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Attendance Management System using Face Recognition

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Abstract: ***In each and every field there is a need of maintaining attendance management system. The system will maintain a log details of each and every in their respective field. From past few years Automatic Face Recognition (AFR) technologies have fair improvements in performance, and such systems are now widely used for security and commercial applications. Automated face recognition system is helpful for recognizing face of humans in a real time background mainly for college to mark the attendance of their students. Automatic Face Recognition System is a real world solution which is useful in everyday activities. The matched face is used to mark attendance of the student. This system maintains the attendance records of students. The traditional approach of manually entering of attendance in logbooks is a difficult task and it also wastes the time. So this system is going to design an efficient module that comprises of face recognition to manage the attendance records of students. The new module enrols the students details those are collection of images. This enrolment is an onetime process and the students face will be stored in the database. This system will store data using roll number which will be unique for each student. The presence of each student will be updated into the database. The results showed improved performance over manual attendance management system and system log details. Attendance is marked after student identification. One of the classification process used is Convolution Neural Network (CNN).***

Keywords: Deep learning, convolution neural network, image recognition, Mysql, accuracy.

I. INTRODUCTION

Automated attendance system will clip the image when the student enters the classroom and will accordingly mark the attendance, but manual attendance system will verify and manage each and every record of student in paper which requires more time and effort for the faculty and there are also chances of proxies in manual attendance.

The proposed system will be more efficient and user friendly as it can be run on devices which are available everywhere and everyone can use them. This project is the first attempt to provide an automated attendance system which identifies students using face recognition technology through an image or video stream. From some distance also Facial images can be captured and there is no requirement of special action for authentication. Having all these special characteristics, the face recognition technique is applied widely in all areas, not only for security applications but also for image retrievals, image indexing and natural user interfaces.

Human faces are highly challenging and dynamic objects that are used for biometric evidence, in identity verification. Biometrics systems plays a major role in the present society they have proven to be an essential security tool, in which large matching of enrolled people and watch lists is performed every day. The importance of developing a new solution to improve the performance of face identification methods has been highlighted and Deep Learning is one of the most promising technology paradigms that can be used to achieve it.

Face recognition technology is used for performing two tasks they are verification and identification of students in a classroom. The main aim of this project is develop a less protruding, cost effective and more efficient automated student attendance management system using face recognition technique.

II. LITERATURE SURVEY

This section, tells a brief explanation about the works that are done on text detection and classification.

One of the study is Attendance System using Image Processing in this study they discussed that In Image Processing basically consists of four types they are Attendance Monitoring System by Image Processing, An Automatic Attendance System using Image Processing and Automated Attendance System using Image Processing [3].

Another study is "Automatic face naming by learning discriminative Affinity Matrices", in this study the authors explained that In “Attendance Monitoring System using Image Processing”, the attendance of the students is marked using face projections on a feature space that spans the significant variations among known face images. These features are known as “Eigen faces”. The proposed system is a Affinity matrix and low-rank representation for Weakly Labeled Images which names the faces detected by the system by using machine learning algorithms and face detection inside images captured.

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There are several approaches to deal with disparity in images subject to illumination changes and these approaches were implemented in object recognition systems and also by systems that were specific to faces [4].

Another study is Automated Attendance system using face recognition is based on face detection and recognition algorithms, which are used to detects the student face when he/she enters the class and the system is capable to mark the attendance by recognizing the student. Viola-Jones Algorithm has been used for face detection which detects human face using cascade classifier and PCA algorithm for feature selection and SVM for classification. When this system compared with traditional attendance marking, this system is best as it takes the attendance automatically by recognition obtained by continuous observation. Observing continuously helps in estimating and improving the performance of the attendance. Positions and face images of the students present in the class room are captured to obtain the attendance, because of continuous observations and recordings the system estimates the seating position and location of each student for marking attendance. The work is focused on the method to obtain the different weights of each focused seat according to its location. The effectiveness of the picture is also being discussed to enable the faster recognition of the images this system saves the time and also helps to monitor the students [5].

III. PROPOSED METHOD

Attendance is a very important and common thing that need to be maintained in all educational institutions. Every field has their own way of collecting student attendance details . In some organizations uses pen and paper based method and others have chosen computerized techniques such as fingerprint biometric techniques. However, these techniques subjects students to wait in a queue which takes time and it is invasive. The goal of progress attendance management system is to digitalized the habit way of taking presentence. A person often use faces to know individuals but upgrading in computing capability over the past few decades now enable similar recognitions automatically. Face recognition technology is one of the least protruding and fastest growing biometric technology. It entirety by recognition of mortals using the most particular features of their faces.

