This section summarizes a few scholarly works proposed about extracting the topics using Latent Dirichlet Allocation (LDA) and various types of clustering used to cluster similar data points. Related work can also be found in the above mentioned applications in multi-domain data. Authors in a research paper [2], proposed an inference algorithm for LDA results that leads to identify documents and the relationships between the documents. [12], applied initial clustering center for K-Means as preprocessing which further makes the latent clustering center more focus on a certain topic.[10], proposed multi-grain clustering topic model which integrates topic modeling and document clustering together. [13], tried to combine LDA with document-specific word distributions for organizing large documents archives. [14], evaluated LDA with the perspective of classifying and identifying the noteworthy topics further applied to filtered collection of Twitter. [1], proposed a generative statistical model, which projects a document into topic space, and each topic contains multiple words. [15], focuses on calculating the temporal weights to reveal the importance of all the topics extracted from the probabilistic approach. [16], introduced an improved K-Means algorithm solving the limitation of traditional K- Means algorithm in terms of dependency on selecting the initial focal points by combining the largest minimum distance algorithm and the traditional K-Means algorithm. Authors in [17] conducted a comprehensive survey on already existing works. Predominantly, they concentrated on event feature learning that has ability on translating social media data into computer friendly numerical form. In [18], Different methods of document clustering and topic modeling on social media content offers a technique of categorizing, interpreting and understanding the large volume of user generated content. Authors have implemented hybrid models to cluster large document sets. Based on contextual keywords, they optimized the clustering similarity index to find the essential key document clusters. Their experimental results show that the clustering based document classification models have better performance [19].

III. METHODOLOGY

This section depicts the proposed methodology for finding the probabilities of topic distribution after implementing via Single-Link Type, Complete-Link Type and Average-Link Type Hierarchical clustering. The Process diagram for implementation is in Fig. 1.

A. **Single Linkage Type:** In this approach, we calculate the similarity for the closest pair. The limitation for this method is that close pair groups merge faster than the optimal, regardless of whether there is dissimilarity for those groups.
B. **Complete Linkage Type:** This approach is based on the phenomenon for calculating similarity of distant pairs along with the limitation of having outliers which causes less merging than optimal one.
C. **Average Linkage, or group linkage Type:** In this, grouping of objects are considered for calculating the similarity, rather than individual objects.

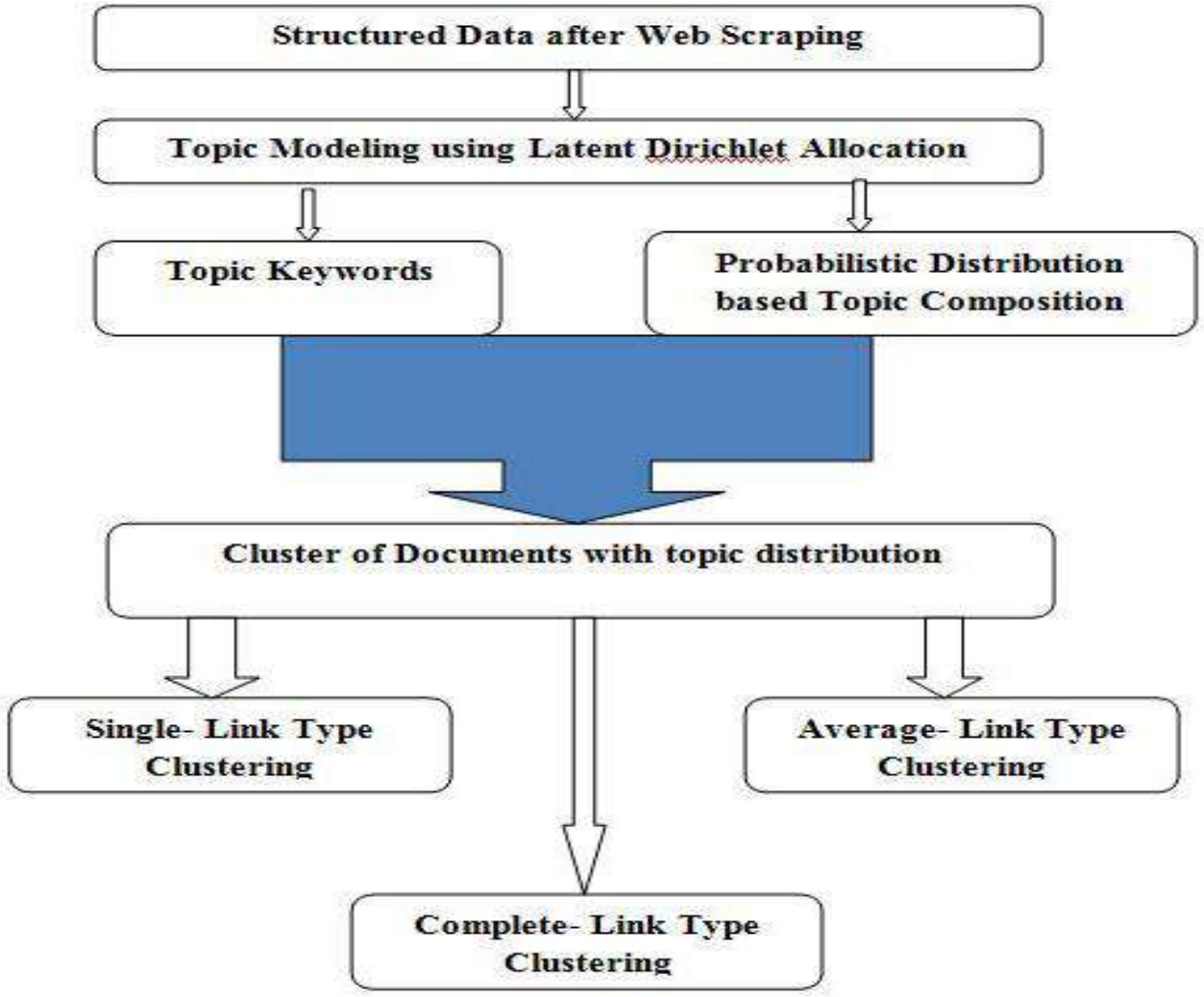

Fig. 1. Process Flow Diagram

The Process flow diagram as in Fig.1 starts with the structured data generated after web scraping. The extracted HTML code from web scraping, we stored the data in the database. The generated dataset is then normalized and LDA is applied to extract the topic keywords and probabilistic distribution-based topic composition. The documents obtained after implementing LDA, passed through soft clustering techniques which results in clustering of documents with topic distribution classified against the types of hierarchical clustering as Single-Link type, Complete-Link type and Average- Link type clustering. The experiments have been carried out on WEKA. In this paper, the dataset has been generated by using the BeautifulSoup4 Python tool of web scraping; the python script has been employed to generate the dataset. The generated dataset in the proposed method has

been stored in two text files that comprises top keywords for each topic in one file and weight distribution of each topic in another file.

IV. RESULTS AND ANALYSIS

The output using the commands in MALLET is stored in 2 files. 1st file- keys_n1.txt is representing what all the top keywords are for each topic as in Fig.2 and the 2nd file- composition_n1.txt indicates the breakdown, by weight distribution, of every topic extracted from original textual file as in Fig.3.

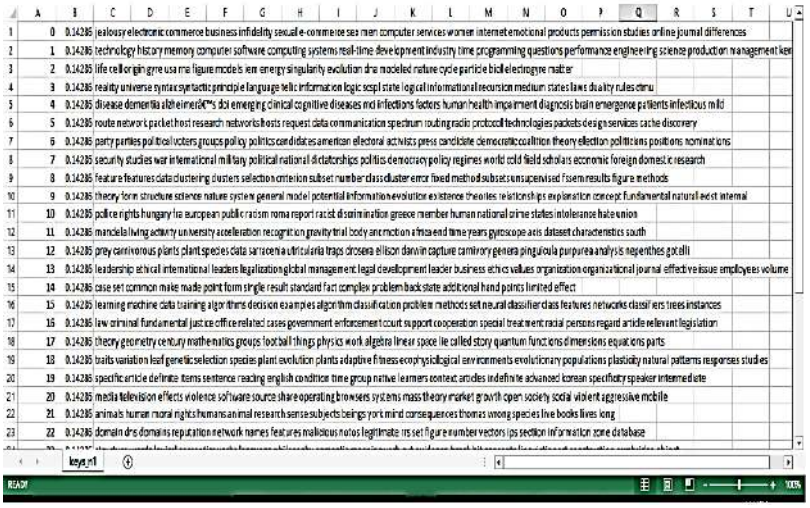

Fig. 2. Top Keywords

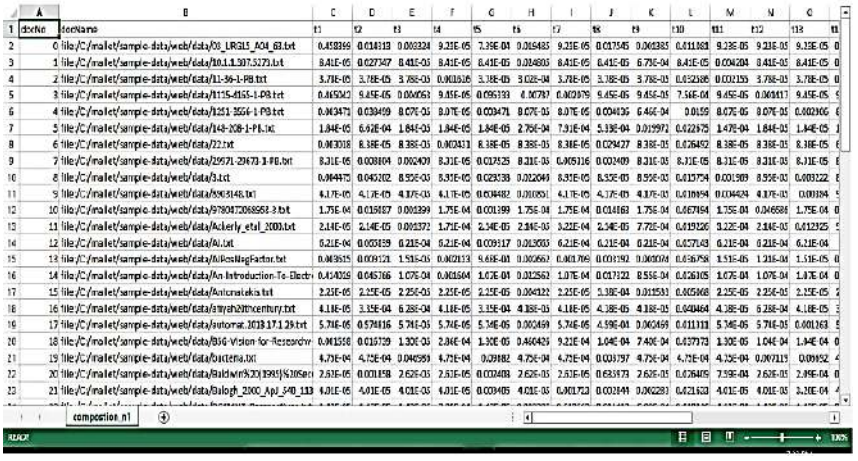

Fig. 3. Topic Composition

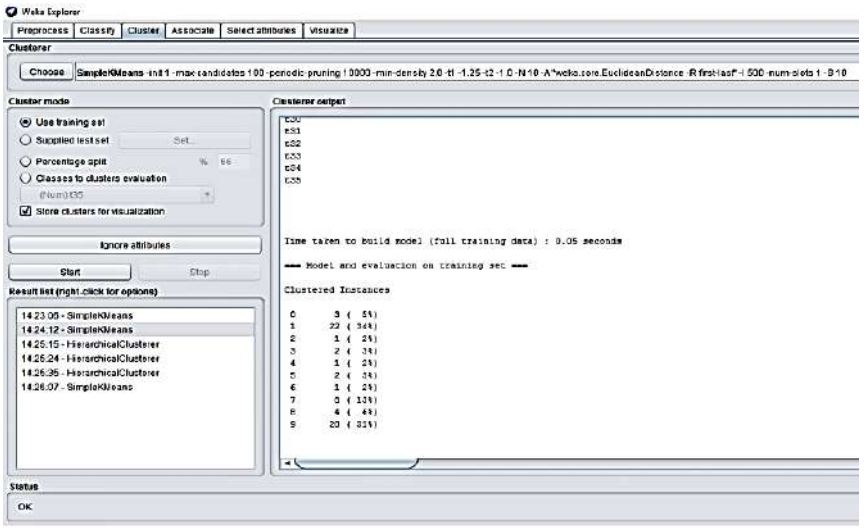

Fig. 4. K-Means Clustering

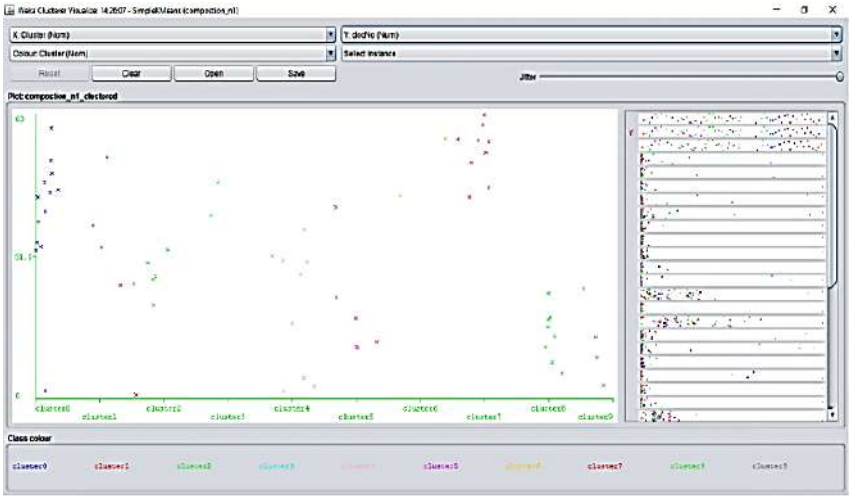

Fig. 5. Cluster of Documents with topic distribution present in the document corpus

We can also visualize the clusters that are formed. The clusters formed after applying K- means clustering on the topics composing the documents as in Fig. 5.

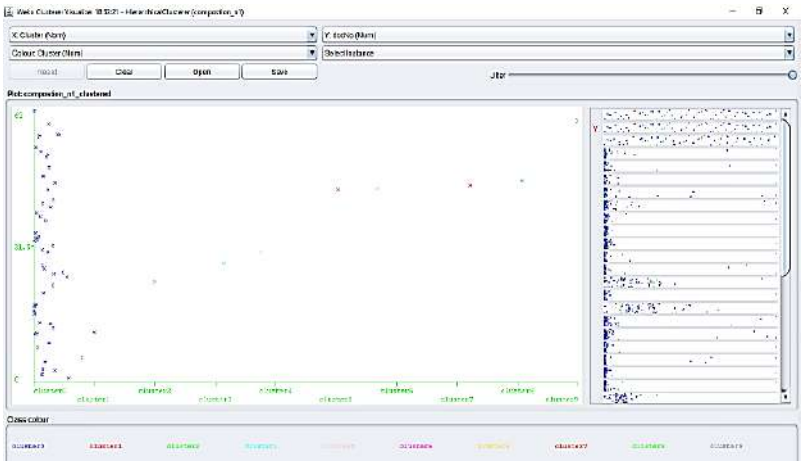

Fig. 6. Single-link type Hierarchical clustering

The results of the Single link, complete link and Average-link of the Hierarchical clustering are as in Fig 6, Fig.7 and Fig. 8.

