



CA2

For

Year Project

Bachelor of Science in Information Technology

Attendance Management System using Face Recognition

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Table of Contents

1.	Abstract:	3
2.	Introduction.....	4
3.	Related Work	5
4.	Methodology	6
4.1.	System Overview	6
4.2.	Algorithm.....	7
4.3.	Datasets	7
4.4.	Evaluation Methods	7
5.	Result and Discussion	8
6.	Conclusion	8

1. Abstract:

The attendance system using face recognition is a computerized system that uses advanced image processing techniques to accurately identify and verify individuals based on their facial features. This system can be used in various settings such as schools, universities, and workplaces, to automatically record the attendance of students or employees without the need for manual input. Implementing a face recognition-based attendance system is beneficial in a way that it improves accuracy, efficiency, and convenience. The system has the potential to reduce administrative workload, eliminate the possibility of fraud, and ensure compliance with attendance policies. Additionally, the system can generate detailed reports that can be used for analysis and decision-making.

2. Introduction

Attendance plays an important role in education sectors be it schools or colleges all over the world. A proper attendance system not only brings students success but also for the institutions.

The current attendance system in educational institutions and workplaces involves manual methods which is time-consuming and prone to mistakes. With the increasing number of students and employees, the traditional way of taking attendance that is paper-based is less efficient, hence there is a need for a more precise and efficient attendance system.

Hence, aiming to develop an attendance system that uses deep learning algorithms to recognize the faces of students and mark their attendance automatically. The system should also have the capability to detect and prevent proxy attendance. The system should be easy to use and implement, scalable, and affordable, making it accessible to schools, universities, and organizations of various sizes

3. Related Work

The paper titled 'Face Recognition based attendance system' by International Research Journal of Engineering and Technology (IRJET) has developed a web based attendance management system using face recognition. They used unique characteristics of the face and used Haar Cascade machine learning algorithm which uses biometric facial recognition including following steps that are capturing the pictures, extraction from sample, comparison of extraction step collected data is compared with existing templates and lastly matching.

Haar Cascade is a machine learning object detection algorithm in which a cascade function is trained from a large number of positive and negative pictures(positive images are those in which the object to be detected is present, negative images are those in which the object to be detected is not present).

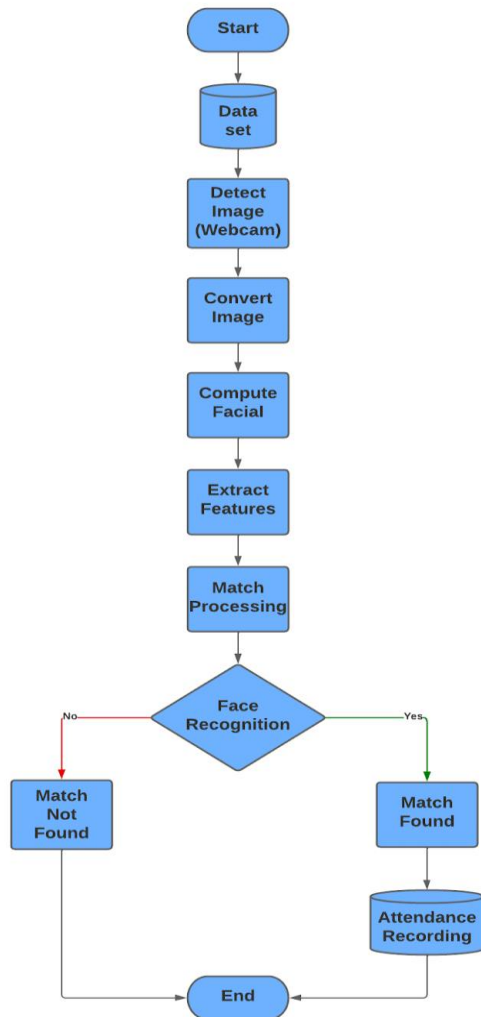
An automatic attendance system has been developed by Nilesh D. Veer in which a video is collected as input. Frames are captured when there is human presence detected. For face detection, Viola Jones algorithm is used, and Principal Component Analysis (PCA) is used for face recognition, which also uses LBP for threshold purposes. The facial recognition rate is nearly 100% for a small number of students and the attendance of the student is recorded along with the entry time of the student. They have used two different data samples, one consisting of images of 56 students and another dataset with images of 20 students. Using this two data samples they have derived the output in which the average recognition rate for dataset1 and dataset2 are 69.21% and 92.87% respectively

The Smart Attendance System was developed by a group of senior students of GCIT. In their project they have used the Haar Cascade algorithm for face detection and Local Binary Pattern Histogram (LBPH) for face recognition. But then in their project, they can only capture one person's image at a time.

