Face Recognition System Using SVM Algorithm

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Abstract: Face recognition technology has become an effective and automated solution for managing attendance in academic and organizational settings. With advancements in machine learning and computer vision, it is now possible to recognize individuals accurately in real time using facial features. This project presents a Face Recognition Attendance Management System that automates the attendance process by detecting and verifying faces through live camera input. The system uses techniques such as face detection, feature extraction, and classification, with the help of Convolutional Neural Networks (CNN). We analyze the system's performance under varying conditions such as lighting and face angles, and evaluate its accuracy and reliability. Our study demonstrates that integrating face recognition with attendance systems enhances security, saves time, and minimizes the chances of proxy attendance.

Keywords: Face Recognition, Attendance Management, Machine Learning, Deep Learning, Computer Vision, Convolutional Neural Networks (CNN), Image Processing.

INTRODUCTION

- In recent years, the adoption of biometric technologies has grown rapidly across various sectors, particularly in the field of security and automation. Among these technologies, **face recognition** has emerged as one of the most promising and widely used methods for identity verification. Its non-intrusive nature and ease of integration with camera systems make it an ideal solution for real-time applications.

- One such application is **attendance management** in academic institutions and workplaces. Traditional methods such as manual attendance or ID card scanning are often time-consuming, error-prone, and vulnerable to proxy or fraudulent entries. These limitations have led to the development of automated systems that leverage face recognition to mark attendance accurately and efficiently.

- Face recognition systems operate by capturing facial images, detecting key features, and comparing them with stored records to verify identity. With the help of **machine learning** and **deep learning**, especially using **Convolutional Neural Networks (CNNs)**, these systems have achieved significant improvements in accuracy and speed. Technologies like **OpenCV**, **Dlib**, and **FaceNet** enable efficient real-time face detection and recognition in various environmental conditions.

- Despite these advancements, challenges remain. Variations in lighting, facial expressions, occlusions (e.g., masks or glasses), and camera angles can affect the performance of recognition systems. Ensuring data privacy and preventing unauthorized access are also critical concerns in biometric applications.

- Nevertheless, face recognition-based attendance systems offer numerous advantages. They minimize human intervention, reduce the chances of attendance fraud, save administrative time, and maintain accurate digital records. As such, they are becoming an integral part of smart institutional infrastructure.

- This project aims to design and implement a **Face Recognition Attendance Management System** that automates the attendance process while ensuring high accuracy, usability, and security.

A. Main Module And Overview Of System::

1) Student login.

2) Face dataset training

3) Face extraction and detection

4) Mark the attendance in excel sheet

The goal of face recognition based attendance system is to detect face of student from image or video stream automatically in real time. It capture facial data and storing it into dataset the CNN and histogram of oriented gradient, haar cascade is the method used which increase the accuracy .recognized face data save in the form of excel sheet which mark the attendance.[2]

B. Technology Used

1) Python

2) OpenCv

3) Webcam

4) Tkinter

5) Html,css,js

6) Student Dataset and Algorithm

7) Haar classifier ,KNN,CNN,SVM

C. Purpose

The main purpose of this system to detect the student face and taken the attendance automatically, with saving time and also   reduce the chance of mistake it save money also and pen as well as paper can save manual work can be reduced.

METHODOLOGY

The various stage can be occur in it they are as follows which help to build project.

A. Data Entry

The first step is that we are collecting the student image with different posture and they are stored in the form of dataset. The name and roll number, branch can be written in the login page we have log all the student with their name, roll no, branch and this data are stored in dataset. When the student come in front of live video stream their face is detect and the attendance can be taken and this attendance stored in excel sheet. Photos……..> enter name and roll no, branch to the photos. Enter this photo set in the folder and save image with their id and name. Sign in to the system with roll no and their respective id, and branch.

B. Dataset Training

The given dataset are stored in a folder with their name, roll number and branch the Dataset are used as input when student are in live video stream they identify student with their name and roll no, attendance can be taken automatically within 2 sec and Attendance stored in the form of excel sheet. The given dataset are focus on how face recognized and detect the authorized student and Count at what time they are coming in and going out from classroom .and also record how many classes they attained .the system keep authorized record of each student in the Form of its attendance in excel sheet format when face recognition done the automatic it Mark the attendance and store in the form of excel sheet.