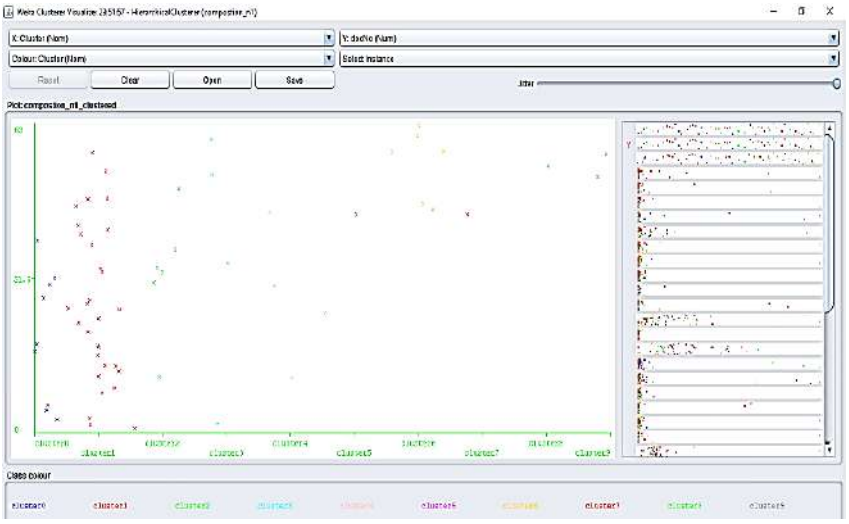

Fig. 7. Complete-link type Hierarchical clustering

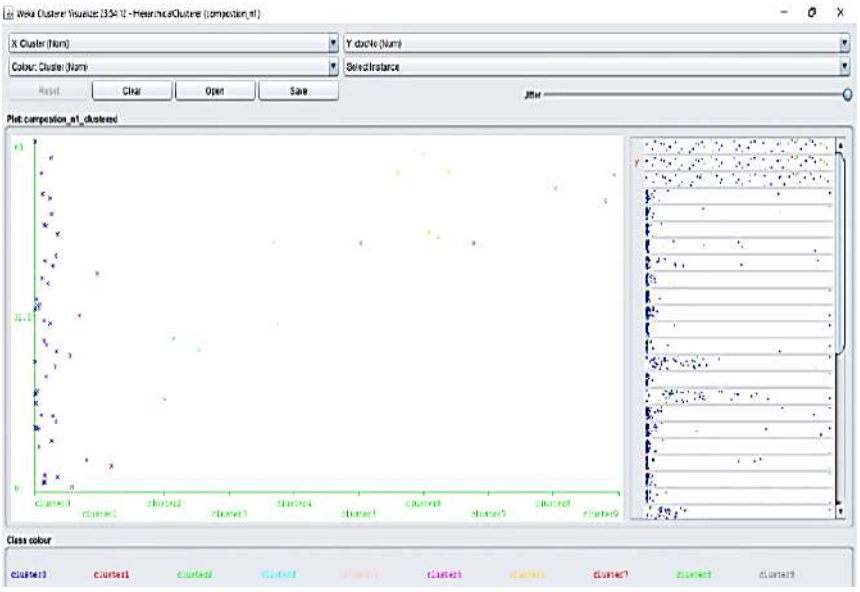

Fig. 8. Average-link type Hierarchical clustering

V. CONCLUSION

From the experiments, it has been concluded that the clusters are made on the basis of the distribution of topics over which the documents are close to each other in terms of their meanings and the probability value is same for Complete-Link Type and Average-Link Type clustering for each topic in each document. Less-fold cross validation might be the reason for the same values in the probability values. In contrast to this, Single- Link type has very low probability for topics. As Topic modeling is an emerging and current field, we can increase the cross validation on dataset to have more accuracy and we can also approach different methods to improve the performance of the models for managing large archives of information. The futuristic directions for further research can Fuzzy logics and the Dynamic data-set. We can perform a hybrid approach by combining LDA and K-Means clustering on a dynamic dataset instead of static. In the Fuzzy Logic approach the simple LDA topics can be considered in a crisp set. Hence, we can fuzzify the output in results; and further the recovered topics can be in the form of a fuzzy set.

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A Way to Trust Deportment for Security in Distributed Systems

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Abstract -The objective of this paper is to describe the implementation of the 3D model of a library using Virtual Reality. VR is emerging as an interesting new technology in today's world where we can experience a 3D environment from anywhere. VR experiences can build inordinately immerse environments and spots, asserting users to move in that place without actually visiting there. In this project, a 3D model of our college library full of interactive objects [3] is made in which the user can move around and explore the environment. It includes various scripts written in C# programming language to help it become interactive. Gaming engine Unity was used to develop this project.

Keywords— Virtual Reality, Unity, Script, Headset

I. INTRODUCTION

Virtual Reality (VR) provides a simulated experience that is almost identical to the real world. VR provides interactive content which enables the user to explore the entire 360 degrees of a scene. From conventional classroom place to utmost training spots, VR down scales investment and enriches advancement through a range of industries. VR requires a headset to get the immersive experience to see the 3D environment. During this pandemic situation when people are not able to go out and experience the place, they can enjoy the 3-D model of the place which is almost identical to the real world and can utilize this model for their work. Nowadays Libraries [11] have become a kind of a community center centered on knowledge and education [8]. Providing an almost identical experience to the real world with Virtual Reality sounds like science fiction but isn't it cool, people can move freely and experience the place virtually [1].

Virtual Reality technologies can be applied to college libraries to give the users a 3-Dimensional experience of the library where the user can move around and explore the library virtually. The user can interact with the 3D objects present in the library virtually, thus this application can act as a tool to maximize the operability of the library, where interactive objects can enrich the user's experience and inspire users to visit the library more often. This model helps the users to get the information and navigate easily using VR based mobile applications when moving inside the library. The 3D model of the library makes it easier for the user to explore the library without visiting in person. This project uses scripts written in C# language to make the application [6]. The findings of our study provide a contribution to the research field concerning user's perceptions of benefits of smartphone-based virtual reality applications within the education industry [12] where the user can get an immersive experience. Using this 3D model, the user can see where the different book-sections are located, and the smartphone-based virtual reality application will help the user to move in the different sections inside the place. VR has signified its ability to transFig and manage results in the learning and instruction arena. There are different types of headsets [10] available in the market today like oculus rift, Samsung gear etc.

II. LITERATURE REVIEW

In past research the visualization of complicated engineering data has been done and a set of multimodal tools has been provided to audit a 3D model on various levels, discussing the difficulties that arose while the implementation process and the future applications of VR in the industrial sector. We have implemented one of those applications in the education sector. Virtual Reality can act as an amazing medium to connect people to the unreachable world where people can experience the real world using the virtual environment created using VR. This 3-D world not only provides the immersive experience to the real-world but also the user can interact with the objects present in the 3-D environment. Virtual World has reached the healthcare sector [5] and now it is the turn for the education sector. Education sector needs the implementation of 3D models, helping students in increasing their knowledge and improving the future. We have presented the development of Augmented Reality and Virtual Reality to help users to navigate [2] and get the information easily using VR based mobile applications while walking inside the library. This paper introduced VR technology to enhance and improve the user experience inside the library in the right direction and with the right information instantly [3] addressed the topic to give the third degree to the notion of virtual reality and its suggested uses in libraries to shore the teaching of fact literacy.

III. PROPOSED WORK

Fig 1 depicts the flow of the proposed model, starting from how we created the 3D environment to how we added objects and interactions in the model. Data collection [6] is the first step for modeling any 3D environment. After data collection the design is built and the objects are created and added in the 3D environment. For adding interactions to the objects a script in C# has to be written. Fig. 1 depicts the library layout.

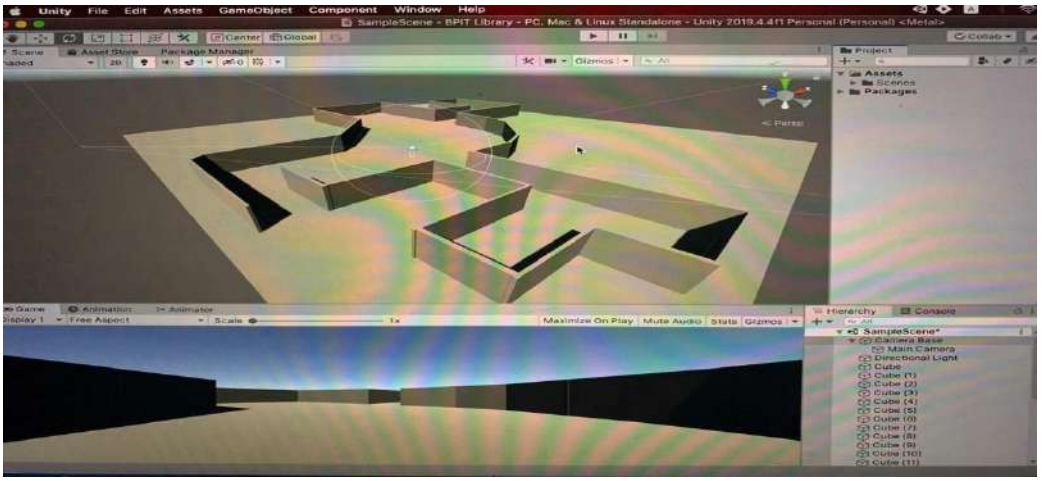

Fig 1: Layout of Library

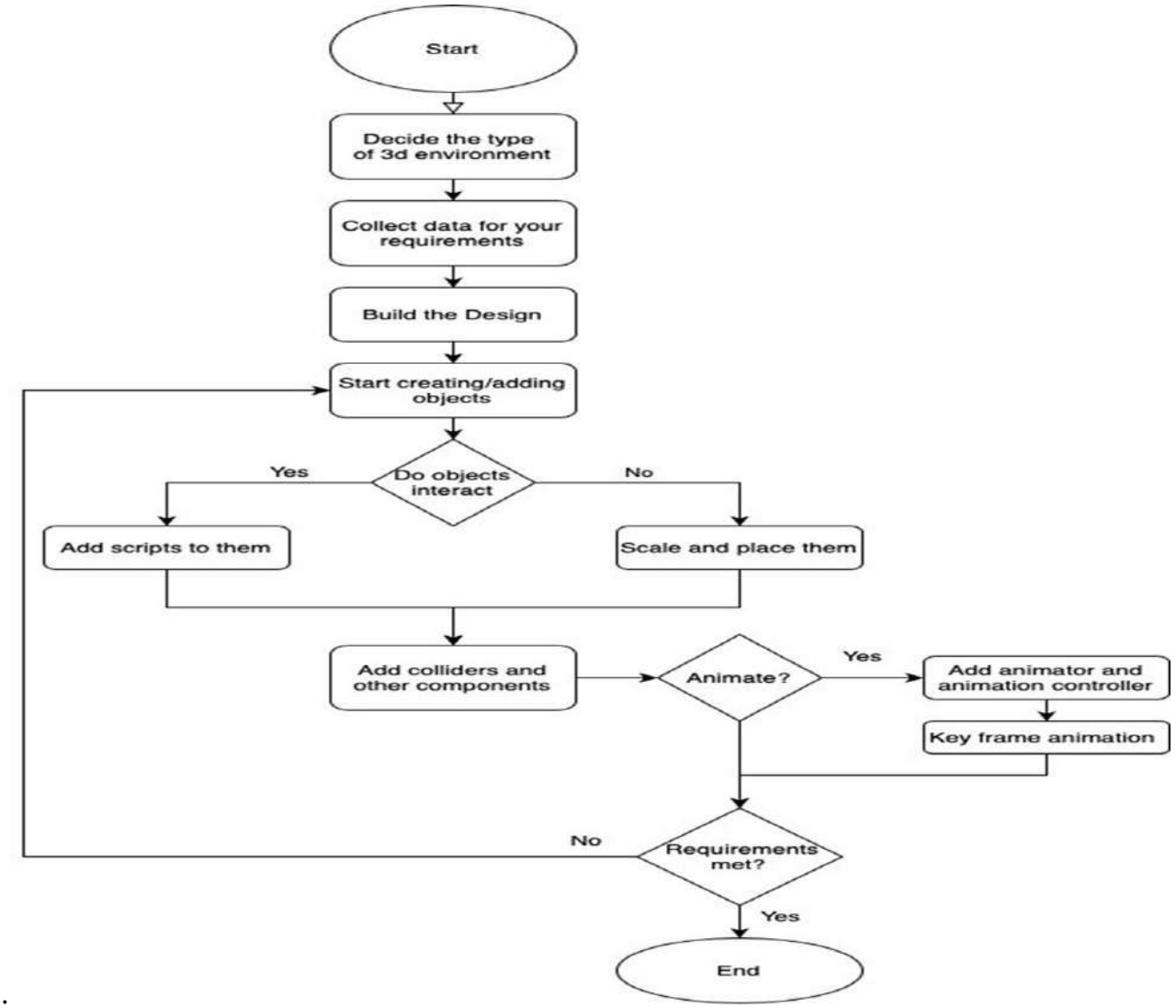

Fig 2: Flow chart for Creation of 3d model of Library

The first step to do in the model is to implement the layout of the library.

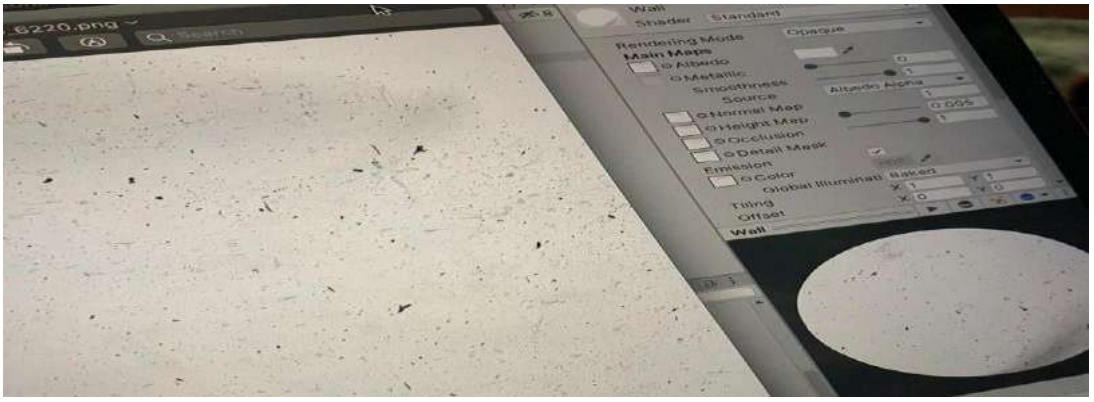

Fig 3: Texture of wall

A tour of the library was done and the data was collected [4] for different materials and texture of library objects. Material is the basic look which tells what the object is made of. Texture on the other hand provides it a more realistic feel. Texture mapping [9] was done to make this happen as in Fig.3.

A C# script is attached to the main camera to control the moving character. Logic for script (if camera angle is greater than 25 degree):

- Toggle angle = 25 degree
- Moving speed = 3.0f
- Vector3forward = vrCamera.TransformDirection(Vector3.forward)
- move = forward * speed

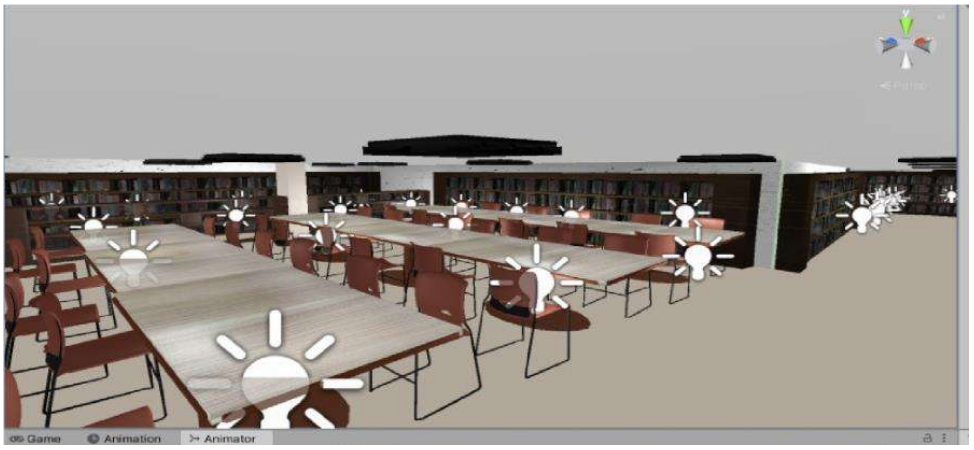

Fig 4: Background Lighting

Character controller for the main camera acts like a 3D character mesh which is attached to the main camera game object. It acts like a rigid body without the need for colliders is as shown in Fig 5.