4. Methodology

4.1. System Overview

Firstly, we collected the data, then used face detection to identify the human faces in digital image using Haar cascade (Viola-Jones Face Detection technique) algorithm. The Preprocessing the training images that is cropping the faces from the images required size by VGGFace16 (recognize custom faces).



4.2. Algorithm

As for the algorithm we used Haar Cascade for face detection and Convolutional Neural Network (VGGFace16) for image recognition

Haar Cascade algorithm

The Haar cascade algorithm is a popular method for object detection in images and videos. It is a machine learning-based approach that uses a set of pre-defined features called Haar features, which are similar to edge detection filters. These features are calculated at different scales and positions in an image and are used to classify sub regions of the image as containing the object of interest or not

VGGFace16

VGGFace16 is a deep convolutional neural network (CNN) model designed for face recognition tasks. It was developed by the Visual Geometry Group (VGG) at the University of Oxford and is based on the VGG16 architecture.

The VGGFace16 model is known for its high accuracy in face recognition tasks and has been used in a wide range of applications, including security systems, biometric authentication, and social media.

4.3. Datasets

The dataset is collected manually that is the images of our classmates. As for the size we have 3100 images, 100 images of each person. All the images are of .jpeg file in which it will be cropped later.

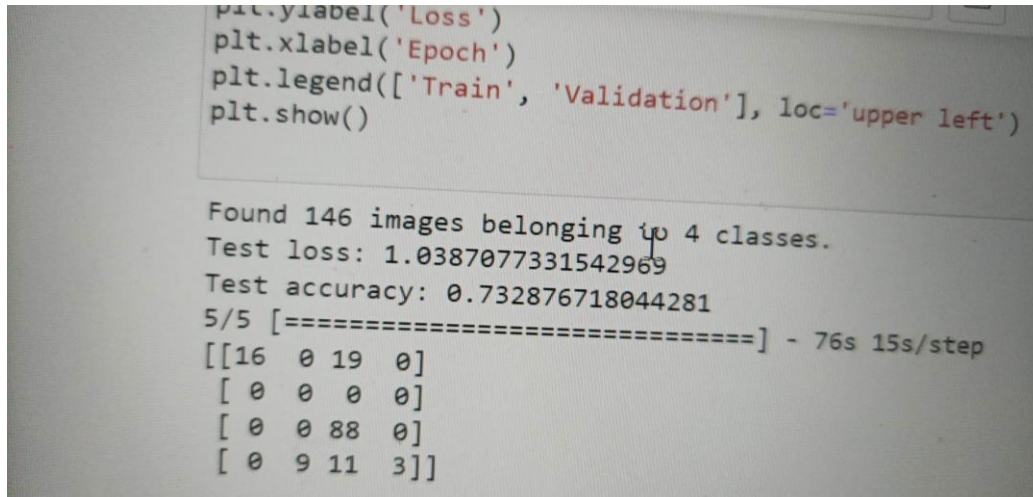
4.4. Evaluation Methods

To evaluate the performance of the model we have used Confusion matrix in which the accuracy score for our model is 73%.

A confusion matrix is a table used to evaluate the performance of a classification model. It is a matrix that shows the number of correct and incorrect predictions made by the model compared to the actual outcomes. It is typically used to evaluate the performance of binary classification models (i.e., models that classify instances into one of two classes).

5. Result and Discussion

The accuracy score using confusion matrix is 73% for now. Since we haven't trained all the data now, we are hoping for higher accuracy score after training all the data



6. Figma Link (UI)

<https://www.figma.com/file/jmobFpB3rzKJLtnQREkV43/Attendance-Management-System?node-id=0-88&t=Mut5DcnzuJ6ekqJR-0>

7. Conclusion

This system aims to build an effective class attendance system using face recognition techniques. The proposed system will be able to mark the attendance via face Id. It will detect faces via webcam and then recognize the faces. After recognition, it will mark the attendance of the recognized student and update the attendance record. Currently the system has attained an accuracy up to 73%.