



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 5, May 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118

9940 572 462

6381 907 438

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Face Recognition for Attendance System Using Deep Learning and Neural Network

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ABSTRACT: This paper focuses on implementation of the attendance cam system which is meant to solve the flaws of the existing attendance system that requires students to manually sign the sheet every time they attend a class. Which in turned consumes more time of the students as well as the instructor. This system is implemented in a form mobile application, wherein the instructor has to capture the photo of the students using the application and it will mark the attendance of the students present in the image. This application will utilize the technologies like MTCNN for detection purpose and FaceNet model for the recognition purpose which will make attendance activities more efficient and faster.

KEYWORDS: Image Processing, Deep Learning, Neural Network, MTCNN, FaceNet, Mobile Application.

I. INTRODUCTION

A facial recognition system is a technology capable of matching a human face from a digital image or a video frame against a database of faces, typically employed to authenticate users through ID verification services, works by measuring facial features from a given image. Face recognition is used for recognizing faces in images or videos. There are lot of models to recognize faces, but We are using FaceNet which is trending and accurate model to extract facial features from an image or video. Face recognition helps to verify the person's identity from the face of a person. Face recognition has multiple applications such as identifying criminals, thieves, etc but we are mainly focusing on student's attendance. In today's digital world, education along with time is important so in order to save time we have implemented a face recognition system. Therefore, face recognition is very useful in terms of verifying attendance to speed up the process of recording and verifying the person.

II. RELATED WORK

Many people are familiar with face recognition technology through the FaceID used to unlock iPhones (however, this is only one application of face recognition). Typically, facial recognition does not rely on a massive database of photos to determine an individual's identity — it simply identifies and recognizes one person as the sole owner of the device, while limiting access to others.

Face images in the wild undergo large intra-personal variations, such as poses, illuminations, occlusions, and low resolutions, causing great challenges to face related applications. This paper addresses this challenge by proposing a new deep learning framework that can recover the canonical view of face images. It dramatically reduces the intra-person variances, while maintaining the inter-person discriminativeness. Unlike the existing face reconstruction methods that were either evaluated in controlled 2D environment or employed 3D information, our approach directly learns the transformation from the face images with a complex set of variations to their canonical views. At the training stage, to avoid the costly process of labelling canonical-view images from the training set by hand, we have devised a new measurement to automatically select or synthesize a canonical-view image for each identity [1].

In modern face recognition, the conventional pipeline consists of four stages: detect \Rightarrow align \Rightarrow represent \Rightarrow classify. We revisit both the alignment step and the representation step by employing explicit 3D face modelling in order to apply a piecewise affine transformation and derive a face representation from a nine-layer deep neural network.[2].



As the world has seen exponential advancement over the last decade, there is an abnormal increase in the crime rate and also the number of criminals are increasing at an alarming rate, this leads toward a great concern about the security issues. Various causes of theft, stealing crimes, burglary, kidnapping, human trafficking etc. are left unsolved because the availability of police personnel is limited, many times there is no identification of the person who was involved in criminal activities. To avoid this situation an automated facial recognition system for criminal identification is proposed using Haar feature-based cascade classifier. This paper presents a real-time face recognition using an automated surveillance camera. This system will be able to detect and recognize face automatically in real-time [10].

III. METHODOLOGY

The Attendance system is a mobile application which utilizes technology like React Native for the development of the application. The application comprises of few forms which end user needs to fill. In order to provide basic information of the current ongoing class. Camera module has been implemented inside the application which utilizes the device native camera which will capture the image of the students whose attendance needs to be marked. Once the instructor uses the camera module to capture the image of the students, the image is sent to the back-end and in the back-end we utilize MTCNN for detecting all the faces in that image and FaceNet to recognize image against the existing dataset. The recognized face information is stored in the database which is a NoSQL database hosted on MONGO ATLAS.

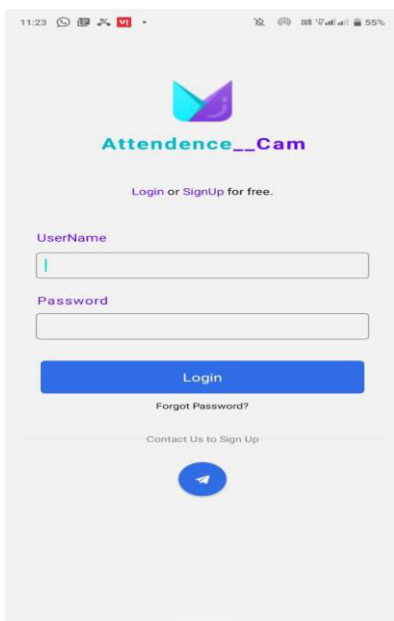
The data of the current recognized image is sent back to the React Native application and then in the React Native application, the data is converted into pdf format using expo print and save locally in user desired directory using Expo file system.