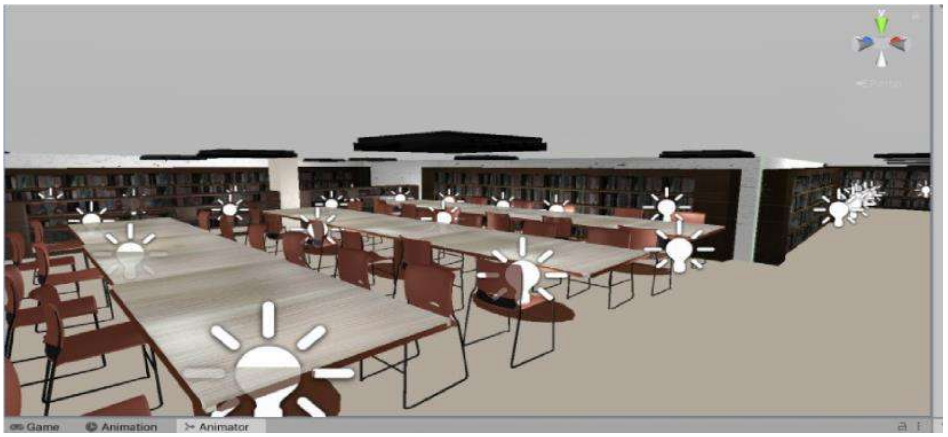

Fig 5: Character Controller for main camera

IV. RESULT AND DISCUSSION

Virtual reality provides an environment [7] which is presented to the user in a way that their precept is deferred and they accept it as the real environment. On a device, virtual reality is primitively experienced through the two of our five senses that is "sight" and "sound". With this project we have created a 3D virtual environment for a library in which the user can freely move around and interact with different interactive objects. It provides the user a fresh and new way of being in a place just while sitting at home or anywhere by putting on the headset and enjoying the environment around them.

V. CONCLUSION AND FUTURE WORK

Whilst the VR concept isn't new, the technology to power the VR is, as this technology delivers a seamless experience for the user. The bright side is that with nearly limitless applications, VR offers an abundance of opportunities in almost every aspect of our world, including education, design, commerce, gaming, tourism, medicines [5] and knowledge. Since many of us have already created things that never leave the web's digital space, it's not facile to imagine a primarily digital future which will be powered by a VR environment. Virtual Reality is no longer a fiction, it is integrated into our present and, in the future it will lead to a lot of advancement that will shape the future and it will be very beneficial to the industry. Some interactions can be added to the model in future which makes the user able to read books from the shelves.

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Light Stimulated Rat (LSR) Algorithm Based Multimodal Image Fusion for MRI Images

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Abstract - Fusion of MRI images enhances the level of information in a great way. The features of individual images not only get clubbed but the diagnostic approach for diseases will also get increased. In this research a detailed study on the image fusion strategies in medical images has been carried out. In this research paper a novel bio inspired optimization Light stimulated rat algorithm has been employed for Multimodal MRI Images Image Fusion. The proposed work has been compared with the state-of-the-art Fusion method and it has been identified that the proposed work out performs with great merit over the other fusion methods and the proposed research work can be considered novel for the transform based medical image fusion schemes. Discrete wavelet transform based MRI decomposition and reconstruction scheme has been employed in this proposed work.

Keywords--- fusion, information, medical images

I. INTRODUCTION

In the direction of diagnostic analysis with different medical modalities sufficient efforts are being done to extract meaningful features and hence information in the form of digital images so that any decision can be established about an ailment in the body[1],[2].From many years a lot of image processing techniques like image deblurring, image enhancement, denoising etc. have been evolved to extract out maximum information from the source medical images[3],[4].Multimodal Image fusion is also an important and growing technique in this domain. Two modality images are so fused with each other pixel wise that the third image consists of the features of both images [5], [6], [28],[29].The motive of this pixel level image fusion method is to eliminate the redundancy of image feature and common information and to reserve the complementary information from both images to the third image i.e. fused image[7],[8]. This process of image fusion not only conserves the memory of a computer system but also helps in reduction of decision time of a doctor or of an automatic disease diagnosis system[9],[10],[26]. Every modality of an image technology such as MRI, generates an image with a salient feature or information [11],[12],[27].

Some modalities provide information about the peripheral region of organs while some provide detailed information about central features of an organ. In case of human brain MRI imaging Flair and T2 are such two modalities for these purposes respectively.T1C and T1 are also two important modalities which provide the fluid information and information regarding minute discontinuities in the tissues of the brain respectively. In transform domain fusion methods such as wavelet based, contourlet(CT) ,non-subsampled contoulet (NSCT) and curvelet transform (CVT) etc. the signal processing like image decomposition at frequency level is performed on image coefficients .According to information measure ,the fusion technique is broadly grouped in three ,that is pixel, feature and decision. In the pixel class the direct operations are performed

on pixels of images to fuse[13],[14].In the feature class the operations are performed at frequency level to enhance the detailed prime features of images like edges, points and corners etc. At the decision class the images are fused by applying classifier rules and fuzzy logic etc. to the image coefficients [15],[16]. Fig.1 and Fig.2 provide a conceptual view about the medical modalities of MRI.

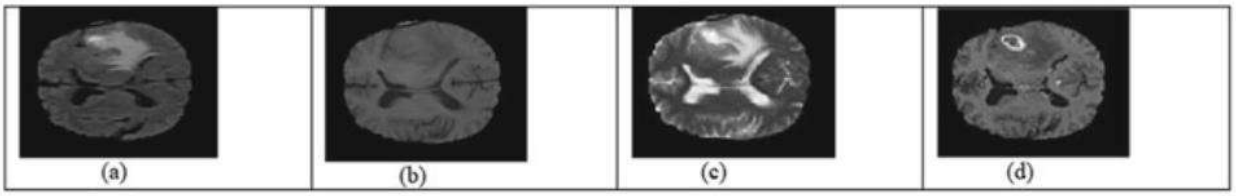

Fig.1 Dataset-1 modalities

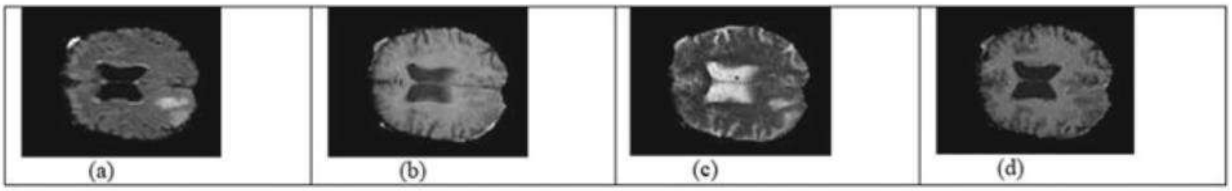

Fig.2.Dataset-2 modalities

The fusion result for above Fig 2 is shown in the result section in fig.7.

II. METHODOLOGY

This section discusses the methodology employed using Image Decomposition and Fusion rule

A. Image Decomposition

The methodology used here is basically a signal decomposition into different coefficients of frequency for individual images and further mix them into each other with in limits of signal processing and its operators[17],[18]. Fig.3 presenting the Schematic diagram of the proposed Image Fusion method.

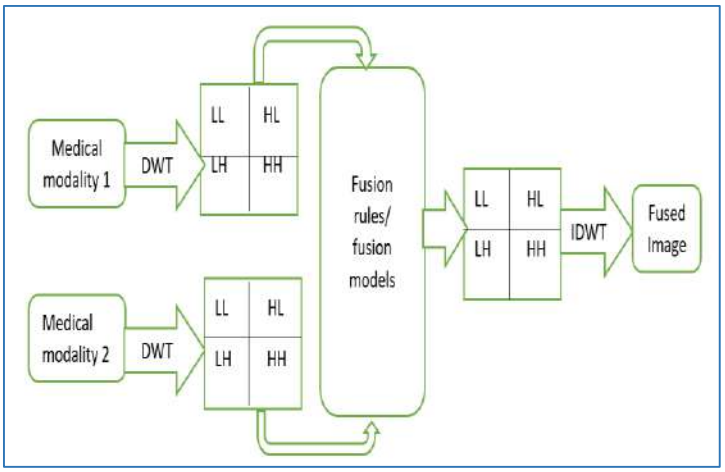

Fig.3 Schematic diagram of the proposed Image Fusion

B. Fusion Rule

In the fusion rule a metaheuristic scheme for optimization is applied. The strange behaviour of rats with exposure to light is mimicked in the fusion model [19-21]. The MI of each pixel is calculated and the way a rat finds the maximum displacement on light stimulation is modeled to raise the value of MI per pixel. Further the pixels are clubbed to each other and the final image reconstructed after the process of reconstruction by some appropriate transform tool [22-25].

RESULT AND DISCUSSION

The results for the proposed fusion scheme are illustrated in Fig. 4 to Fig. 7. The results have been evaluated qualitative as well as quantitatively. The evaluation measures values of mutual information and other parameters like RMSE and PSNR proves the merit of this fusion method. Two data sets from a famous MRI data set are tested .The proposed method is compared with three very renown techniques of fusion. These are Wavelet and Halo-whale method, SWT-NSCT combined method and simple NSCT method. Our proposed method is outperforming the compared one method. The effectiveness of the proposed method is deliberately explained in this section. Table I and Table II are providing a view of satisfactory results.

Table 1 Comparative analysis using dataset-1

Metrics	Wavelet + HW Fusion	SWT + NSCT	NSCT	Proposed
Mutual information	1.4673	1 4669	1.4299	1.5765
PSNR (in ffi)	37.8289	37.8848	36.8904	44.0957
RMSE	6.5101	6.5281	6.5409	5.4940

Table 2 Comparative analysis using dataset-2

Metrics	Wavelet + HW Fusion	SWT + NSCT	NSCT	Proposed
Mutual information	1.4612	1.4550	1.4508	1.4960
PSNR (in dB)	32.991	33.470	32.498	35.541
RMSE	10.0053	10.0510	9.9689	9.6404

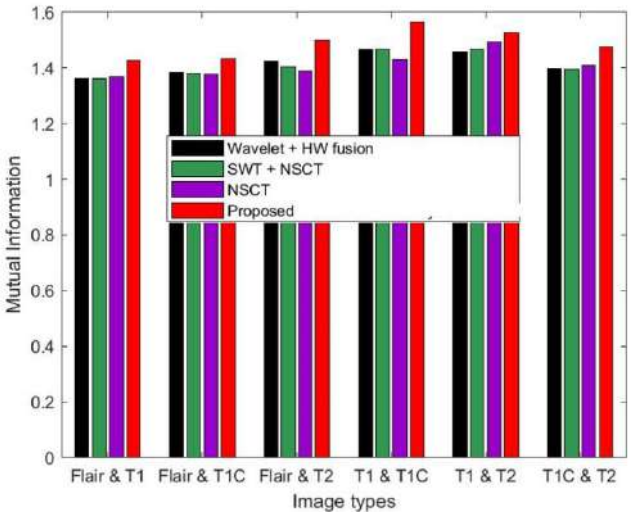

Fig.4.MI values for each modality set fusion

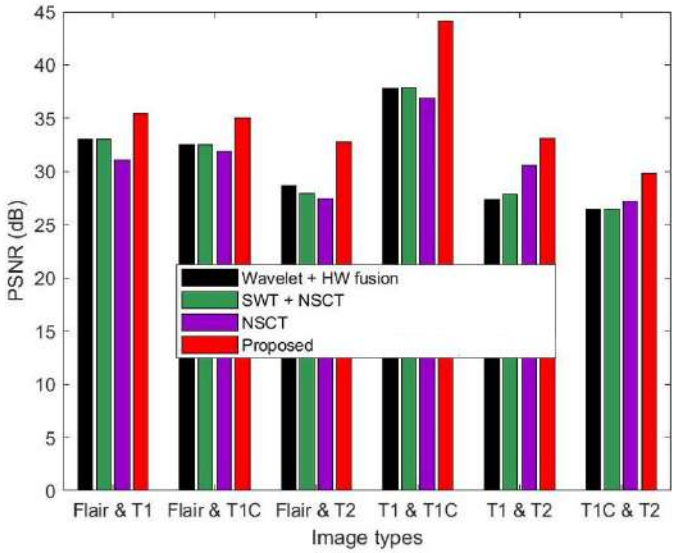

Fig.5 PSNR value for each modality set fusion

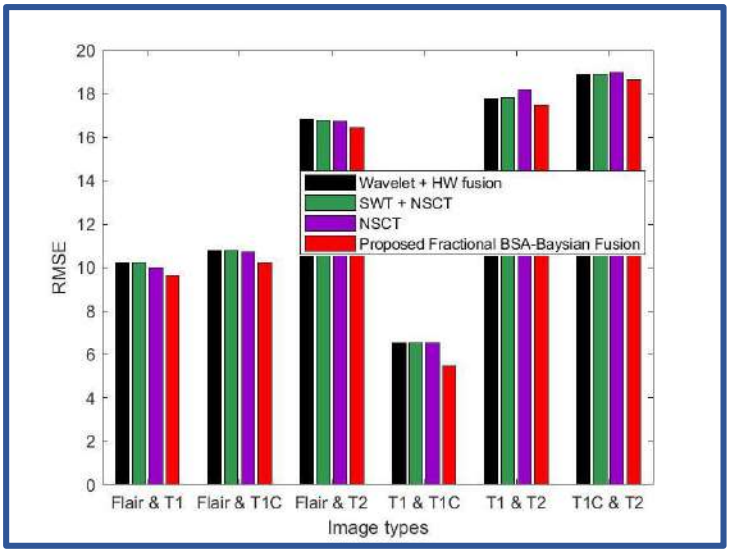

Fig.6 RMSE for each modality set fusion

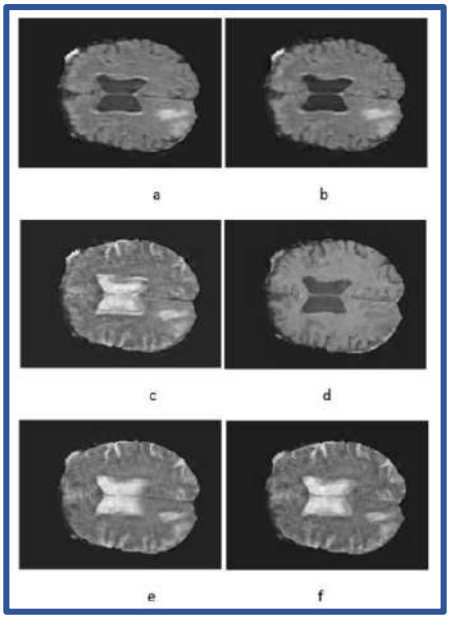

Fig.7 MRI Fusion

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Smart Secured Voting Tool Using Block-chain Technology in Peer-to-Peer Network

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Abstract- Electronic Voting (e-voting) is the well-known method of casting and/or counting votes electronically. This is a cost-effective and efficient approach for handling a voting procedure, which has the feature of being benevolent as well as presenting data and soliciting high safety. Procuring e-voting is the need of the day and can be accomplished using only by the domains of communications and net-working. The major concerns are the data privacy for e-voting. We have proposed a tool- E-Matdan using block chain for safe and reliable of e-voting. It is a three-step process, in step the mapping of a synchronized model of voting records based on Distributed Ledger Technology (DLT) is done to avoid fabrication of the votes. Secondly, on the using Elliptic Curve Cryptography (ECC), user credential model is made for validation of votes. Thirdly, a withdrawal model is made that allows the voters to change their vote before a preliminary to the decided deadline. By amalgamating the above constructions of different designs, we have proposed a block chain based e-voting scheme in P2P network. To showcase the work, using block chain an e-voting system is implemented on Linux platforms in the P2P network for sundry candidates.