A. Methodology

1) *Convolution Neural Network (CNN):* Nevertheless, the sequential API is a perfect choice for most problems. To create a convolution neural network we only need to create a sequential object and use the add function to add layers. The code above first of creates a Sequential object and adds a few convolution, max pooling and dropout layers. After that it flattens the output and passes it to a last dense and dropout layer before passing it to the output layer. If you aren't confident build a convolutional neural network (CNN)[3] check out this great tutorial. The syntax is also supported by sequential API where the layers are passed to the constructor directly. By preference, the practical API allows you to build the same designs but offers you more resilience at the cost of simplicity and debility. CNN can be used with multiple input and output layers as well as shared layers, which helps to build really complex network structures. While using the practical API we always need to pass the earlier layer to the present layer. It also needs the use of an input layer. Before we can start training our system we need to construct the learning system. To this, we required to mention an minimizer, a loss method and deliberately some parameters like accuracy.

This is most important step for our network. It consists of three parts -

a) Convolution
b) Polling
c) Flattening
d) Fully connected

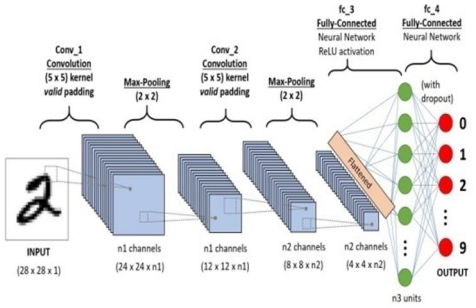


Figure 3.1: Convolution Neural Network Process

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1) *Convolution:* Convolution is a elementary mathematical operation which is significant to many common image handling functions. Convolution gives a method that is `multiplying together' where two arrays of numbers, which are of different sizes, but of the same dimensionality are multiplied to generate a third array of numbers of the same spatiality.
2) *Pooling:* Pooling is the another important step of CNN, which is a form of non-linear down-sampling. To implement pooling *Max pooling* is the most commonly used method among all non-linear methods. It divides the given image as a set of non-overlapping rectangles and, for each such sub-region, outputs the maximum.
3) *Flattening:* Flattening is the one that converts the feature map that was pooled to a single column and that is passed to the fully connected layer. Dense layer summates the fully connected layer to the neural network. After completing the previous two steps, the method is supposed to have a pooled feature map by now. As the name of this step mention, we are actually going to flatten our pooled feature map into a single column.
4) *Fully Connected:* The main aim of a fully connected layer is to take the results of the convolution/pooling process and use them to classify the image into a label (in a small classification example).The result of convolution/pooling is flattened into a single vector of values, each describing a possibility that a certain characteristic belongs to a class.

IV. IMPLEMENTATION

1) *Collection of Dataset:* To train our model, we need a large amount of data so that our machine can learn from them by recognizing out certain relations and features related to the objects. Here we created our dataset which consists of 500 images. This will help in training and also testing of the model.
2) *Importing Libraries and splitting the Dataset: For* effective use of the libraries, we first need to import them. After importing the libraries, we need to divide our data into two parts- one is training_set and another is test_set. The training set has 300 images of two persons while the test set has 80 images of each.
3) *Convolution Neural Network:* This is the most important step for our network. It consists of three parts -

a) Convolution
b) Pooling
c) Flattening

4) Building CNN: The Full connection is connecting our convolutional network to a neural network and then compiling the network.
5) Data Augmentation: Data augmentation is a way in which over-fitting on models can be reduced, where we increase the amount of training data using information only in our training data.
6) Training the Network: Upto now all the steps of construction are completed and now it's time to train our model. If you are training the model with a good video card with enough RAM, then the time required will be less than an hour. By using CPU will take a long time for training. With an increasing number of epochs, the accuracy will increase.
7) *Testing:* Yes, the network correctly predicted the image of the person!! Though it is not 100% accurate it will give correct predictions most of the time and stores the attendance of a person. Adding more convolutional and pooling layers might get high accuracy results.