C. Face Recognition

The face detection is performed by using haar-cascade using openCV in python. Haar cascade algorithm train the image detect in webcam and extract their feature. After it show the window which recognized the face in webcam which is register in previous from dataset image and after running it the attendance record and show in the form of excel sheet.

The below flowchart show how the face are recognized in the camera and training of the Register dataset show using train algorithm and by using haar cascade feature are extracted and in live webcam the face are detected if it identified then it record attendance and store in the form of excel sheet in database. If face is not recognized then it need to be signed in In the system if it is done then in live webcam it recognized it and automatic attendance will be mark in excel sheet. [6, 9]
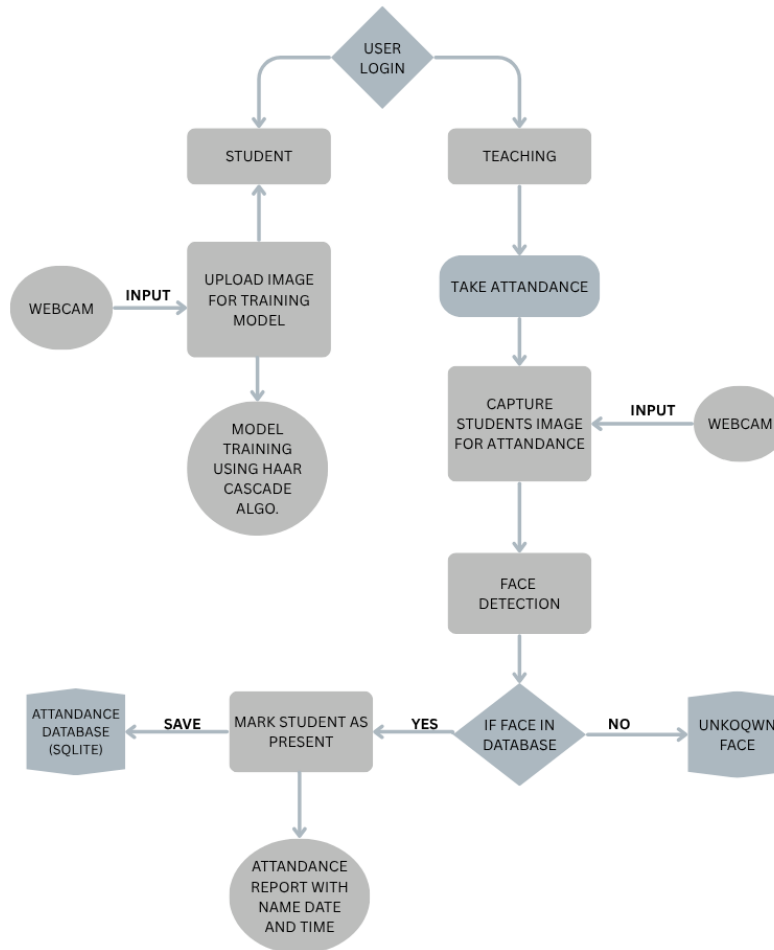
D. Algorithm Used

The given system used the proposed algorithm, CNN, algorithm, SVM, LBPS, face detection and face recognition algorithm are used in attendance system. The face detection algorithm are used to find out location and size of the faces in the form of image it detect the face first using face detection algorithm and after detecting the face in webcam it recognized the image. Proposed algorithm it capture the image of each student in camera and then CNN (convolutional neural network) algorithm is applied and already recognized and capture image are used trained it in the network ,and greatly increase image recognition rate. AdaBoost algorithm is used in OpenCV method and it detect the face it firstly extract the feature image into sample set by extracting the haar cascade feature in the image and then detect the image clearly and properly

Haar cascade detect the face with eye, nose and mouth with opencv and detect it more properly.