Keywords--- Tensor, Gaussian, Decomposition, Corel-10K

I. INTRODUCTION

Democratic voting is the necessity of every Democratic country. The most familiar and easy voting technique was paper-based but now with so much advancement in technology, this casting of votes would save paper and minimize the cost of conducting elections. Another advantage of get ridding of this traditional paper based scheme with a new election system is to reduce forgery , booth capturing and other unfair means to a clean and fair elections [1].

Voting is the modus operandi to make a collaborative resolution or communicate an opinion among an assembly or a meeting or constituency [2]. Voting usually follows debates and discussions, controversies and election crusades. Since the 17th century, voting has been the accustomed technique by which contemporary exemplary democracy has set off. During voting, the individual to be elected is the one contesting the election, also known as the candidate of the election and the one who casts a referendum for their selected contestant is the voter. Customarily, the voter can vote in obedience to the list of candidate/contestant or vote for any other individual(s) he/she favors. Voting plebiscites must be anonymous and stamped by the voters in private kiosks so that no one else can discover out for [whom an individual is voting. Voting is also used in various other distinct privatized establishments and brackets, such as clubs, corporations, and volitional consortiums.

With the expeditious evolution of the Internet and information technologies, many run-of-the-mill offline amenities such as casting votes, sending/receiving mails, payments, are hiking up

to the online ones. Online voting is also well known as electronic voting (e-voting). E-Voting is an electronic means for registering and enumerating votes. E-voting helps us save time and endeavor with high productivity and pliability. Users of e-voting are balloters and election officials. The balloter/voter can proffer his/her votes in a computerized manner (electronically) to the election officialdom from any placement through the way of e-voting. The election administration is accountable for accumulating the votes from the balloters/voters. It is surely getting more and more recognition instead of the traditional method of voting. With the development of the Internet, e-voting became a crucial means of countless corporations.

A. E-Voting

Electronic voting machines (EVMs) are generally considered as weak machines for security concerns. Anyone who captures the machine or has access to it can interfere with it and can change the vote casts through that machine. Hence, there is a need to move one step ahead for this fair voting which is digital voting.

In digital voting the electronic devices, such as voting machines or an internet browser, are used to cast votes. The voting done through EVMs, which are at the polling stations, is also called e-voting. When the voting is done using a web browser is known as i-voting. Every mechanism has their pros and cons, the main concern in i-voting is the security issues. To handle the security the safest track is blockchain technology.

Blockchain technology was primarily designed for cryptocurrency- bitcoin. It uses the distributed architecture, and every transaction is stored as a block chain. It is a secure and robust system and can be used for digital voting.

B. Role of Blockchain in E-voting

A blockchain is a distributed, immutable, incontrovertible, public ledger with 4 main features – storage at many different locations, no single point of failure in the maintenance, every new block holds the reference the previous version of the ledger, creating an immutable chain and lastly every new block becomes a permanent part of the ledger. The first block in the blockchain is known as the ‘Genesis block’ or ‘Block 0’. [3] All this is based on the cryptography techniques, providing a more secure database than the previous databases. The blockchain technology can therefore be considered as the ideal tool for the voting process.

The design of blockchain in e-voting is based on DLT which is a list of blocks It is represented as a series of voting blocks chained sequentially chained to each other. The first block is known as the Genesis block. This is shown in Fig 1.

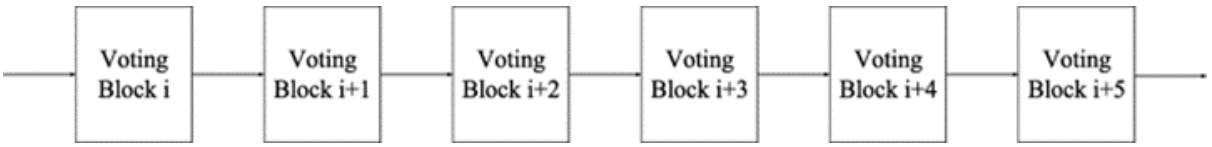

Fig. 1: E-Voting blockchain

In each block, there is a voter’s ID, voter’s signature, timestamp, vote and a digest (hash) as shown in fig 2.

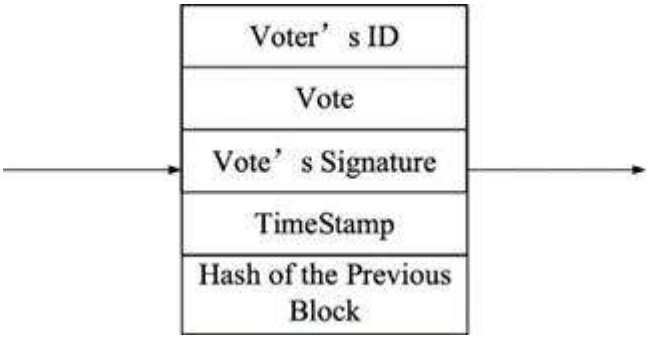

Fig. 2: A voting block

(1) Voter’s ID: Voter is the person who casts a vote to his/her chosen candidate. ID is assigned randomly to the person who has the right to vote.
(2) Vote: A ballot is assigned to the chosen candidate of the voter.
(3) Voter’s signature: A voter uses his/her private key to assign the vote in an encrypted manner. This encryption is done with the help of private key and hash generation. No one else can find out to whom the ballot is assigned.

(4) Timestamp: Submission of ballot is tracked by a timestamp. If two or more blocks have the same timestamp, the one with higher value of signature is preferred over others.
(5) Hash of the previous block: SHA-256 algorithm is used to compute the previous block hash value.
Thus, the blockchain-based e-voting scheme is immune to data modification and is non-repudiation.

C. Our Contribution

In our work, blockchain technology is used to improve the security of e-voting. Following are our contributions:
(1) A synchronized model of voting records has been designed based on DLT to avoid forgery of votes.
(2) A user credential model has been designed based on ECC to provide authentication and non-repudiation.
(3) A withdrawal model has been developed that enables voters to change their vote before a preset deadline.
By integrating the above designs, we propose a blockchain-based e-voting scheme, which meets the essential requirements of the e-voting process.
Following are the features of our blockchain-based e-voting scheme as follows:
(1) The blockchain-based e-voting scheme is public, distributed, and decentralized. Votes can be recorded from voters across the world using mobile or computers

(2) In blockchain-based e-voting schemes voters are allowed to audit and verify the votes inexpensively.

(3) The management of the database of votes is done autonomously and uses a distributed server of the timestamp on a peer-to-peer network.

(4) Process of voting on the blockchain is a workflow where voters regarding data security are marginal, which removes the characteristic of infinite reproducibility from e-voting.

The paper is organized as follows. Section1 deals with introduction. Section 2 deals with the related work. Problem formulation is described in the Section 3, Section 4 and its subsection deals with the estimation of the context information. Mathematical model for context estimation comes in Section 5. Section 6 deals with result and discussion .Section 7 deals with conclusion and future scope. Section 8 contains the reference part.

II. RELATED WORK

Block chain technology can be applied in many applications, here we have discussed its applications done in different manners and in different domains. Anonymous voting by two-round public discussion, proposed an addition of a self-tallying function to the 2-Round Anonymous Veto Proto-col (called AV-net). The AV-net provided exceptional efficiency compared to related techniques, the paper was focused on the dining cryptographers network (DC-net) and its weaknesses and proposed the AV-net as a new way to tackle that problem [4].The new protocol, like the AV-net requires no trusted third party or private channel. Participants execute the protocol by sending two-round public messages, but are significantly more efficient in terms of the number of rounds, computational cost and bandwidth usage.

In general, the new protocol divided electronic voting into to two classes:
1) Decentralized elections where the protocol is essentially run by the voters.
2) Centralized elections where trusted authorities are employed to administer the process.

The goal there-fore was to eliminate the use of a trusted third party altogether. The first round in the two-round protocol consisted of every participant to publish his public key and a zero knowledge proof (ZKP) for his private key. When the round finished, each participant checks the validity of the ZKPs and computes. In the second round, each participant needs to demonstrate that the encrypted vote was one of the valid voting choices without revealing which one. The authors in [5] have proposed the first implementation of a decentralized and self-tallying internet voting protocol with maximum voter privacy using the Block chain, called The Open Vote Network (OVN). The OVN is written as a smart contract for the Ethereum block chain. It is costing 0.73$ per voter. In this system the voting is conducted in an unsupervised environment. The OVN is also vulnerable to denial-of-service The implementation is feasible only for small boardroom voting, with the disadvantage that each voter has to download the full Ethereum block chain to confirm the voting protocol is being executed correctly.

A multi authority secret-ballot election scheme which would guarantee privacy, universal verifiability and robustness, where voters would participate using a PC, where the main consideration is the effort required of a voter [8]. In this model, voters cast their vote by posting ballots to a bulletin board. The bulletin board works as a broadcast channel with memory to the extent that any party can access its content but no party can erase anything from the bulletin board. The ballot does not reveal any information on the vote itself but is ensured by an accompanying proof that the ballot contains a valid vote. The final tally, the sum of all votes,

which occurs when the deadline is reached, can then be obtained and verified, by any observer, against the product of all submitted ballots. Which would ensure universal verifiability, due to the homomorphic properties of the encryption method used? While this proposal can scale up to large elections better than the previous ones, it does have limitations.

Netvote[9] is a decentralized block chain-based voting network on the Ethereum block-chain. Netvote utilizes decentralized apps for the user interface of the system. The Admin dApp allows election administrators to set election policies, create ballots, establish registration rules and open and close voting. The Voter dApp is used by individual voters for registration, voting and can be integrated with other devices (such as biometric readers) for voter identification. The Tally dApp is then used to tally and verify election results.

Netvote supports the three main types of elections as:
1) Open Election: Anyone may vote
2) Private Election: Only authenticated and authorized individuals may vote
3) Token-Holder Elections:

Another approach that only voters who operate accounts that have a balance of a designated compliant token may vote is implemented on Ethereum network. Here the people who do not even have an Ethereum wallet are allowed to vote. Users can give votes through their Android device or directly from their Ethereum wallets, and these transaction requests are handled with the consensus of every single Ethereum node for e-voting [10]. In [11], the Block-chain-enabled e-voting (BEV) is implemented to reduce voter frauds. Eligible voters can cast their vote through a computer or smartphone. BEV uses an encrypted key and tamper-proof personal IDs for e-voting. Block chain is offering new opportunities to develop new types of digital

services. In [12], block chain technology is used for electronic voting that could be used in local or national elections and help to increase the trust of voters as well as governments.

III. PROPOSED METHODOLOGY

The objective of this paper is to develop a safe and secure tool for voting over the internet and this tool is E-Matdaan. The step by step execution of the framework of the E-voting is, Firstly the user registers for an electronic ID, a user chooses a PIN number for its corresponding ID consisting of 6 numbers. A user will therefore identify himself in the voting booth by scanning his ID and providing his corresponding PIN number to authenticate himself to the system.

Using the following methods:

1) Any computer in any voting district can be used by any eligible voter to vote, by checking its authentication. As the wallet for the corresponding voter has information about the voter.

2) On successful authentication, the corresponding smart contract which is a ballot is prompted for choosing the candidate to which the user wishes to vote.

3) Voter now must re-enter the corresponding PIN number for his electronic ID for casting vote.

4) Once the vote is signed the data is verified by the district node. If the node accepts the vote data, the vote data must be agreed upon by the majority corresponding district node.

5) If the majority of district nodes agree upon the vote data, consensus for the particular vote has been reached. The user then receives the transaction ID for the corresponding transaction of his vote in the form of a QR-code and the option to print the transaction ID. After this, smart contract adds one vote to the party for which the user has voted for. This functionality is used for voting and displaying results at district level.

6) Now all the received and verified transactions are added as blocks in the block chain after the threshold time is reached. The block chain is then updated with the entry of every new block and each district node updates this copy of the ledger as in fig3.

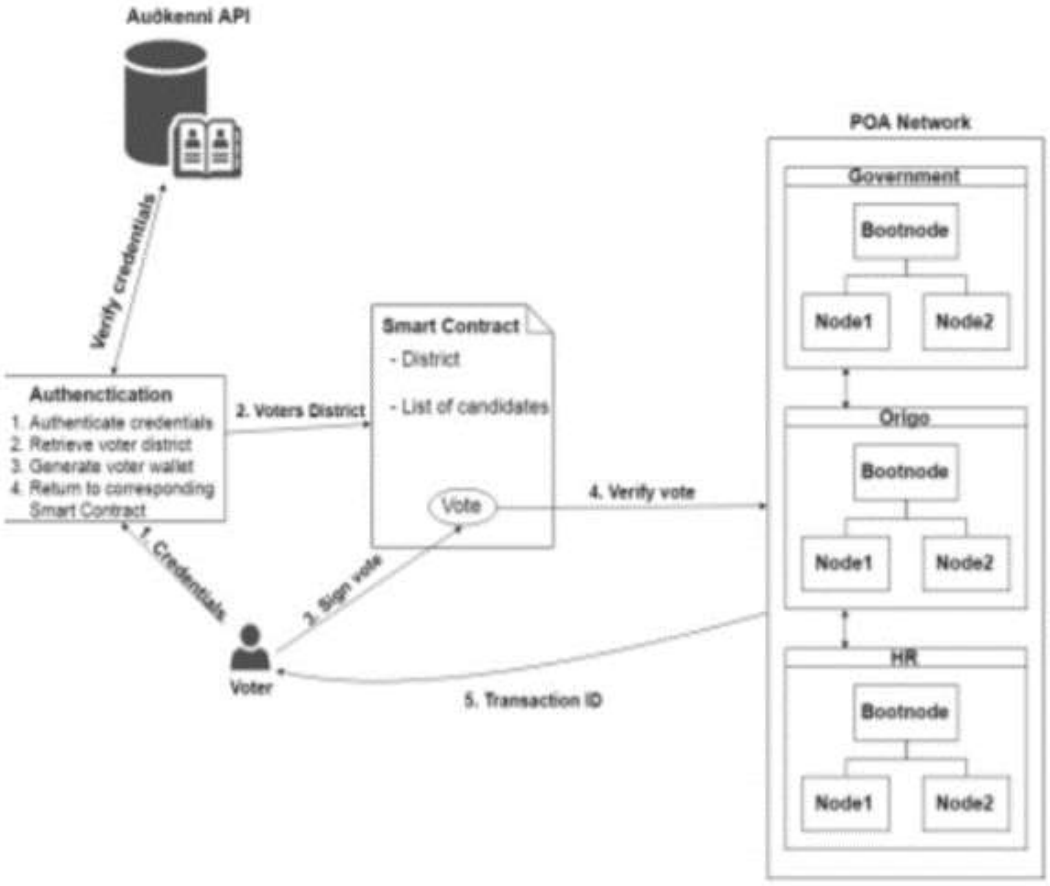

Fig. 3: E- voting proposed Methodology

IV. IMPLEMENTATION AND RESULTS

This section illustrates the design and functional phase of our application E-Matdan are shown in Fig. 4, 5, 6 and 7.

