e-ISSN: 2582-5208
International Research Journal of Modernization n Engineering Technology and Science
Volume:02/Issue:02/May-2020 www.irjmets.com

STUPROBE – SMART ATTENDANCE SYSTEM WITH STUDENT ENGAGEMENT ANALYSIS

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ABSTRACT

Attendance marking using conventional method, that is, manually marking attendance on paper has many flaws, can be vulnerable and is time consuming. This problem requires serious attention. So, we are proposing this system Smart Attendance System using Subject Images which takes automatic attendance without any intervention. The system uses facial recognition to identify students. Generates easily digestible graphs and charts to comprehend the situation of the selected individual. The overall goal is to record student attendance and thus respond accordingly.

KEYWORDS : Camera, Android Application, ConvNet.

I. INTRODUCTION

The state of quality of education in the country is a little suspicious. This can be thanked to the traditional record keeping and analysis that is currently in use. There are a lot of students in the country and lesser teachers. Every student cannot be analysed by a single teacher and traditional attendance takes time that could otherwise be used for studying. This problem requires serious attention. So, we are proposing this system - Smart Attendance System with Student Engagement Analysis which takes automatic attendance without any intervention. The system uses facial recognition to identify students. Generates easily digestible graphs and charts to comprehend the situation of the selected individual. The engagement of a student in the classroom is determined on account of facial expressions extracted sparsely. The overall goal is to analyse student engagement and thus respond accordingly.

II. METHODOLOGY

(1) Image Acquisition : Before the students are recognised, they must be added to the knowledge-base of the system. This means telling the system to recognize faces uniquely. To do this, images containing facial data must be acquired.

(2) Image Pre-processing : To remove noise in image or other object removal, pre-processing techniques are considered. Image clipping i.e. cropping of the face from the image to get the interested region of image. Image smoothing may be used, this is done using the smoothing filter. Image enhancement method is carried out for increasing the contrast. The colour conversion method is used to convert images from RGB to grey. This is done to reduce the computational overhead.

(3) Image Segmentation : This method is used for the conversion of digital image into various segments having some similarity. Image segmentation helps within the detection of objects and border of the image. Image segmentation is used to serrate the distinct parts with some information in the image.

(4) Feature Extraction: In feature extraction method features such as colour, texture and structure are used in face detection. Various Haar-like features are selected. Each for detecting a facial feature like eyes, nose and mouth. For each feature there is a weak classifier, together creating a strong facial classifier.

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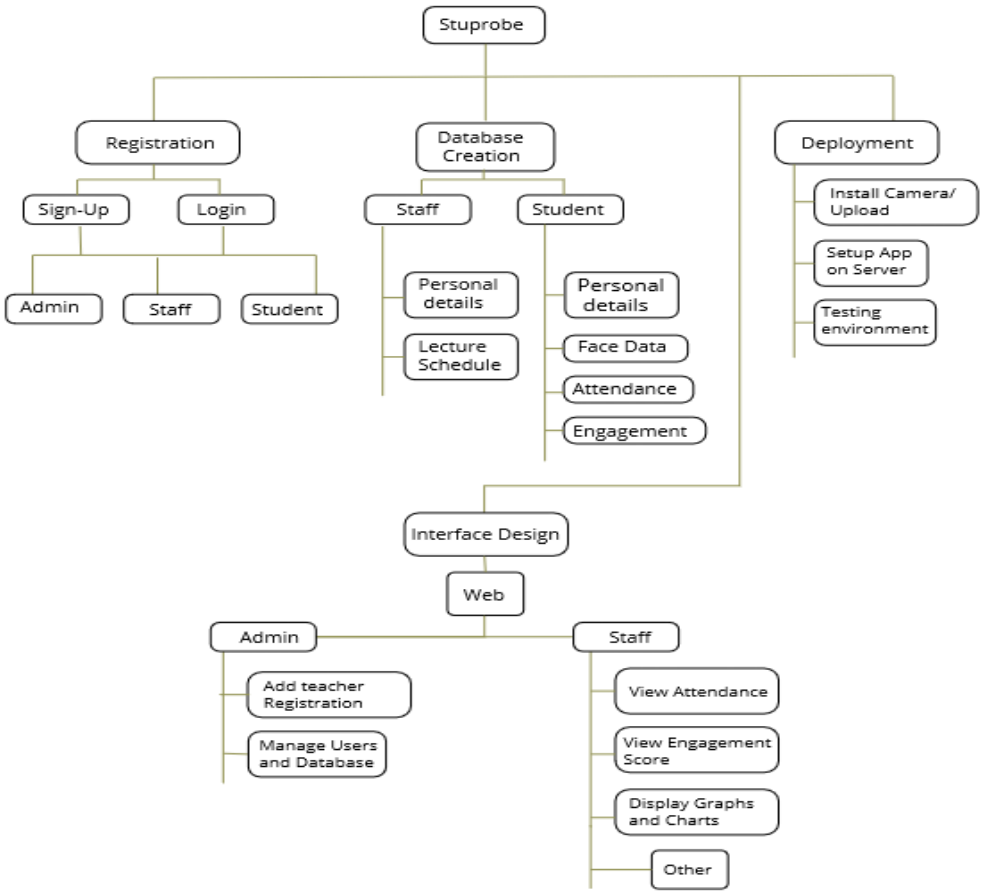