SVM (support vector machine) and LBPH (local binary patter histogram) are used to generate a decision surface separating the two classes. They re-interpret the decision matric between two facial images. This helps to construct face recognition algorithm. And LBPH is used to recognize the face of person it increase its performance and how it is able to recognize the face of person from both front face and side face in recognition process. [6, 10, 14]
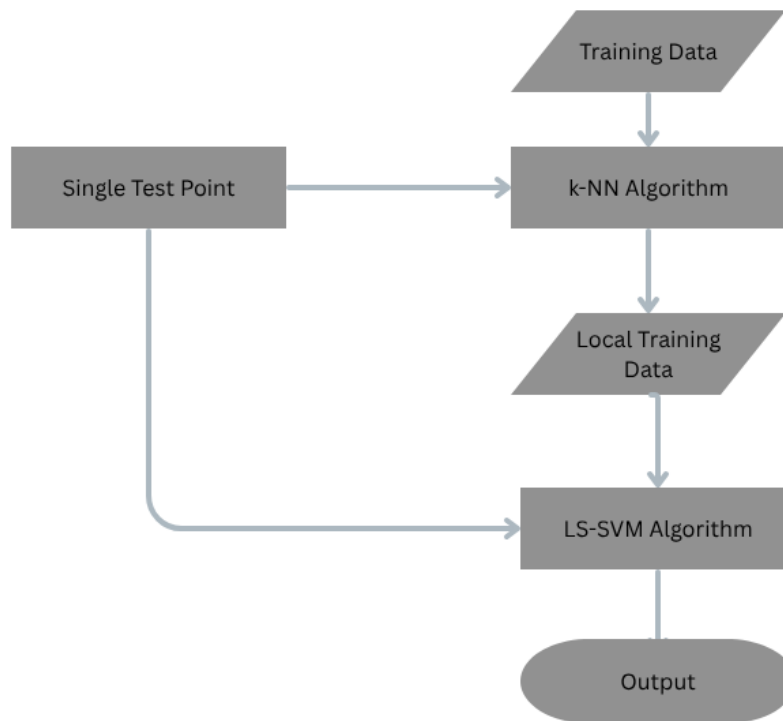
When the data are trained using KNN and SVM algorithm it test the given image if image is match then it recognized and the output will display in the form of attendance data of student
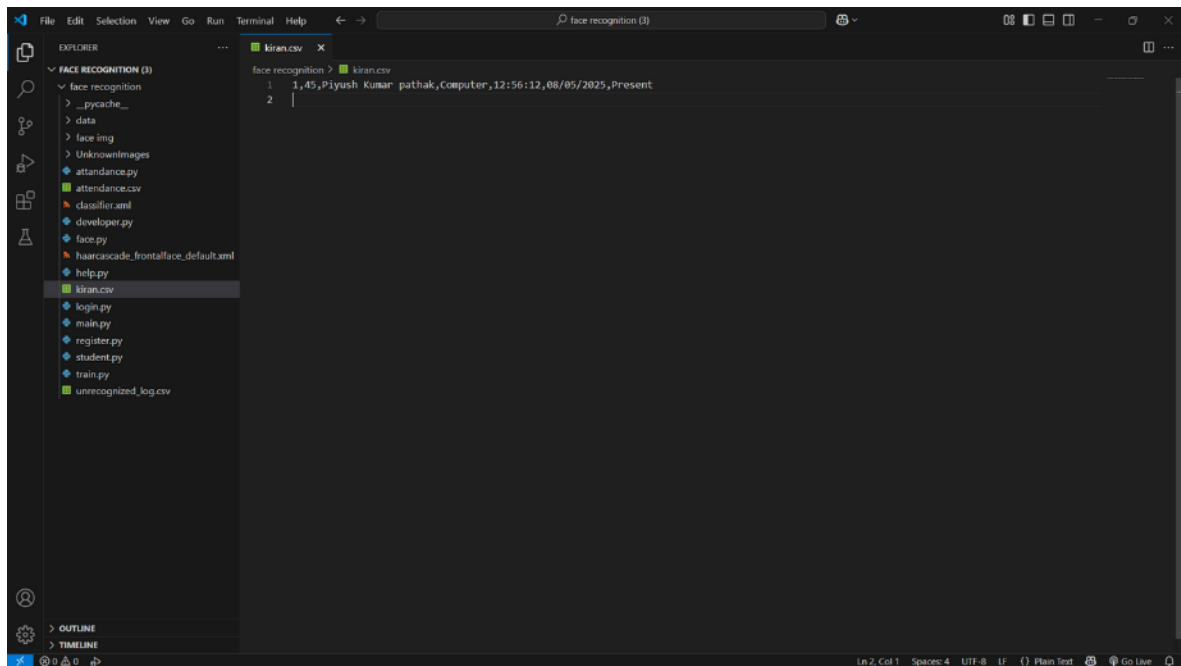
In the excel sheet store in database