The different phases of the tool are discussed below:
1. **Registration Phase:** The Voter has to register itself first with its unique id and attributes such as name and mobile number. All this data is stored in the database.
2. **Login:** The voter after registration tries to login using password. After successful login, to cast their vote voter has to authenticate themselves using OTP authenticity.
3. **Blockchain Technology**: Blockchain encrypts the vote casted using Asymmetric encryption algo-rithm. A public key is provided by Blockchain, and private key is with the host. Public key is used for verification purposes by the ledger.
5. **Ethereum Network:** Ethereum network provides a framework for blockchain creation and stor-age. Every block is created and its details are stored in an encrypted ledger using Solidity. These created blocks are distributed among nodes which provide high fault tolerance to the system.

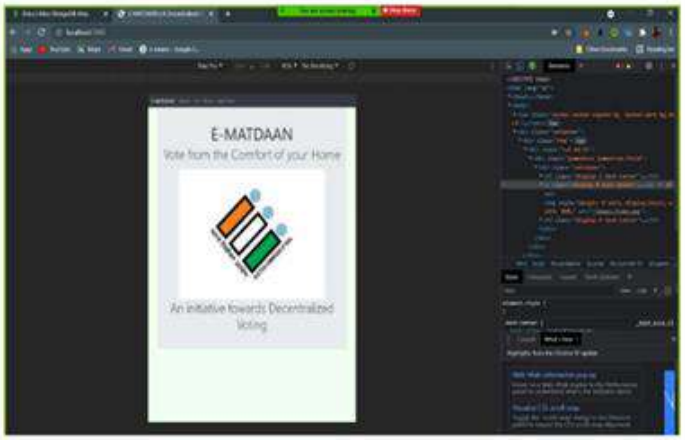

Fig. 4: Home Page of E-Matdaan

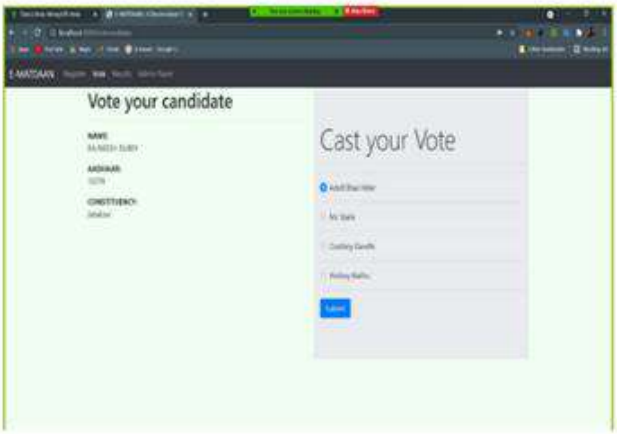

Fig. 5: Voting Page of E-Matdaan

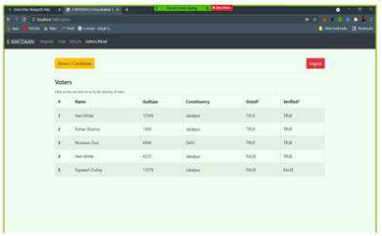

Fig. 6: Admin section of E-Matdaan

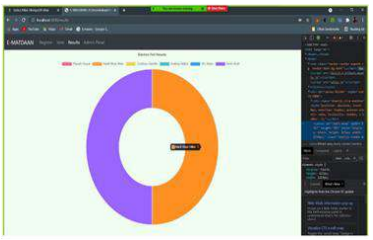

Fig. 7: Results Section of E-Matdaan

V. CONCLUSION AND FUTURE DIRECTIONS

In this research paper a smart and secured tool – E-Matdaan for safe and secure voting using block-chain has been proposed. The block chain has been implemented using the Ethereum network. The idea of adapting digital voting systems to make the public electoral process cheaper, faster and easier, is a compelling one in modern society. Making the electoral process cheap and quick, normalizes it in the eyes of the voters, removes a certain power barrier between the voter and the elected official and puts a certain amount of pressure on the elected official. It also opens the door for a more direct form of democracy, allowing voters to express their will on individual bills and propositions.

We have outlined the systems architecture, the design, and a security analysis of the system. By comparison to previous work, we have shown that blockchain technology offers a new possibility for democratic countries to advance from the pen and paper election scheme, to a more cost- and time-efficient election scheme, while increasing the security measures of today's scheme and offering new possibilities of transparency. Using an Ethereum private block chain, it is possible to send hundreds of transactions per second onto the block chain, utilizing every aspect of the smart contract to ease the load on the block chain. For countries of greater size, some measures must be taken to withhold greater throughput of transactions per second, for example the parent & child architecture [28] which reduces the number of transactions stored on the block chain at 1:100 ratio without com-promising the network's security. Our election scheme allows individual voters to vote at a voting district of their choosing while guaranteeing that each individual voters vote is counted from the correct district, which could potentially increase voter turnout

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Smart Agricultural Robot

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Abstract: This paper represents technological enhancement in the field of agriculture. Agriculture is the most important part of the country's economy as it gives great contribution to the development of the country. Here we are proposing a wireless agricultural robot which will perform basic operations done in farming activities so that it will reduce the labor size, time and energy required to perform the different tasks. The concept of smart agricultural robot represents a Wi-Fi controlled robot that will perform digging mechanism, seed sowing mechanism and water irrigation after sensing the temperature and moisture of soil. Moreover, the proposed mechanism gives a solution for farmers to automate irrigation. Farmers may make decisions based on monitoring different parameters like humidity, soil moisture, temperature etc received on his mobile app.

Keywords--- Agriculture, Robot, GPS, GSM, ARM7

I. INTRODUCTION

Few years back farmers were using bullock to perform different agricultural task, after some advancement in the technology farmers are now using tractors for seed sowing operations but still there are some tasks which need to be performed by farmers manually, so to reduce man power and efforts we are designing a smart agricultural robot which will be controlled by farmers using wireless technology, and it will perform basic farming operations. Many systems were developed in past years to provide the best solutions in a field of agriculture which results in greater yield of different crops. Nowadays technology is becoming a great contributor in this field as with its advancement systems are developed using microcontrollers to perform different tasks like surveillance, fruit picking and other operations as well. A precision agriculture robot for seeding function was being researched in which a robot was developed which helps in sowing seed to specific depth according to crop requirement [1]. A Smart Farming System Using Sensors for Agricultural Task Automation was developed which works with different sensors to predict the moisture and nutrient contents of soil and works as water irrigator [2].

A Smart farming using IOT system is being researched which works with obstacle sensor and other sensors and performs cutting and spraying functions [3]. A GPS based autonomous agricultural robot was developed which uses GPS and magnetometer and performs plowing, leveling, and gives message indications to start the irrigation process [4]. By integration of hardware and software automated devices can carry out various processes like seed sowing, irrigation, sensing of temperature, humidity and fertilization. Various Wireless networks are

utilized in respect to control the action from the remote place. It may be done using GSM, Sensors network, Zigbee, Bluetooth and IOT [5-8].

Table I: Comparison table to summarize the differences with other systems

Parameters	Precision robot	Smart Farming using Sensors	Smart Agricultural robot using IOT
Microcontroller	ARM7	Ardiuno	AVR
Technology used	GSM based	IOT based	Telnet based
Working	Precise seed sowing operation	Sensing moisture and perform irrigation	Sense temperature, moisture, distance and perform basic operations
Cost	Expensive	Low cost but limited operations	Cost effective
Operations	Perform seed sowing only	Performs irrigation only	Performs irrigation seed sowing and digging.

The proposed architecture uses the Wi-Fi module to send the sensed data from sensors to farmer mobile app. Farmer can also give commands from his phone to the robot present at his fields to perform the needed activity. A summary of various parameters which are helpful in opting the solution among the present are listed in comparison Table I .This paper will work on different parameters like temperature and soil moisture content according to crop requirement. The main objective is to build a general purpose robot that will help in performing different

operations related to farming. This paper also aims at using cost-effective technology which will be affordable and easily accessible to the farmers. The paper is organized in three main subsections. Section II describes the architecture of the proposed robot. In section III the working of the proposed prototype will be discussed. Section IV will investigate the final hardware Robot and the results.

II. ARCHITECTURE OF PROPOSED ROBOT

In past years many systems were developed which were limited to performing one or two tasks like seeding, water irrigation and weeding. Those systems were based on wireless technologies like GPS which makes the system expensive and prohibitive for farmers. This paper strives at developing a system using inexpensive and lightweight components which makes it low-end and compact. The aim is to provide a cost-effective system for farmers and to reduce labor, manpower, noise and it helps in reducing pollution created by tractors these days. Fig.1 depicts the block diagram for the smart agricultural robot which senses the temperature and soil moisture of a field and performs other agricultural tasks like digging, seed sowing and water irrigation using mobile applications with the help of Wi-Fi module.

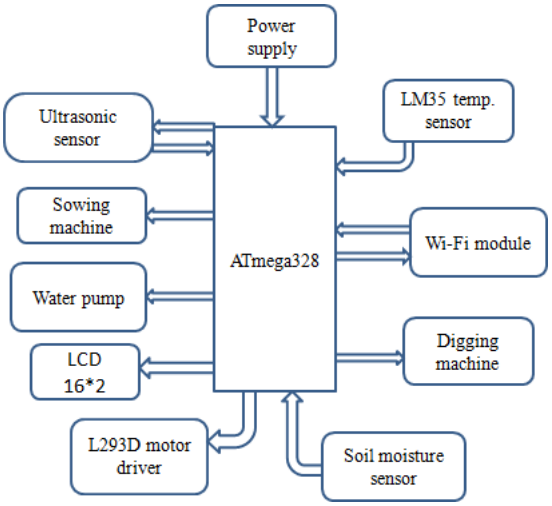

Fig.1: Block Diagram for the proposed smart agriculture system

III. METHODOLOGY

In agriculture, parameters like temperature and soil moisture are important for crop production as these parameters will detect whether a particular crop can be grown in that area or not. The

temperature of field is observed using a LM35 temperature sensor, in accordance with this water content of soil is sensed by soil moisture sensor and an ultrasonic sensor is used to detect obstacle in the fields and also detects the fencing of field 50cm beforehand, all these conditions are displayed on 16×2 LCD. When conditions of field are perfect for a particular crop then user can send command to the robot using a mobile application which is connected with the Robot through a Wi-Fi module named as ESP8266, this module will receive commands from mobile application and send it to AVR microcontroller then it will send these commands to other components to perform a desired task.

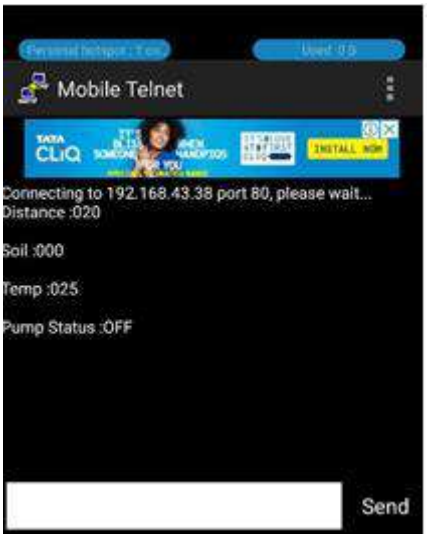

Fig.2. Screenshot of Mobile application

Fig.2 shows the screenshot of a mobile application used by the farmer to control the proposed smart agricultural robot.

Table II: List of Operations given on mobile app

Operations	Task performed
Forward#	Moves robot in forward direction
Backward#	Moves robot in backward direction
Right#	Moves robot in right direction
Left#	Moves robot in left direction
Sow#	Rotates the seed bottle to drop seeds
Up#	Moves digger upward
Down#	Moves digger downward
Pump on#	On water pump
Pump off#	Off water pump
Send status#	Send temperature, moisture content, distance to app
Stop#	Stops movement of robot

Table II. Elucidates the operations performed on pressing different keys on mobile applications. By a single click on the operation tab, users can control the robot at fields to perform the appropriate activity to yield the crop. The input is given to ATmega328 IC through the Wi-Fi module and output is obtained at the mechanical parts of the robot. For moving the robot forward or backward DC motors are connected with wheels which will move the robot easily on normal as well as rugged fields. For digging mechanism, a clipper is connected with the help of a dc motor which will dig soil when a command to perform digging operation is received using Wi-Fi module. To perform seed sowing operation a bottle with holes in it is connected to the system using a DC motor so that seeds can be dropped in soil easily by rotating the bottle using a DC motor. When the user sends a command for seeding operation from a mobile application the microcontroller will receive the command and send it to the DC motor which is connected to the seed bottle and make it to drop seeds in soil. In order to make soil wet or perform water irrigation a submersible DC water pump is connected in a system which will receive command through Wi-Fi to plunge water in soil which will help in keeping moisture content of soil as required. An ultrasonic sensor is added in the system which detects fencing of the field before 50cm of reaching the fencing so that when sensor detects the fencing it will stop and send message to user that obstacle is detected on mobile app of user.

Fig.3 Final proposed prototype with LCD display

Fig3 shows an image of the final robot which will perform basic agricultural tasks and a LCD display to show the reading taken up while the experiment has been performed. A small piece of land is used to perform the experimental setup to test various operations as listed in Table3.

IV. RESULTS AND DISCUSSION

The main aim of developing a multipurpose system is to reduce time and energy consumed in performing agricultural tasks. This system also aims at making a cost-effective aid which can replace existing systems and help in efficient crop production. This robot will perform basic operations of agriculture easily and it will be beneficial for farmers to get solutions to their problems in hand. To check the performance of the robot, experiments are done on both dry soil and wet soil and moisture content is displayed on display for both soils.

Fig.4. LCD output for the conditions of Dry soil

Fig.5. LCD output for the conditions of Wet soil

When experiments were performed the time required for performing different operations have been calculated. Table 3 presents the time delays during the various operations performed. This

system will perform basic agricultural tasks in a very less time and help in reducing labor and manpower.

Table 3: Calculated time delays

Operations	Task performed	Time delay
Connection power supply	Supply power to whole circuit	2-3 secs
Wi-Fi connection	Connects robot to internet	5-6 min
Movement		
Forward	Moves robot forward	2-3 secs
Backward	Moves robot backward	2-3 secs
Left	Moves robot left	2-3 secs
Right	Moves robot right	2-3 secs
Irrigation		
Pump On	On water pump	2-3 secs
Pump Off	Off water pump	2-3 secs
Sowing		
Sow	Rotates the seed bottle to drop seeds	2-3 secs
Digging		
Up	Moves digger upward	2-3 secs
Down	Moves digger downward	2-3 secs
Send status	Send parameters details to app	4-5 secs
Stop	Stops movement of robot	2-3 secs

VIII. CONCLUSION AND FUTURE SCOPE

A smart agricultural robot is developed to perform basic tasks of agriculture i.e. sensing temperature, sensing moisture content of soil, digging, seed sowing and water irrigation. This robot is developed using low end and accessible components which makes it cost effective. In

order to sense temperature LM35 temperature sensor is used and for observing the moisture content in soil, moisture sensor is used which helps in providing greater yield of different crops. Technology used in this system is easy to understand which makes it user friendly. In this system Wi-Fi module is used for serial communication between AVR microcontroller and mobile application which is easily accessible. The design of the robot is less complex and manageable which proves to be a quick fix to farmer’s problems. This robot helps in reducing man power, labor, cost, noise and it helps in decreasing pollution created by tractors these days. This robot can be a good choice over tractors which are being used now as it is an environment friendly system. For further advancements we can use solar panels to provide power supply to the system which makes the system less dependent on electricity because there are large amounts of power cuts in rural areas. We can also add different operations in the robot like spraying pesticides, cutting weeds etc.

