Automatic Student Attendance System

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Abstract— In this paper, we propose a framework that manages the attendance of students for classroom lecture. For the attendance to be taken automatically, face of an individual is considered. Conventional method requires calling out the name or roll number of students in order to take attendance. This process consumes at least 5-10 minutes of a 60 minute lecture. To avoid this, an automatic process is used in this project which is based on digital image processing. In this project face detection and recognition is used. To detect the face region, here face detection is used and then face recognition algorithm is used for marking student's attendance. The database of all the students in the classroom is stored and when the face of the individual student matches with one of the faces stored in the database then the attendance is recorded.

Keywords: Automatic Student Attendance System, A.Face Detection, Support Vector Machine

I. INTRODUCTION

Student attendance management system deals with the maintenance of the student's attendance details. It generates the attendance of the student on basis of presence in class. Given a situation, that in a classroom, multiple lectures are conducted with different sets of students at different time periods. In Autonomous attendance systems, like face recognition, the recognised person should get attendance accurately. This paper we propose an algorithm to handle such scenarios. The framework is such that it registers and maintains the attendance log systematically. Report of the student's attendance on weekly and monthly basis is generated.

II. LITERATURE SURVEY

In this paper, we introduce Facenet, that directly learns a mapping from face images to a compact Euclidean space where distances directly correspond to a measure of face similarity. Using Facenet embeddings as feature vectors, implementing face verification and recognition is efficient.

It uses deep convolution network, which optimizes the embedding. To train, triplets of roughly aligned matching / non-matching face patches generated using triplet mining method. This method is much efficient, as it achieves excellent face recognition performance using only 128-bytes embeddings.

The system achieves accuracy of 99.63% on LFW.

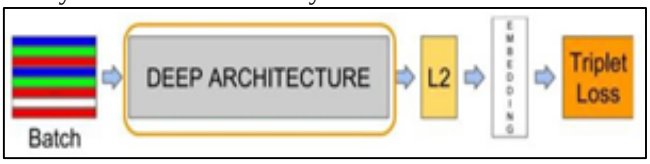


Fig. 1: Model Structure

III. PROPOSED SYSTEM

A. *Face Detection:*

1) Stage 1: Proposal Network(P-NET) convolution network is used to obtain candidate facial windows, resize the image and their bounding box regression vectors. Non-Maximum Suppression is employed to merge highly overlapped candidates.
2) Stage 2: Refine Network (R-NET) stage rejects false candidates, re-calibrates bounding box regression, and NMS.
3) Stage 3: Output Network(O-NET) performs more refinement to identify faces. The network will output five facial landmark positions.[1]

B. *Model*

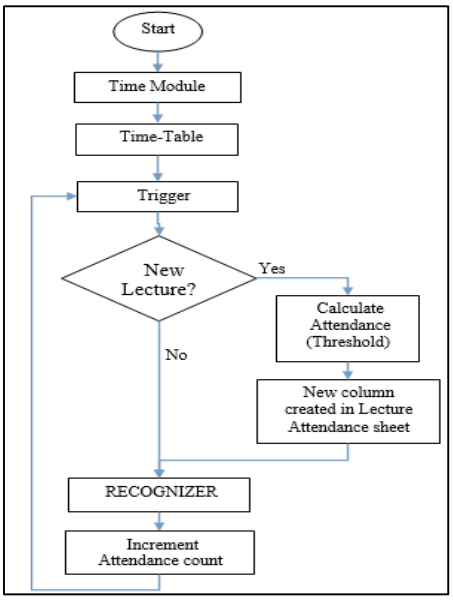
Face embedding is multidimensional numerical vector representation of a face which represents the unique identity of the face. Facenet used 128 dimensions and created a model that maps any human face in generic. When we provide an input image to the model it gives us 128 bytes of numerical vector data that may be generated by comparison with model mapped generic face representation. These embedding points are easily comparable by measuring Euclidean distance.

C. *Classifier*

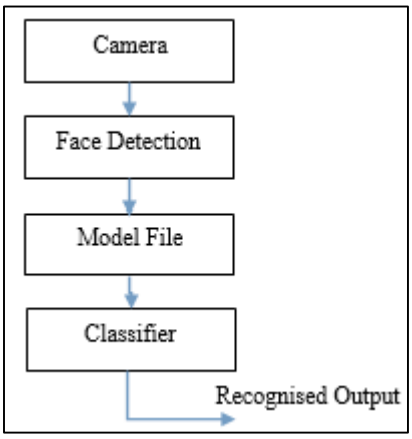
Support Vector Machine: SVM algorithm has achieved good results in classification. This classifier finds the hyperplane, defined by weight and bias, with maximum Euclidean distance to the closest training samples.

IV. SYSTEM IMPLEMENTATION

A. *System Flowchart:*



B. Recognition Flowchart:



V. System Overview

Based on Date-Time Module, the system will determine the current lecture details from the provided Time-Table data sheet. If there's no lecture, the system will be on halt for that period.

The Trigger block will trigger the loop after every 6th minute, passing the lecture and date-time details. Trigger initiates the recognizer, and attendance count is incremented once for each loop if the student is recognized.

For a new Lecture, new column is created with null value. Also the date and time of lecture is logged in the records.

The final attendance is calculated based on the threshold limiting value. If the count is more than 3, the student is marked present for that lecture.

VI. Conclusion and Future Works

Face recognition based on Facenet Model proves secure and time saving system that can be implemented as automated attendance system in schools and colleges. This method works well in real time scenarios, than other algorithms, in terms of recognition rate and low false positives.

The proposed Framework works well for a given cell. As the Algorithm is developed for a classroom application, and it will work for a one room. But later on it can be modified to handle student's attendance in multiple rooms.

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