EXECUTION PROSESS

First the student of image is collected with different posture having high accuracy then the collected image are stored in the given database with their roll number, name and branch the separate folder are created for student image then student can registered or sign in in the form to stored their name and roll no, branch registered student can recognized while training of image take place in recognition phase unregistered student cant not recognized by system. The unauthorized person cannot access the detail. This is security to the system, the register student can recognized and attendance will be mark it store in the form of excel sheet. [3]
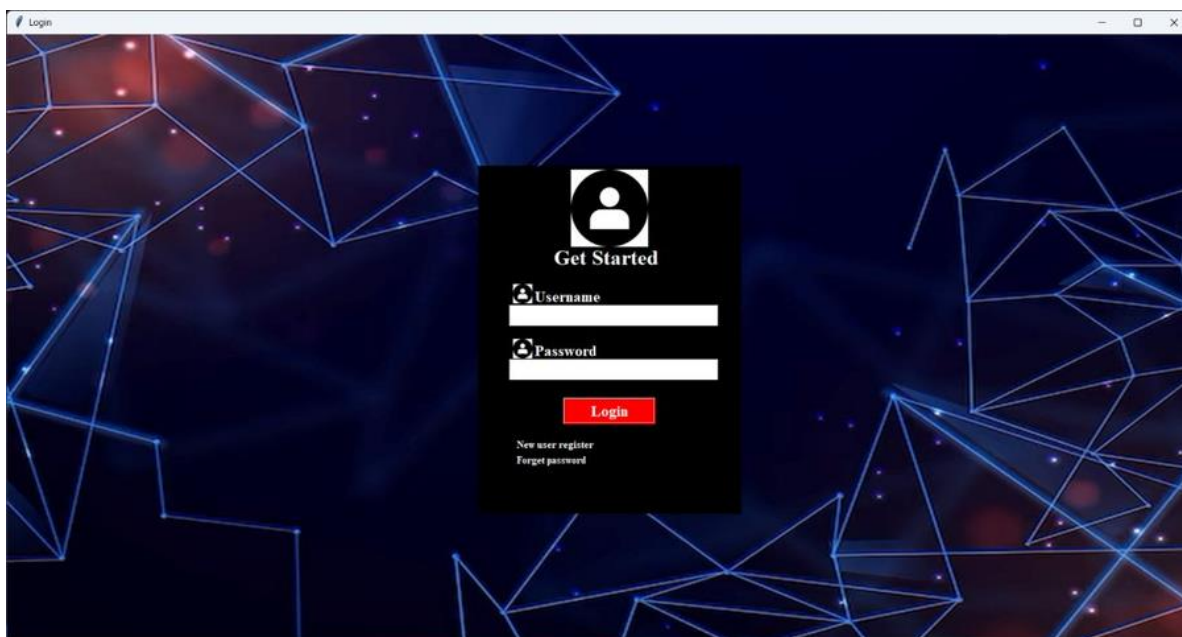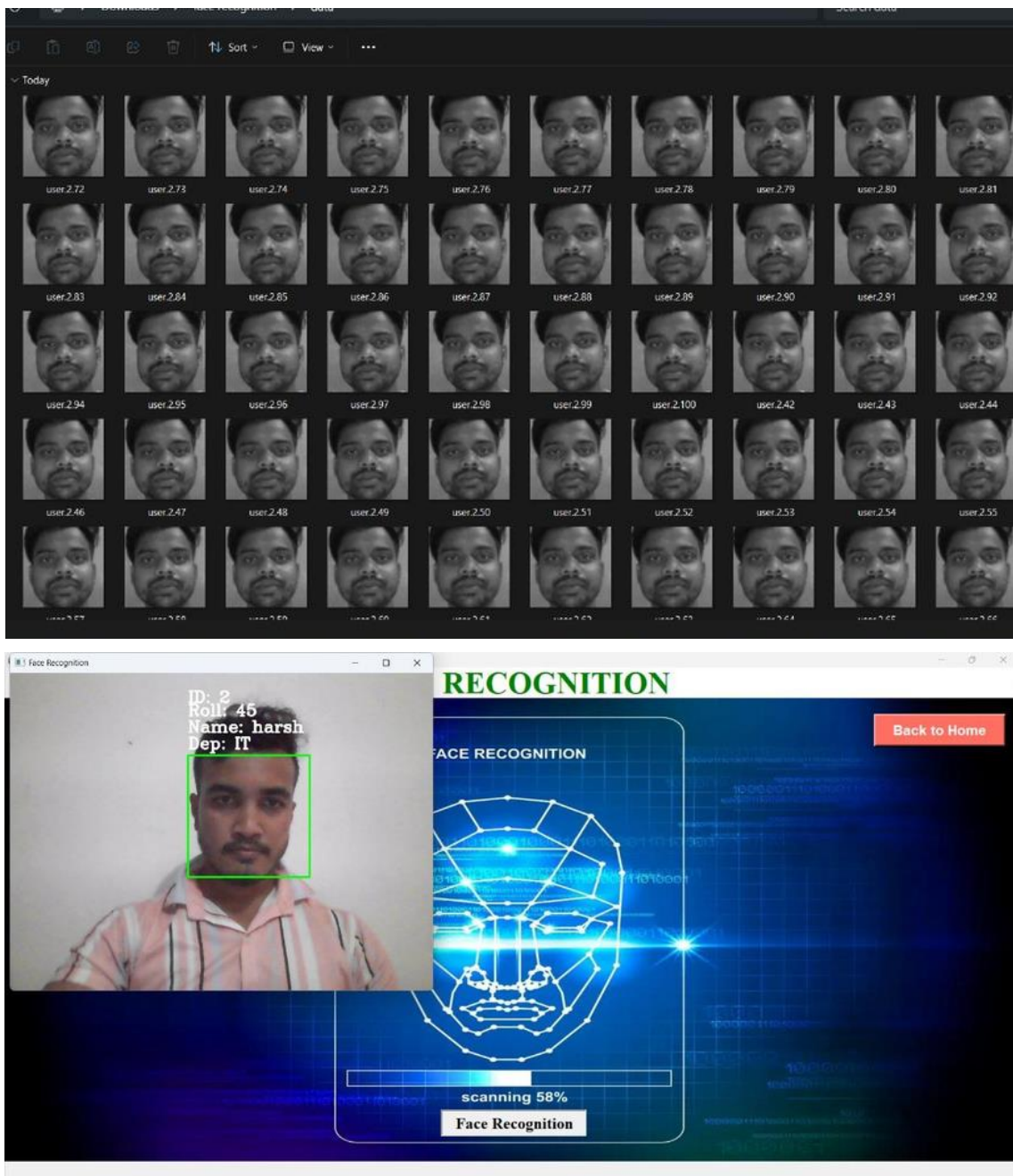
Face are recognized in the live video stream by detecting name of student, roll no and branch see in above picture and attendance can be mark in the form of excel sheet store in the dataset.