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Camera Model Identification with Convolution Neural Network

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***Abstract*—With the vast improvements in multimedia, image forgery has become a growing threat to forensics. In this research, we present a deep learning-based strategy for tracing an image back to its original camera model. We categorized a set of seven camera models; however the concepts presented in this research can be easily expanded to classification of almost any number of models based on the training data provided to the system. A comparison of dense neural networks and convolutional neural networks was conducted, and both of these cutting-edge techniques produced a robust solution.**

***Keywords*—Dense Neural Networks, Convolutional Neural Networks. Digital Images, Camera model identification.**

I. INTRODUCTION

With the advent of technology and the recent influx of gadgets, cyber forensics has become a hotbed of computer related research. In today’s technology oriented world, there is no shortage of digital footprints and these can inadvertently help in solving criminal cases, finding individuals, carrying out relevant research, etc. [1]. For more than a decade, identifying the brand and model of the camera that recorded a picture has been a significant study subject in information forensics [2]. Determining the type of camera used to acquire an image can aid in determining its source. Although metadata may convey information about the origin of a picture, it is simple to change [3]. As a result, signal processing is developed to determine the inherent traces left on a picture after the digital cycle. This has applications in proof verification because it substantially reduces the time required by using digital technology; an algorithm to fix this can be placed on smartphones, enabling real-time verification while eliminating the logistics of transporting image/video proof to a forensic lab [4]. It will be far more crucial in a country like India due to the absence of judges and an increase in case time. Up until now, hand-crafted filtering and feature extraction techniques have largely been used in camera source identification and other image forensics [5]. However, following the success of picture recognition reported in a number of deep learning based studies have recently appeared. The camera model problem illustration is given in Fig. 1. To create an algorithm, we must first comprehend the process of capturing a digital image. Fig. 2 depicts the pipeline and several steps of the picture capture process. In reality, current forensic research has proven that each physical and algorithmic component creates an inherent trail that is individually identifiable to the camera model, and these remnants may be employed to connect the image to the model of its manufacturer [6].

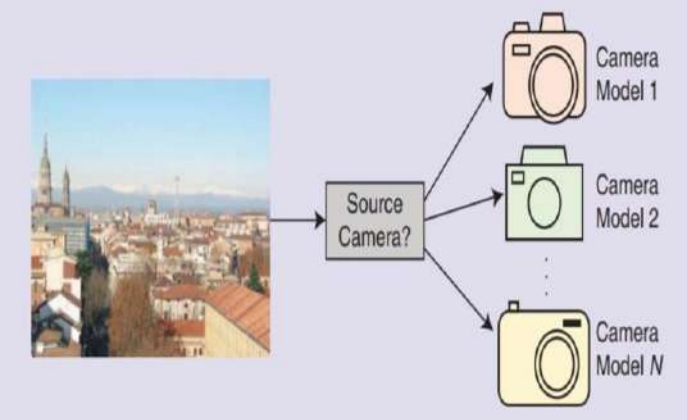

Fig.1. Camera Model Problem Illustration

Various camera types, for instance, employ different lenses, which might inject distinct noise into the image. The camera gathering process pipeline is given in Fig. 2. According to recent forensic research, each physical and algorithmic component generates an inherent trace that is uniquely traceable to the camera model [7]; those remnants may be utilized to link the image to the model of its manufacturer. For instance, various camera types employ different approximation demo-spacing methods.

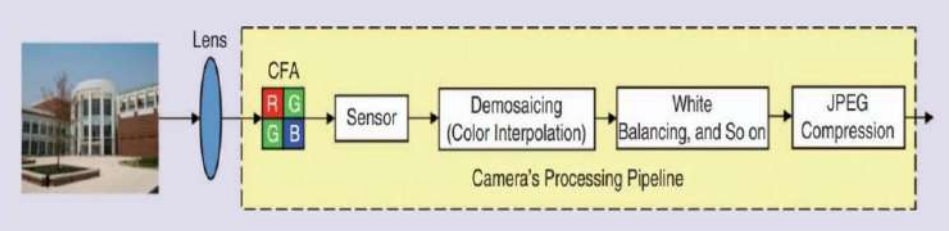

Fig.2. Camera gathering process pipeline

In this research article, we present a convolution neural network based solution for the posited problem. We first articulate the problem in section 1. In section 2, discuss notable work done in the recent past that has been conducted in this field. Sections 3-5 are dedicated towards a description of the presented proposed approach. Section 6, presents the results followed by Conclusion and Future research directions.

II. LITERATURE REVIEW

In previous works, rule based approaches have been explored. Feature engineering is done by domain experts and despite the fact that these methods have produced very good results but they are limited to their respective models and data, their extension is not guaranteed to work on unknown camera models as they don’t have the ability to adapt to new data sources [8]. Statistical models have been developed to model the sensor noise pattern to classify the model of the camera used [7], [8]. Features based on JPEG compression have been built to solve this challenge [9].

For a brief overview of the research in this field, survey papers can be referred to [10]–[13]. Hu et al. [14] suggested three types of local characteristics for pedestrian portrayal: Hierarchical Weighted Histograms (HWH), Gabor Ternary Pattern HSV (GTP-HSV), and Maximally Stable Color Regions (MSCR), which could impose limiting factors on the part-level, pixel-level, and blob-level, including both. Based on the symmetry and asymmetry perceptual concepts, Bazzani et al. [15] proposed the Symmetry-Driven Accumulation of Local Characteristics (SDALFs) to identify three complementary characteristics for pedestrian photos. Yang et al. [16] created the Salient Color Names-based Color Descriptor (SCNCD) to compute colour name patterns across multiple colour models in order to manage lighting fluctuations. The Local Maximal Occurrence (LOMO) [17] technique seeks to overcome viewpoint variations by maximizing the frequency of extracted features of horizontal areas. There was a time when hand-crafted features were popular. [18]–[19] Prior to the widespread adoption of deep learning technologies in humans Gheissari et al. [20] used normalized colour and salient edge histograms to depict pedestrian pictures that are resistant to changes in surroundings and aspects.

III. ARTIFICIAL NEURAL NETWORKS

Artificial neural networks, the architecture of which is influenced by the biological brain, [21] have been known for a long time and have historically been able to tackle certain types of issues. However, more recently, neural network architectures that contained layers of hidden neurons (in addition to the input and output layers) were developed, and it is this added degree

of complexity that enables deep learning and gives a more powerful set of problem-solving capabilities [22-23]. The general model of the deep neural network is given in Fig3.

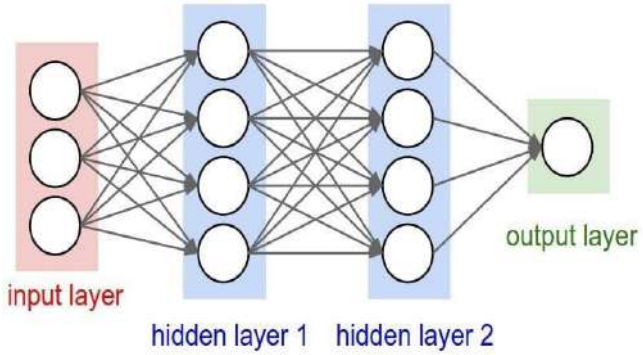

Fig.3. Deep Neural Network model

Since ANNs have such a wide range of architectures, there is no universally accepted neural network description. The ability to approximate nonlinear functions and the possession of adaptive weight sets are two common aspects of all ANNs [24].

IV. CONVOLUTION NEURAL NETWORKS

Convolution Neural Networks are a class of deep learning algorithms that are based on the mathematical operation of convolution [25]. These powerful neural networks that derive

inspiration from the natural world form the backbone of the computer vision industry. A layered neuron architecture is employed here and the spatial characteristics of the images remain intact which is one of the main driving forces behind their large-scale success [26].The general model of a convolution neural network is given in Fig. 4.

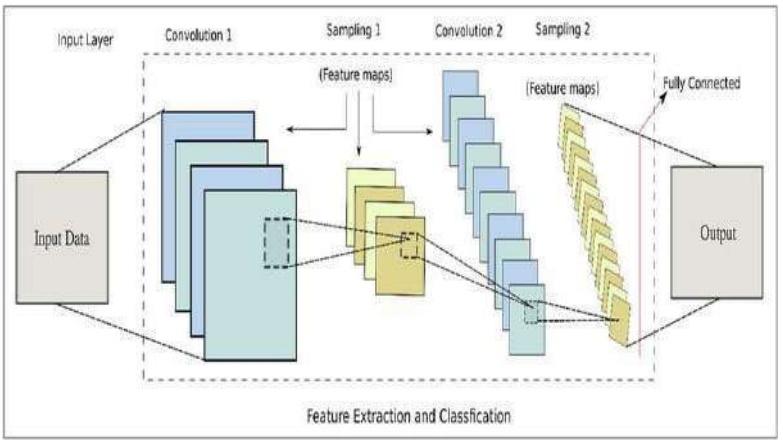

Fig.4. A general Model of a Convolution Neural Network

In keeping with the general rule of thumb when it comes to convolutional neural networks, the first few layers are charged with detecting low-level features and the deeper the network is the more details are detected. The matrices are called as kernels are convolved, i.e., a weighted sum of products is taken, with the image [27]. This exercise is repeated multiple times often coupled

with pooling operations to reduce image dimensionality. Some combination of dense/ fully-connected layers is also often used to derive meaningful insights [28].

V. EXPERIMENTAL SETUP

To verify our model’s efficiency and generalization capacity, we will partition the dataset into two sets: training and validation. The training set is used to train our model so that the CNN may learn high-level characteristics from it. The test set and train set do not intersect since doing so would result in the leaking of validation set information into training, rendering the split ineffective. Our issue is primarily one of categorization. We will utilize the Dresden database, which is used to create benchmarks for numerous image related challenges in the field of forensics, making comparison simple.

To stay below our computational budget, we will create our model for 7 distinct camera models, making it a 7 multi classification task. The resolution of each image was modified to 100*100*3. In training and testing, around 13000 photos were used.

A. DENSE NEURAL NETWORKS (DNN)

The first approach employed is a basic dense connected neural network with a softmax function as the last layer. Cross entropy loss is the definition of loss, while accuracy is the assessment metric. We also look at the confusion matrix to observe how the DNN performs with various models. The model is based on local Fourier characteristics and a local binary pattern.

These characteristics capture the local variance in the image. We acquire roughly 250 features for each image once we extract these features; hence our training set has the shape (10000*250).

The network's weights are randomly initialized, and RMS prop is used to update gradients. At highly linked layers, activation ReLU is utilized, whereas in the softmax layer, sigmoid is used. It took a day for the training to come together. The accuracy of 0.82 has been achieved on the test set. The model's parameters considered are as in Table1.

Table.1. Summary of the model generated

LAYERS	SHAPE
input 1 (input layer)	(None, 250)
Dense 1 (dense)	(None, 1000)
Dense 2 (dense)	(None, 512)
Dense 3 (dense)	(None, 512)
Dense 4 (dense)	(None, 256)
Dense 5 (dense)	(None, 128)
softmax$_1$(*dense*)	(None, 7)

B. CONVOLUTION NEURAL NETWORK (CNN)

The second strategy is based on CNN, a specific neural network design for image-based challenges. Convnets, which have demonstrated effectiveness in recognition and classification, will be used in this design. Back-propagation is used to update the weights, the Adam optimizer to update the gradients, and the leaky-ReLU activation function in convolution layers and dense

layers. Convolution layers are designed to extract features, and as we go deeper, more advanced features can be extracted, and finally convolution layer, the output is flattened and fed to a dense layer, after that we have another 2 dense layers and then in the final layers which is the softmax layer, we make calculate the probabilities associated with each class for a particular instance.

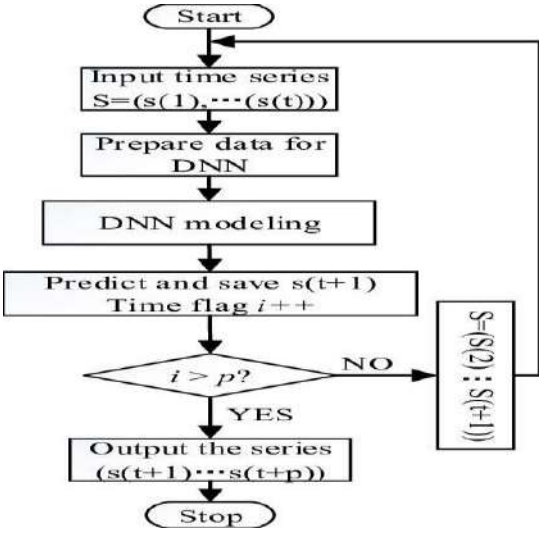

Fig.5. Flowchart of DNN training

Training took the same time as above; we made sure the amount of parameters in this is the same as the previous approach to see which architecture makes better use of the parameters.

The flowchart of the architecture of DNN and CNN training model are as in Fig.5 and Fig.6. An Accuracy of 0.91 has been achieved for the test set.