Fig-1: System Architecture.

(5) Recognition : As all the faces unique, the classifier outputs different data for different faces. This variation helps us identify every face uniquely.

(6) Solution : This system will provide solution for the identification of face in an image.

Algorithms :

Knowledge-Based: The knowledge-based method depends on the set of rules, and it is based on human knowledge to detect the faces. Example -A human face must have an eyes, mouth and nose at proper distance. To build a set of rules with these method is very difficult. If the rules are in detailed format then there could be many false positive. This method alone is not sufficient and unable to find many faces in multiple images.

Feature-Based: The feature-based method is to locate faces by extracting structural features of the face. In this method, the system is trained as a classifier. The trained classifier used to differentiate between facial and non-facial. The idea is to overcome the limits of our instinctive knowledge of faces. This method divided into further steps and photos with many faces which report a success rate of 94%

Template Matching: Template Matching method uses parameterised face templates. By using edge detection method the face model can be built by edges. Implementation of this method is easy but not sufficient for face recognition. Deformal template is the solution to this problem.

Appearance-Based:

To find out face model, the appearance-based method depends on a set of delegate training face images. statistical analysis and machine learning to find the relevant characteristics of face images. Generally, appearance-based method is used for performance enhancement. To find the relevant characteristics of face images statistical analysis and machine learning methods are used.

CNN : A Convolutional Neural Network can take input image by assigning importance (learnable weights which and biases) to various aspects/objects in the image. The CNN is also able to differentiate one image from the other image.