The Attendance can be mark after detecting a face in webcam and store in the database in the form of excel sheet detecting name and roll no and branch with incoming and outgoing time and mark the attendance in excel sheet.

A. Accuracy

While testing the accuracy of facial recognition algorithm its works perfectly and highest performance of the used algorithm. In idle condition recognition system can have perfect accuracy the algorithm have 99% accuracy while testing the face in live webcam cropping the face out whole image converting it to grayscale resize image and detect the face efficiently. The face are recognize in better way and having the accuracy 99% to 98%. Student face recognized in webcam in better way having highest result.

FUTURESCOPE

An automatic attendance system is an educational system that record the attendance of students in college or school. Attendance software enables the faculty to record, Store, and monitor students attendance history and manage the classroom properly. It saves lot of time, pen, paper and it avoid the chance of mistakes in attendance. Data are save private and no can do the changes in it hence it is more secure.

ADVANTAGE

1. It is Time saving process
2. It is easy to manage and more secure
3. It is cost effective
4. Attendance can mark automatically
5. Time and date also automatic track.

DISADVANTAGE

1. If it goes in wrong hand it will make a problem.
2. Data privacy breach
3. Low reliability
4. Lack of regulation in face recognition system

CONCLUSION

The system provide the feature such as face detection, extraction of feature, detection of extracted feature and analysis of student's attendances. It recognized students face iJand detect their face attendance mark using name and id and store in the form of excel sheet.it helps to build effective class attendance using face recognition system.

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