Table2. Confusion Matrix for DNN

	0	1	2	3	4	5	6
0	0.82	0.07	0.05	0.01	0.04	0.01	0
1	0.07	0.83	0.02	0.03	0.01	0	0.04
2	0.05	0.02	0.84	0.08	0.01	0	0
3	0.01	0.03	0.08	0.79	0	0.08	0.02
4	0.04	0.01	0.01	0	0.84	0.07	0.03
5	0.01	0	0	0.08	0.07	0.789	0.054
6	0	0.04	0	0.02	0.03	0.054	0.832

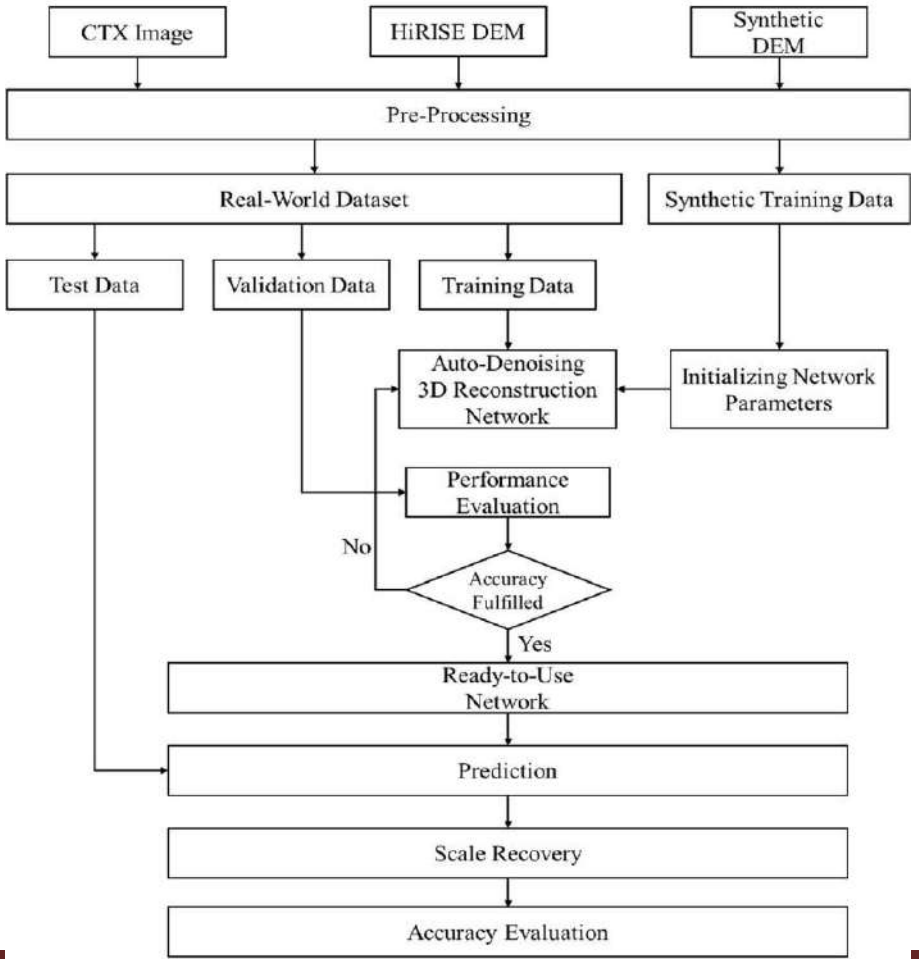

Fig.6. Flowchart of the CNN training process

VI. RESULTS

Even though we didn’t have a huge dataset and access to high-end PC, but from the above results, we can infer that CNN performs better than a simple DNN, as CNN is able to model spatial features we can assume that a camera model leaves particular kind of spatial noise in the image which can be modeled mathematically.

Table2. Summary of the model generated

LAYERS	SHAPE
input1(InputLayer)	(None, 100, 100, 3)
batchnormalization1	(None, 100, 100, 3)
conv2d1(Conv2D)	(None, 100,100, 16)
batchnormalization1	(None, 100, 100, 3)
conv2d1(Conv2D)	(None, 98, 98, 16)
maxpooling2d1	(None, 46, 46, 16)
conv2d1(Conv2D)	(None, 46, 46, 32)

batchnormalization1	(None, 46, 46, 32)
conv2d1(Conv2D)	(None, 42, 42, 32)
maxpooling2d1MaxPooling 2	(None, 16)
Dense2(dense)	(None,512)
Dense3(dense)	(None,512)
softmax1(dense)	(None, 7)

A dense neural network based and a convolution neural network based methods yielded accuracy values of 82% and 91% respectively.

Table.4. Confusion Matrix for DNN

	0	1	2	3	4	5	6
0	0.94	0.02	0.01	0.02	0	0	0.01
1	0.02	0.92	0.02	0.01	0.03	0	0
2	0.01	0.02	0.82	0.05	0.02	0.03	0.05
3	0.02	0.01	0.05	0.85	0.04	0.03	0
4	0	0.03	0.02	0.04	0.91	0	0
5	0	0	0.03	0.03	0	0.92	0.02
6	0.1	0	0.05	0	0	0.02	0.92

VII. CONCLUSION AND FUTURE SCOPE

This paper has proposed a robust methodology to trace back an image to the camera model that was used to capture it. A dense neural network based and a convolution neural network based methodologies have been employed. Both methods yielded useful results with accuracy values

of 82% and 91% respectively. Variations of CNN and a much deeper network with skip connection can be used to achieve higher accuracy. We can also use pre trained networks like the Inception module, GoogleNet to harness the benefits of transfer learning. An interesting route would be to apply Capsule nets to model spatial relationships more concretely.

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Importance of values and Ethics for teachers: A reality check for the Contemporary Indian Education Sector

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Abstract- Morals and good values are the building blocks of the character of a person, thereby, of the society as such. Off late, there has been a rampant degradation of ethics and values, pervading all cross sections of the society in terms of age, gender and professions. However, the most potent threat to mankind stems from this degradation pervading the education sector. Teachers being the nurturers of future generations of this country, there is an immediate need to arrest this rot in the system and ensure a value based and ethical education system.

Keywords---Morals, Ethics, Ethics in Education, Ethical Conduct, Value Based Conduct.

I. INTRODUCTION

"The function of education is to teach one to think intensively and to think critically. Intelligence plus character – that is the goal of true education."~ Martin Luther King, Jr. (1929-1968) [1]. Morals and values, since time immemorial, have been recognised as the bedrock of human character [2]. History has always regarded us as supreme, the men and women of honour and character. There exist, in history as well as in mythology the world over, numerous counts of persons of virtue giving up everything, including – in some cases – even their lives, to honour their word. That, alas, was history! Those were the times when even the wars were fought with respect and honour for one's enemies, in an ethical manner. It was against the warriors' creed to attack an unarmed opponent or to attack an unprepared enemy from behind. Such morality was founded upon the education of the young amidst an atmosphere of ethics and sound morals.

Today, the world is seeing a constant erosion of morals and values in a never-ending quest for material gains and the greed for power. Surprisingly, while almost every sane mind does recognise this exponential degradation of values, it is also their belief, more or less, that very little can be done to arrest this downfall. While the degradation of morality and values is evident across all sections of the society and assuming monumental proportions, no other field is affected more seriously by this problem as the education sector. The most potent threat to our future stems from the decline of ethical and value based conduct among the teacher, because teachers are the nurturers of future generations. Teaching has always been regarded as the noblest and, arguably, the most challenging profession. It is expected of a teacher to foster in the minds of their pupils the belief in leading an ethical life, following good morals and values. In the recent years, owing to a number of incidents that have taken place, it has oft been commented that the morals, values and ethics in the profession of teaching have also severely eroded. There is an immediate requirement for introspection, to ascertain the extent of evacuation of morality and values from the education sector and also to ensure that the changes in the society notwithstanding, the education sector must be insulated from this erosion of morals and values.

II. AIM

The aim of this paper is to examine the relevance of morals and values for the higher education sector, highlight their prevailing state in India and to suggest some measures to ensure moral and ethical conduct by the *teachers and students. "Leadership is a potent combination of strategy and character, but if you must be without one, be without the strategy[3]" ~ General Norman Schwarzkopf ethics originated from a value based upbringing.*

III. MORALS, VALUES AND THE TEACHER

A. Morals, Values and Ethics

Character is the most important asset for a man. Nothing describes the importance of character for a human being better than the above mentioned statement by General Norman

H. Schwarzkopf, who led the US military in the Gulf War of 1991. He emphasized that character was more important for warriors, than even military strategy. This also holds true for every other profession. Before we analyze the importance of these virtues to a teacher, it would be prudent to understand what morals, values and ethics actually mean. These words are often used as synonyms for each other. Probably, the dictionary meanings of each of these will amplify the difference and significance of these words. The Cambridge Advanced Learner's Dictionary defines these words as follows (bolds / italics have been added by the author for emphasis on key aspects):-

Moral [4-5]: Relating to the standards of good or bad behaviour, fairness, honesty, etc, which each person believes in, rather than to laws. Behaving in ways is considered by most people to be correct and honest. It is a standard for good or bad character and behaviour.

Values [6-7]: The beliefs people have, about what is right or wrong and what is most important in life, which controls their behaviour.

Ethics [8-9]: A system of accepted beliefs, which controls behaviour, especially such a system based on morals. The study of what is morally right and what is not.

It is evident from the aforesaid dictionary meanings, that while morals and values are largely personal traits of an individual, ethics are more related to group, society or organizational aspects. Ethics enable an action to be considered in a perspective, within the framework of an organization or a society, and then arrive at a conclusion of that action being good or bad. For instance, in certain societies polygamy is a taboo while in another society it is an accepted norm. This is based on the ethics of those respective societies. The profession of teaching, more than any other, ought to be founded on impeccable ethics, as it shapes the future generations of the planet.

Teacher is a Paragon of Virtue. Almost every young mind casts an image in their minds and aspires to be like either their parents, or their teachers. The teacher, as a ‘role-model’, is expected to set an example for the pupils to follow. However, the young boys and girls carry out a detailed analysis of their teachers and only when found worthy of it do they aspire to emulate them [10]. Besides the pre-requisites of good professional knowledge and acumen, a

teacher ought to be a person of strong character, morally upright and honour-bound. Honesty and integrity are counted among the core values of a teacher, besides the qualities of selflessness and loyalty to the profession. Innumerable accounts of personal sacrifice for each other, from gurus and their disciples, adorn the historical texts. Swami Vivekananda paid the most befitting tribute to his teacher, Swami Ramakrishna Paramhansa, when he said, "I am what I am, and what I am is always due to him; whatever in me or in my words is good and true and eternal came to me from his mouth, his heart, his soul. Sri Ramakrishna is the spring of this phase of the earth's religious life, of its impulses and activities. "If I can show the world one glimpse of my Master, I shall not have lived in vain" [11].

A teacher harnesses tremendous power in himself, bestowed upon him by his ability to nurture the thoughts and influence the minds of his pupils. But that power is accorded to him along with an unwritten undertaking of very onerous responsibility that he would do so only in extreme circumstances, when no other recourse is available. Any misuse or abuse of that power would lead to shattering of the faith of several generations, which rally behind their educators.

IV. MORALS, VALUES AND ETHICS IN INDIAN EDUCATION SECTOR – A REALITY CHECK

Over the recent few years, especially the last three decades, there have been numerous reasons cited for the rapid decline in moral standards and ethics in Indian society as a whole. Different observers have analyzed the causes for this decline in diverse manners. While some have attributed it to being a fall-out of westernization of Indian culture, others have pinned the blame on immoral conduct of political leadership while some others have done so upon the rampant corruption among government servants and service providing agencies, particularly so the over-ambitious and overtly career conscious leadership in public and private sector enterprises. All of these may, however, not be the most comprehensive and fair assessments of the problem. Among a few of the important questions that need answering is, firstly, "Have the morals and values undergone degradation in the Indian education sector?" Secondly, "If yes, who or what is responsible for it?" and thirdly, most importantly, "What can be done to arrest this decline?"

The answer to the first question is an obvious and resounding "Yes". The morals, values and ethics have indeed taken a beating in the last few decades. The concept of 'Student Before Self' and 'Self-regulated Honour Code', which used to be the hallmark of a teacher have been reduced, by inconsiderate and reckless actions of some individuals, to mere words of insignificance. How else could one explain the several accounts reported over the years, of academic practitioners indulging in immoral actions of monetary gratification being sought for marks and question papers, sexual misconduct, focusing on private tuitions rather than institutional teaching, irregularities in conduct of examinations, etc. ? A perusal of detailed accounts of such actions, as listed above, would reveal that the affliction is not restricted to a particular level and it rather permeates all levels of academic hierarchy.

Therefore, the answer to the second question is that everyone who commits as well as those who ignore/ overlook / condone such actions being carried out, is responsible for it. While some are directly guilty of such behaviour, the balance of us is guilty of condoning the same. The unethical behaviour of a teacher has an all pervading manifestation, across the cross section of his students. Besides, this manifestation takes different forms depending upon the manner in which it affects the students. As has been observed in the recent past, the resultant behaviour may range from small acts of indiscipline of certain individuals, like disobedience of orders, thefts, smoking on campus, use of unfair means in examination halls, eve teasing, etc., to even bigger crimes like molestation, rape or murder, when the moral standards are breached repeatedly and rampantly. The problem, therefore, is more complex than just being considered as erratic or incorrect behaviour of individuals. It must be remembered that the individual under the lens is a teacher and, therefore, upon his actions hinge the dynamics of all the students who look up to their teachers. The ethical dimension, in the field of teaching, therefore, is paramount.

V. POSSIBLE CAUSES FOR UNETHICAL BEHAVIOUR

While nothing in this world can justify immoral and unethical behaviour, there seem to be some factors which may have a bearing upon such behaviour by some teachers. An observing mind, over the past twenty years has noted the major ones as enumerated:-

1. **Lack of Emphasis on Morals and Ethics in Training and Early Stages of Life:** There is a definite lack of training in ethical behaviour in the formative stages in the country. Training in values and ethics is generally limited to some non-graded value education books. Unless as a child these values and ethics are ingrained into the system, their importance will never be fully realized and generations after generations will see rapid decline in values based living.
2. **Result Oriented Approach:** Today's academics, almost like the corporate sector, have got influenced by the target or result oriented approach. The focus is primarily on achieving 'desired results' at all costs, usually by means of stage managing. The focus today is more on results and not on learning or knowledge sharing. This 'results oriented approach' is severely detrimental to the development of value based, ethical actions and a 'humane' psyche, which is more important for a teacher. What one must remember is that the end does not always justify the means.
3. **Lack of Resources in Institutions:** While there is a boom in the education sector, in terms of new institutions being opened up, the quality is taking a severe beating. Some of such institutions lack proper infrastructure for academic pursuits and associated co-curricularactivities. It may be financial or material resources which are at a premium and teachers are asked to be ingenuous and enterprising, to manage things 'by hook or by crook'.
4. **Inadequate Avenues for Personal Aspirations:** Every man dreams and aspires to be an achiever. Such avenues in the profession of teaching are limited. This results in discontentment and resentment, prompting them to resort to unethical practices, in

pursuance of their aspirations right from the early days. The means adopted may vary from resorting to promoting students to use unfair means in examinations for better student feedback and visibly better grades in comparison to other teachers, fraternizing with students for popularity, affiliations on regional or religious grounds, to paying bribes for career progression through manipulated and better appraisal reports. Resorting to private tuitions and coaching classes, for monetary gains, and favoring students who subscribe to such services is also very common.

5. **Financial Insecurity:** Teaching has long ceased to be a career of choice for the youth. Once regarded as a noble profession, they are now regarded as non-achievers by the more pragmatic and materialistic generation. Those who do join this line usually end up unsatisfied, comparing themselves to the outside world and some of them resort to unethical means in a bid to achieve competing lifestyles with their friends / counterparts in the corporate world.
6. **Decline in Respect and Social Status:** Teachers, the shapers of our future generations are not accorded the due respect, financial remuneration and social status which is their rightful due. This gives rise to discontentment and is a cause of severe stress in the teachers in our country.
7. **Personal Inadequacies:** There are certain individuals who have flaws and weaknesses in their character. It is possible that despite the stringent selection process, they have been able to make it through and are now a part of the system. Such individuals, if not weeded out of the organization in time, will destroy generations of the future.

8. **Inadequate Disposal of Identified Cases of Unethical Conduct:** Not all cases of immoral or unethical behavior in the education system have been satisfactorily disposed. Usually the education sector is being driven by big business entities and cases go unreported or are covered up. Unless the environment realizes that any violations of the moral code, irrespective of the magnitude of such violations, will attract the maximum punitive action, it is unlikely that people with such inclinations will be deterred from indulging into such behaviour.
9. **Societal Influence:** While this reason may initially appear to be as firing the cannon from someone else's shoulder, the influence of the society upon a teacher cannot be ignored. With the details of rampant corruption in the other professions and businesses in the country, there are many people in the teaching profession who feel they are being deprived of this share. At times they feel furious because it is from the taxes they have paid that some cronies are enjoying a lavish life. This resentment and the feeling of deprivation also may lead some people down a path of unethical lifestyle.