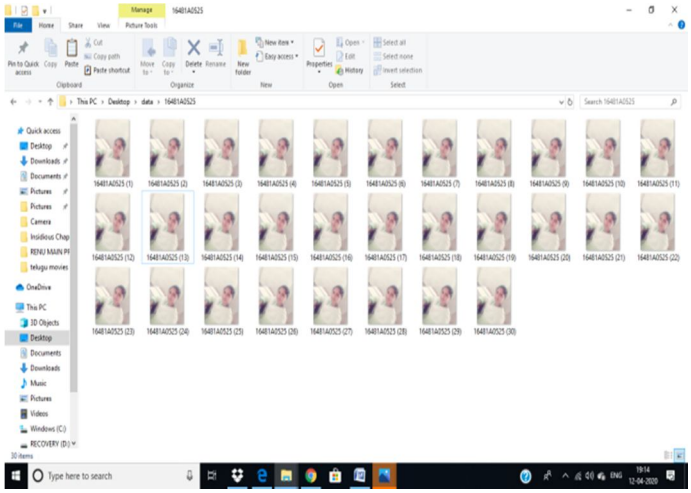


Figure 4.1: Dataset of 16481A0525

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Data set is used in order to make the system for training and testing to generate accurate results.

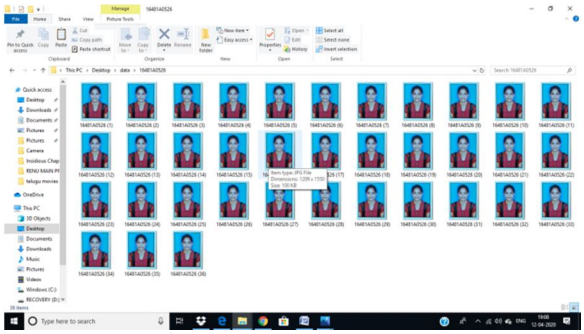


Figure 4.2 : Dataset of 16481A0526

The above data set is used in order to make the system for training and testing to generate accurate results by predicting the class.

V. RESULTS

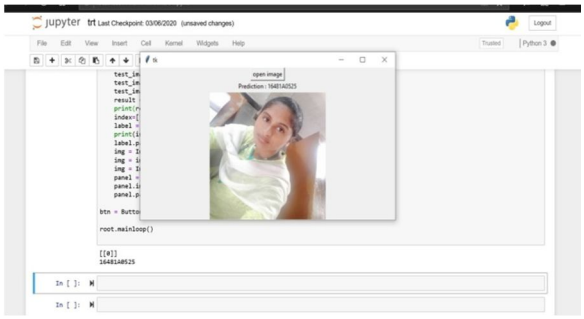


Figure 5.1: Here the model predicting the Roll number 16481A0525

The system used the GUI Tkinter as a user interface in order to identify the student roll number when the system takes the input as a image .Here the system identify the roll number 16481A0525 .

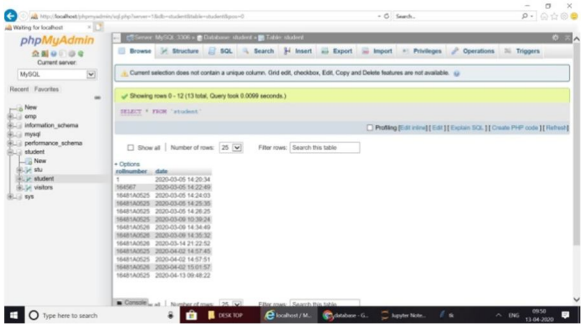


Figure 5.2: The system predicted the Image of '16481A0525' and stored in Mysql database.

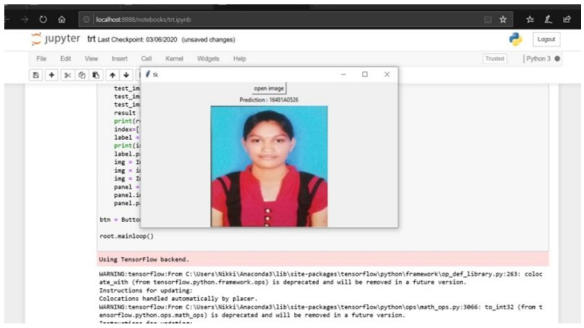


Figure 5.3: Here the model predicting the Roll number 16481A0526

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The system used the GUI Tkinter as a user interface in order to identify the student roll number when the system takes the input as a image .Here the system identify the roll number 16481A0526 .

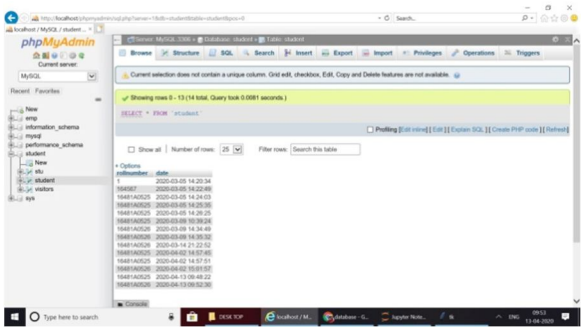


Figure 5.4: Predicted the image of '16481A0526' and stored in MySQL database

VI. CONCLUSION

Attendance Management system is a very important concept for storing attendance in any institute where attendance plays an important role. Still, most of the existing approaches of taking attendance are time consuming, intrusive and it requires a lot of manual work from the users. The proposed system develops a less intrusive, cost effective and more efficient automated student attendance management system using face recognition technique which will be helpful to all the users as it reduces the manual work. By using convolution neural network the proposed system predicts the image of a student with better accuracy. If the scanned student is present in the trained set, then automatically the respective student attendance will be stored in the database automatically.