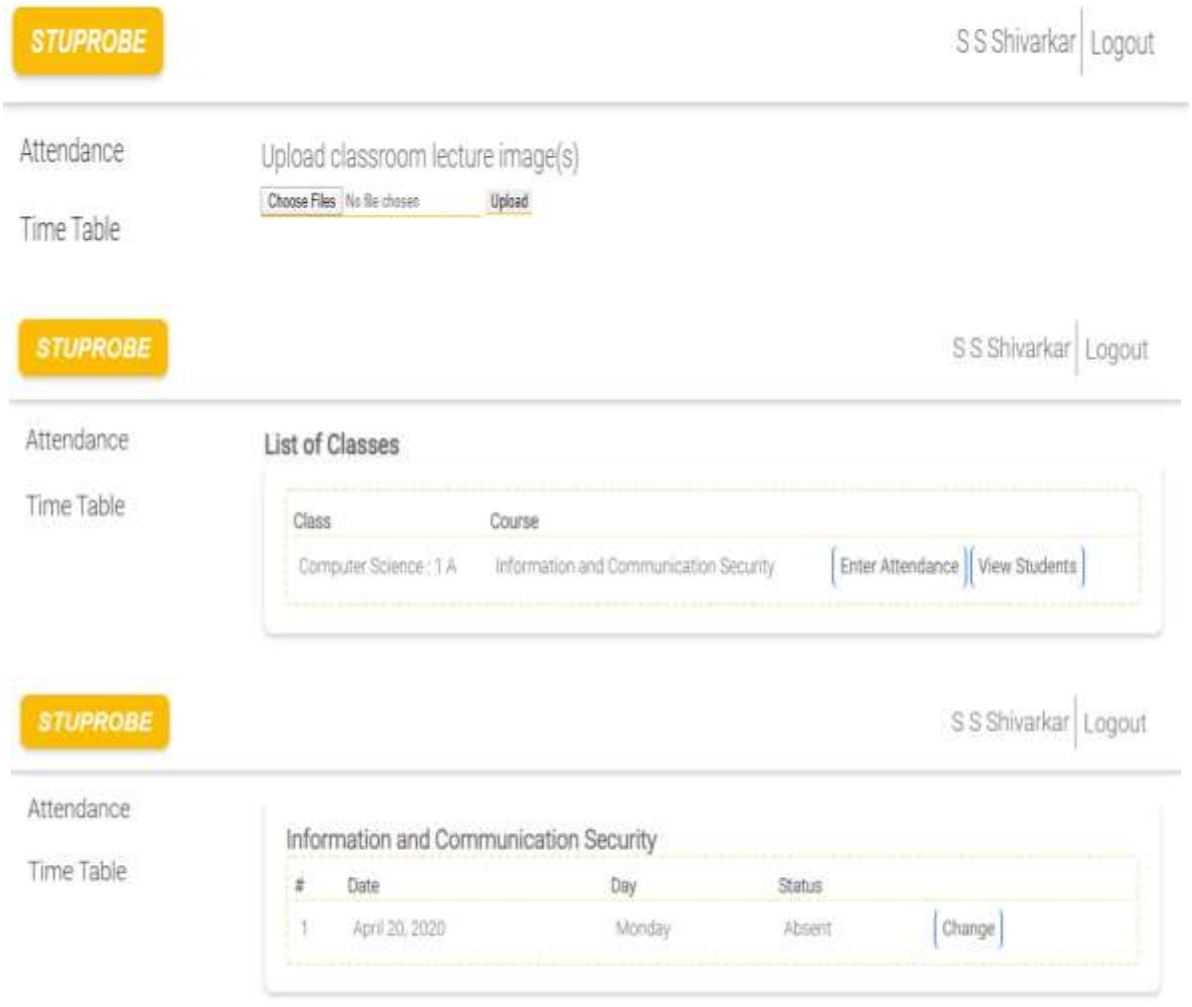
The ConvNet which is required for pre-processing is lower compared to other classification algorithms. The architecture of a ConvNet is similar to that of the connectivity pattern of Neurons in the Human Brain. It was inspired by the organization of the Visual Cortex. Single neurons respond to stimuli only in a restricted region of in receptive field, an individual neuron responds to a stimuli.

A collection of such fields causes overlap to cover the entire visual area.

MTCNN : (Multi-task Cascaded Convolutional Neural Networks) is an algorithm consisting of 3 stages, which detects the bounding boxes of faces in an image along with their 5 Point Face Landmarks. Each stage gradually improves the detection results by passing it's inputs through a CNN, which returns candidate bounding boxes with their scores, followed by non max suppression.

III. RESULTS AND DISCUSSION

The main working principle of the project is that, the video captured data is converted into image to detect and recognize it. Further the recognized image of the student is provided with attendance, else the system marks the database as absent.