VI. MEASURES TO PROMOTE ETHICAL AND VALUE BASED CONDUCT

Some steps that can be taken to provide an ethical environment in academic institutions and promote value based conduct are as follows:-

1. **Stringent and Uncompromising Selection Norms**: The selection process for teachers has to be very rigorous and may be it needs to take a lead from the services selection board (SSB) for military officers, which is regarded as one of the most stringent and nearly fool-proof system for selection of military officer trainees. Proper psycho-analysis of prospective teachers is very important, given the influence a teacher casts on the future generations. It is better to have a deficiency in numbers, rather than have deficiency in moral and ethical standards of teachers.
2. **Ethics and Values in Training Curricula:** There can be no denying the fact that the foundation of a teacher must be based on strong values and ethics. The blasé and nonchalant approach with regard to these issues has to cease right away. Besides the subjects being included in greater details in the curricula, adequate emphasis must also be laid on ethical and value based conduct by officer cadets. Strict adherence to Honour Codes must be implemented and harsh action taken against defaulters, to instill the sense of abiding by such conduct through the life. The tendency among some quarters, to overlook infringements or award light punishments, in the name of shortage of teachers, is inappropriate and must be curbed.
3. **Emphasis on Quality of Knowledge Sharing Rather Than on Result Oriented Approach:** A teacher should be judged on the basis of his overall intellect and moral qualities and not merely on the basis of academic results or honours and awards. While professional knowledge and competence are important facets of personality of a teacher, the marks and results may not be the true reflection of his capabilities. The extent of manipulation in marks and grading, to achieve seemingly good results, has

been repeatedly brought to light from different quarters. More attention, therefore, must be paid to a teacher's character and human qualities and, most importantly, on his performance in shaping the character and wholesome positive personality traits in his students.

4. **Exemplary Punitive Action:** As far as ethical and moral dimension is concerned, it is vital to note that there is either 'white' or 'black' and there are no 'grey' zones, therein. There cannot be, under any circumstances, partially moral or ethical behaviour. Therefore, exemplary punishments for violations of moral codes must be meted out, to drive home the importance of abiding by the standards. Long drawn trials followed by light punishments or acquittals, gained by manipulation of systems or exploiting of 'loopholes', encourage the fence-sitters also to take recourse to unfair practices. This must be deterred by swift execution of justice and maintaining scrupulous standards in this context.
5. **Enhancement of Social and Financial Status of Teachers:** There is an inescapable need for enhancing the social and financial status of the teachers, to augment the motivational and security needs of the teaching community. Although some corrective measures have already been instituted towards this effect, especially in government aided institutes, there still is a lot of ground to be covered – particularly in the private sector, which incidentally dominates the education market in our country. It may easily be argued that comparison with civil services or the corporate sector must not be solicited in view of different service environments and complexities of the job profiles. However, the comparison is inevitable. The disparity in financial

remuneration and social status must be appropriately bridged to meet the aspirations of the teachers and keep them motivated.

6. **Address Resource Crunch**: It would be incorrect to assume that the resource crunch in terms of basic infrastructure, modern teaching aids, proper and contemporary training material, good classrooms, other ancillary facilities, etc., will not affect the psyche of teachers and, consequently, their personal conduct. All these constraints have a profound impact on the job satisfaction of teachers and the absorption quotient of students as well. In addition, the shortages lead to unscrupulous and adhoc practices which tend to get templated and accepted as the way of life. A person may, therefore, not even realize as to when he transgresses the boundaries of ethical conduct and makes a wrong decision.
7. **Value Based Conduct in Society:** This is a vital ingredient to the moral health of the society. A large segment of population today is bereft of moral values at large. In its quest for material needs and the lack of adequate opportunities for all, morality and ethics have been relegated to lowest rungs of priority. This dereliction is evident from the contents of newspapers and electronic media news every day. However, as it is said that even the longest of journeys begin with a small step, it is for each one to at least try and make a beginning. In addition, the Governments must be urged to include these aspects in our formal education at all levels and ensure implementation of honour codes for citizens, backed by equally stringent implementation supported through legal means.

VII. CONCLUSION

Change will not take place in a day. That, however, does not imply that efforts for change must not be made in full earnest. The society looks upon the teaching fraternity as the cradle of all virtues and values. Numerous surveys by various organizations, across the cross section of population, have repeatedly indicated that the teachers do command significant respect and admiration from the people. It is noteworthy that a survey by UK based Varkey Foundation, of 2018 indicates 54% of Indian parents encourage their children to take up teaching as a profession [12]. In the same survey, India ranked eighth amongst 35 countries, with respect to social status of teachers [13], providing a ray of hope towards this noble profession. It is prudent, therefore, to undertake immediate measures to arrest the moral decline that has lately affected some sections of the teaching community.

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Relevance of Corporate Governance and Profitability in Innovation Policies of Socio-Economic Transformation: A Study in Indian Context

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Abstract-
Corporate Governance is the set of policies that are created for deciding a company's performance and dire ction.In recent years, the area of corporate governance has been in limelight and has attracted increased atte ntion of academicians and researchers worldwide due to high
profile scandals and corporate collapses like Enron, WorldCom and Satyam.Further, we find that corporate profitability also has an insignificant positive impact on governance rating of firm.Before looking at the relati onship between corporate governance, firm performance, and economic growth, it is useful to have a framew ork with which to understand how corporate governance can affect firm behavior and economic performance .One of the problems with the current debate on corporate governance is that there are many different, and o ften conflicting, views on the nature and purpose of the firm.

Keywords---Corporate Governance, Economics,

I. INTRODUCTION

Corporate governance is a multidisciplinary field of study that covers a wide range of disciplines – accounting, consulting, economics, ethics, finance, law, and management. It also includes the relationships among the various stakeholders (e.g. members/shareholders, management and board of directors) involved and the goals for which the corporation is governed. It refers to leadership structure and values that determine corporate direction, ethics and performance. The aim is to align as nearly as possible the interests of individuals, corporations and society. It focuses on how management is committed to sustainability and

corporate responsibility at all levels. The term corporate governance has been used in many different ways and the boundaries of the subject vary widely. In the economics debate concerning the impact of corporate governance on performance, there are basically two different models of the corporation, the shareholder model and the stakeholder model. In its narrowest sense (shareholder model), corporate governance often describes the formal system of accountability of senior management to shareholders. In its widest sense (stakeholder model), corporate governance can be used to describe the network of formal and informal relations involving the corporation.

More recently, the stakeholder approach emphasizes contributions by stakeholders that can contribute to the long term performance of the firm and shareholder value, and the shareholder approach also recognises that business ethics and stakeholder relations can also have an impact on the reputation and long term success of the corporation. Therefore, the difference between these two models is not as stark as it first seems, and it is instead a question of emphasis.

A large number of studies in the past have examined the relationship between corporate governance and corporate financial performance, but the results have been mixed and inconclusive. Eccles et al. (2012) recommended that for sustainability to be embedded in the organizational culture, the governance structure needs to be tailored accordingly. They emphasized on the significance of two key elements of Corporate Governance, i.e. Board of

Directors (BOD) and Executive Compensation, to ensure sustainable growth of the organization. The overall study objective is to formulate a broad planning and development framework setting out guidelines and standards for more effective and comprehensive planning for corporate governance.

The main objectives of the study are as

- To study the present unique economic situation in the Corporate World.
- To study the relationship between corporate governance and corporate profitability.
- To enhance the long-term shareholder value in corporate governance.

II. LITERATURE REVIEW

This study will further advance corporate governance by helping people discover more about their planning and development. So in the past by the researchers following are the outcomes. Gompers et al. (2003) performed their study using a governance index for 1500 large US firms, and found that the risk-adjusted returns of firms with strong governance were 8.5% higher than firms with poor governance. Brown and Caylor (2004) found a positive association between corporate governance scores (after adjusting for industry effects) and financial performance of firms (based on dividend payout, yield, profitability and shareholder returns). One of the key

findings of Mani and Sreedharan (2004), a study conducted by CRISIL Ratings in Indian context over a 3 years period was that superior governance practices of firms are positively and significantly correlated to market valuation of firms.

Van de Velde et al. (2005) observed that portfolios with above-average governance scores outperformed the portfolios with below-average governance scores. Governance Metrics International and Byun (2006) found that companies with higher governance ratings enjoyed higher profits and returns. Ashaugh-Skaife and Lafond (2006); Derwall and Verwijmeren (2007) analyzed the linkage between Governance Metrics International (GMI) governance ratings and the firm's cost of equity capital. They suggested that firms with higher governance scores demonstrate lower risk to investors, and thus, enjoy lower cost of capital.

Sachs (2007) suggested that investments in highly governed companies significantly outperform the investments made in poorly governed companies. Bala Subramanium et al. (2008) found a positive and statistically significant association between their overall India Corporate Governance Index (ICGI) and Tobin's Q value (used as proxy for market value of firm) and further this association was stronger for more profitable firms and firms with higher

growth prospects. Selvaggi and Upton (2008) commented on the direction of causality and stated that good governance causes good firm performance, rather than vice versa.

However, Mukherjee and Ghosh (2004) portrayed a dismaying scenario and concluded that corporate governance in India is still in a young and developing stage and that the investment decisions of Indian investors are volatile, not based on governance practices of firms. Chidambaram et al. (2006) found no significant performance difference between firms with good governance changes and firms with bad governance changes and thus, rejected the hypothesis that better governance leads to better financial performance. This result is consistent with those of Core et al. (2006); and Statman and Gluskhov (2009), who found no significant relationship between corporate governance and firm performance. Azim (2012) observed that different governance elements have varying impact on corporate performance and profitability.

Maria Maher and Rhomas Andersson (2016) Corporate governance: effects on firm performance and economic growth Corporate governance has traditionally been associated with the “principal-agent” or “agency” problem. A “principal-agent” relationship arises when the person who owns a firm is not the same as the person who manages or controls it.

The purpose of this study is to present a review of the literature on two lines of research, corporate governance and innovation, explaining how different internal corporate governance mechanisms may be determinants of business innovation. It explores the theoretical background and the empirical evidence regarding the influence of both ownership structure and the board of directors on company innovation. Then, conclusions are drawn and possible future research lines are presented. No consensus was observed regarding the relation between corporate governance and innovation, with both positive and negative arguments being found, and with empirical evidence not always pointing in the same direction. Thus, new studies trying to clarify this relationship are needed. Over recent years, interest has grown in the influence of governance mechanisms on innovation decisions taken by the management.

Innovation efforts and results depend on factors that are influenced by corporate governance, such as ownership structure or the functioning of the board of directors. This paper presents an updated state-of-the-art in this field proposing future lines for empirical, however, states that the relation between corporate ownership and innovation activity may work both ways. He argues that ownership structure affects R&D expenditure, which affects company value, which

in turn affects ownership structure. Other studies do not analyze a direct relation between ownership concentration and innovation but consider that the former may moderate another existing relation. For example, find that cash flow control by owners positively moderates the relation between internationalization and innovation in the company, while the entrenchment effect that arises from the diverging interests between control and cash flow rights may negatively moderate this relation. Other studies propose that R&D expenditure, Ownership concentration and innovations. The prior literature includes arguments supporting both a positive and a negative relation between ownership concentration and R&D activities. An initial argument on a negative relation lies in greater risk aversion. Ownership concentration and combined ownership and management may reduce the pressure that external investors or other supervisors exert on managers in their control of financial statements, information transparency and strategic renewal.

III. RESEARCH METHODOLOGY

Statistical tools such as descriptive statistics and regression have been applied using Microsoft Excel to study the relationship between corporate governance and corporate profitability using

secondary data. The average data over a period of three years from FY 2016-17to FY 2020-21has been used to enable cross-sectional analysis.

IV. DATA ANALYSIS AND INTERPRETATION

Table. 1: Relationship between Corporate Governance and Corporate Financial Performance

S. No.	Study	Relationship
1.	Gompers et al. (2003)	Positive, but not significant
2.	Brown and Caylor (2004)	Positive
3.	Mani and Sreedharan (2004)	Positive and Significant over 3 years period
4.	Mukherjee and Ghosh (2004)	Not Significant
5.	Van de Velde et al. (2005)	Positive, but not significant
6.	Chidambaram et al. (2006)	Not Significant
7.	Core et al. (2006)	Not Significant
8.	Governance Metrics International and Byun (2006)	Positive

9.	Sachs (2007)	Positive and Significant
10.	Balasubramanium et al. (2008)	Positive and Significant
11.	Selvaggi and Upton (2008)	Positive and emphasizes one way causality
12.	Statman and Gluskhov (2009)	Not Significant
13.	Eisenhofer (2010)	Positive
14.	Pande (2011)	Mixed and Inconclusive
15.	Azim (2012)	Mixed results
16.	Aggarwal (2013)	Positive and Significant over 2 years period
17.	Dr. Shamsher Singh	Positive and Significant
18.	Dr. Neelam Rani	Mixed and Inconclusive

The above table shows mixed and inconclusive results on the relationship between corporate governance and financial performance. Thus, we empirically test this relationship in the given paper in an Indian context. On the one hand, although the legal and regulatory environment affects corporate governance, it is also the case that legal rules and regulations are also, in part, the outcome of different corporate governance systems. For example, systems with dispersed ownership may have a stronger need for regulations that protect shareholder rights. For example, as ownership structure in the US has become more dispersed, the legislative

environment has adapted to the particular needs arising from dispersed ownership. And many European countries are adapting their legislative environments, in particular the strengthening of minority shareholder protection, in response to abuses by controlling shareholders that can arise in their systems of corporate governance. Thus, there is a positive correlation between corporate governance and corporate profitability. Overall, we may conclude that corporate governance has positive but not significant impact on corporate profitability. Hence, we do not reject the first null hypothesis (Ho1).

On the basis of theory and literature review and keeping in view the research objectives, we have formulated the following two hypotheses:

Ho1: Governance rating of a company has no impact on its profitability.

Ha1: Governance rating of a company has an impact on its profitability.

Ho2: Corporate profitability has no impact on the governance rating of a company.

Ha2: Corporate profitability has an impact on the governance rating of a company.

V. FINDINGS AND CONCLUSION

On an analysis and evaluations of the data, the following findings were found:

1) There is a positive correlation between corporate governance and corporate profitability.

2) Governance rating has a positive impact on corporate profitability.
3) Governance rating of a company has a significant impact on Return on Sale.
4) Corporate governance has a positive but not significant impact on corporate profitability.

Thus, we may conclude that corporate profitability has no significant impact on the governance rating of a company. Hence, we do not reject the second null hypothesis (Ho2).

Recommendations:

The following are the recommendations which should be addressed by the future researchers:

1) Limited sample size used in this study so large sample size should be incorporated. Short frame of research covered so frame of research should be large.
2) Short frame of research covered so frame of research should be largely manipulated.
3) Market-based measures such as share prices, stock returns, market value of firms, etc have been ignored. So this hypothetical value should be highlighted.
4) Various control variables (e.g. firm's age, growth, leverage, risk, R&D, industry, etc.) have not been incorporated in our analysis so these must be considered in future research.
5) Comprehensive measures should be considered in corporate governance because corporate governance is a vast concept.

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