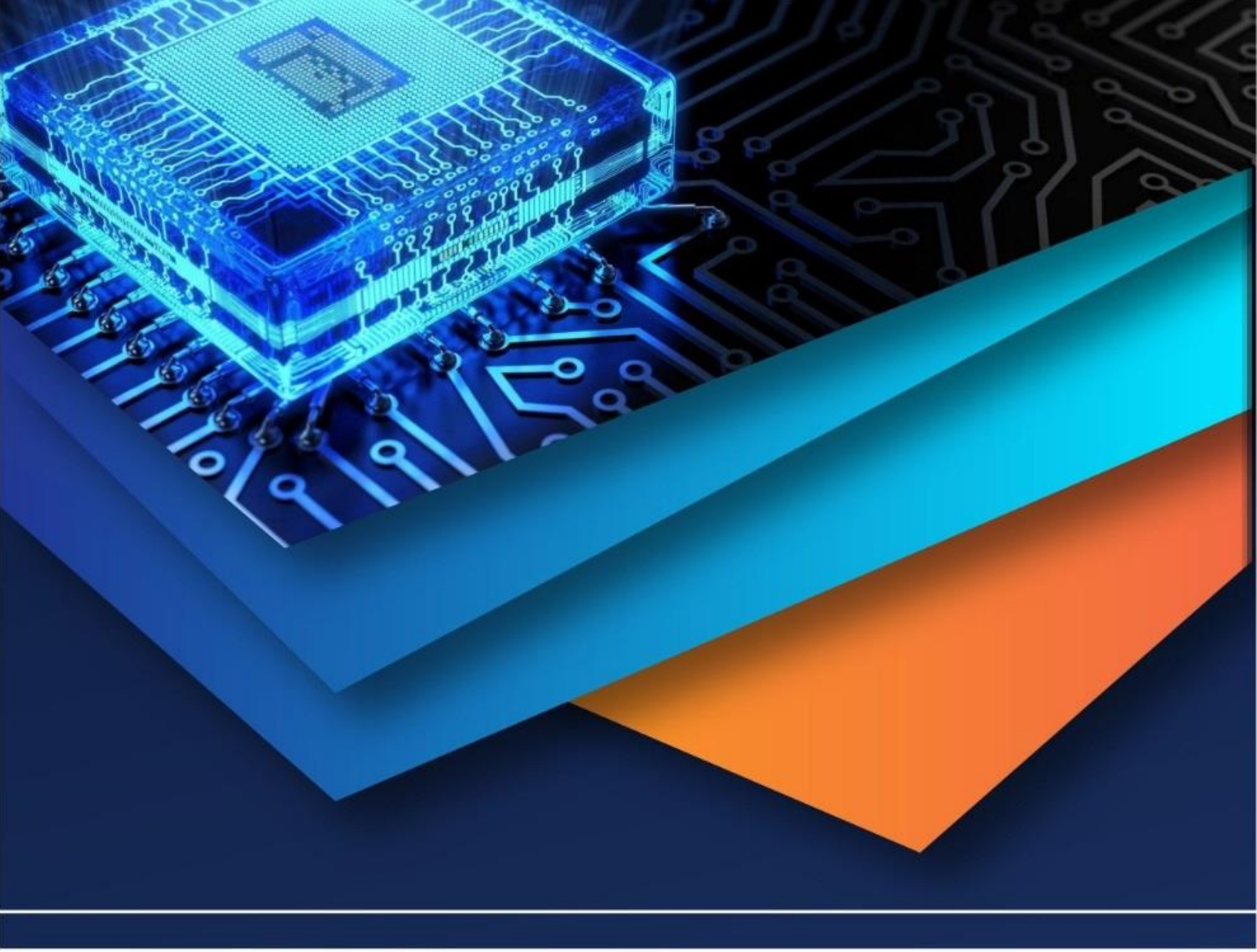
VII. FUTURE SCOPE

Face recognition provides non-intrusive way to recognize a person. By using this system, the chances of fake attendance and proxies can be reduced. The face recognition using eigenface method helps overcome problems related to lightning issues and head pose problems in some cases.

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