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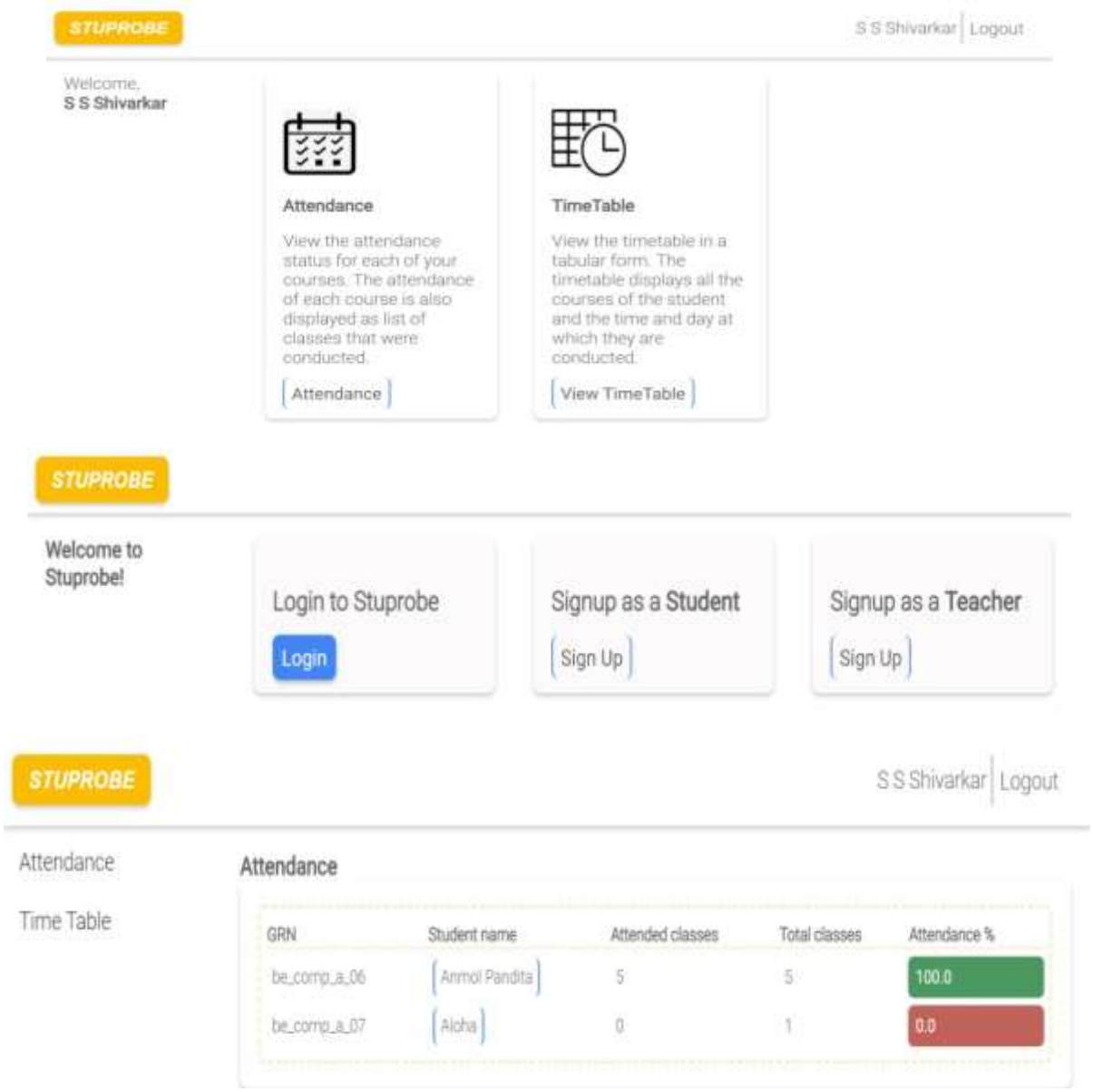

Fig-2: Stuprobe Snapshots showing the attendance and UI.

IV. CONCLUSION

We will develop a web-based analysis tool for student attendance and engagement which will ensure the quality of focus on an individual student and help in enhancement of student engagement. As the system uses only browser which is already installed in user's computer/mobile, there is no need of expensive resources.

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