IV. EXPERIMENTAL RESULTS

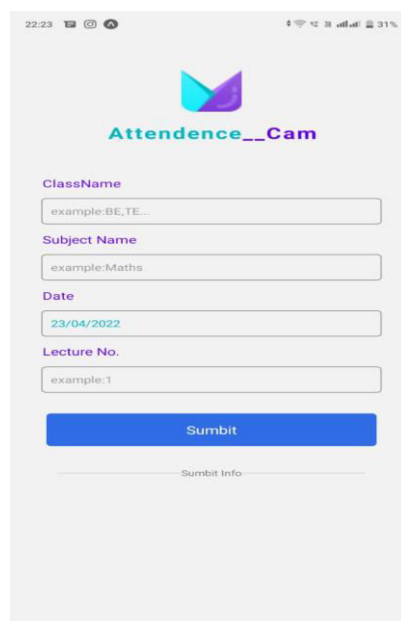
In this application the lecturer has to login with the credentials provided to the lecturer by the admin. Once logged in, then lecturer would be prompted to enter the details of the current class for which the lecturer wants to capture the attendance. After filling the correct details, a button will be shown to the lecturer which would open a camera module through which then the lecturer can capture the image of the students.

The captured image would then be sent to the back-end which would extract faces from the image and compare them with existing image dataset present at the back-end. Once the recognition of the faces from the image is done, the details of the class along with recognized name of students are stored in NoSQL (MONGODB) then the recognized faces and the details are sent back to the client side.

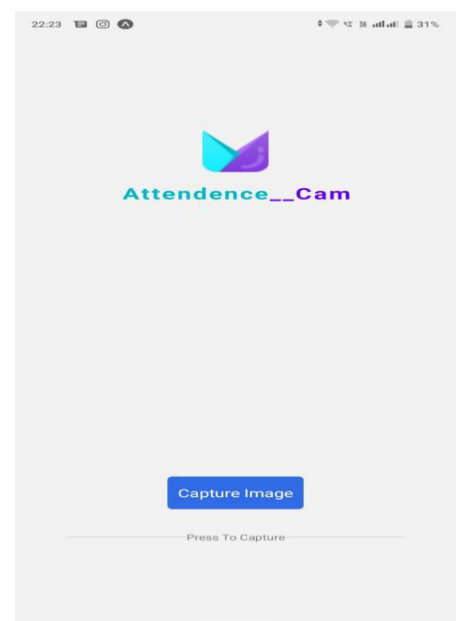
On the client side, we map through the data which was received from the back-end and after mapping the data we convert the data in the pdf format and save it locally on the user desirable location.



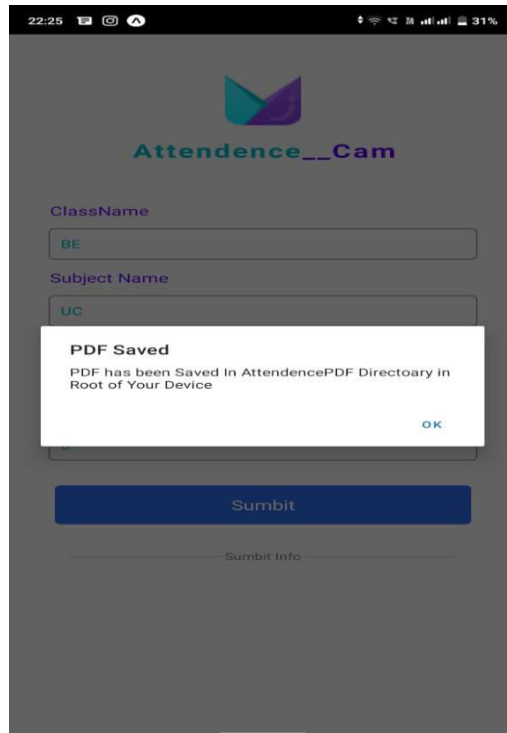
(a)



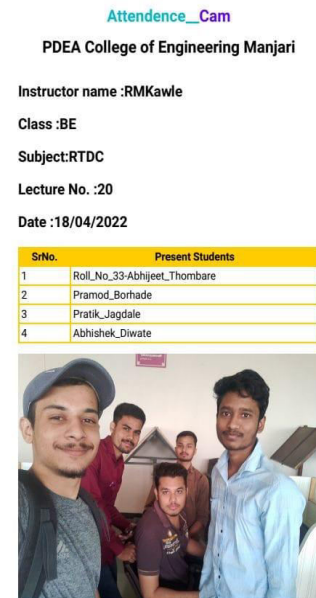
(b)



(c)



(d)



(e)

V. CONCLUSION

The implemented system is capable of correctly marking the Attendance using Facial Recognition System without purchasing any additional hardware which in turn gives low-cost maintenance. The implemented system is capable of correctly recognizing faces from images. It can work with any sort of images and it is sensibly strong to changes in face appearance and light conditions. To build this application we have used React Native for front-end, and Python libraries for Back-end to implement attendance system we have used deep learning and neural network libraries. The Implemented Attendance System has certainly speed up the process of checking student attendance in comparison to other biometrics authentication methods. This implemented system gives more accuracy compare any other system.

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Impact Factor: 8.118



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