FACE RECOGNITION BASED ATTENDANCE SYSTEM

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ABSTRACT

A face recognition attendance system automatically identifies and confirms a person and records attendance based on their face detection. A facial recognition attendance system incorporates facial recognition technology to recognize and verify a person's facial features and to record attendance automatically. Unlike other forms of biometric technology, such as fingerprint recognition, which captures identity by touching, a facial identification system manages without the approach of direct contact.
Face recognition records the attendance with marking time. This application identifies and verifies a person by mapping his or her facial features with the trained data. The machine will be trained well before with the person's id and face so that it identifies accurately when implemented. To identify faces the local features method splits the face into a number of local features and then identifies the face using these features.

Keywords: *Face recognition, Attendance, Training, Mapping, Identification*

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1. INTRODUCTION

Machine Learning is the field of study that gives computers the capability to learn without being explicitly programmed. ML is one of the most exciting technologies that one would have ever come across. As it is evident from the name, it gives the computer that makes it more similar to humans: The ability to learn. Machine learning is actively being used today, perhaps in many more places than one would expect. Machine Learning is an essential skill for any aspiring data analyst and data scientist, and also for those who wish to transform a massive amount of raw data into trends and predictions.

OpenCV is the huge open-source library for the computer vision, machine learning, and image processing and now it plays a major role in real-time operation which is very important in today's systems. By using it, one can process images and videos to identify objects, faces, or even handwriting of a human. When it integrated with various libraries, such as NumPy, python is capable of processing the OpenCV array structure for analysis. To Identify image pattern and its various features we use vector space and perform mathematical operations on these features.

Computer vision is a process by which we can understand the images and videos how they are stored and how we can manipulate and retrieve data from them. Computer Vision is the base or mostly used for Artificial Intelligence. Computer-Vision is playing a major role in self-driving cars, robotics as well as in photo correction apps. Face recognition is such a challenging yet interesting problem that it has attracted researchers from different backgrounds. It is due to this fact, that the literature on face recognition, is vast and diverse.

The problem of automatic face recognition involves four key steps:

- Face Detection
- Feature extraction
- Training
- Recognition.

2. ALGORITHMS

The algorithms we used are:

- Local Binary Patterns Histogram Algorithm
- Haar Cascade Algorithm

Local Binary Pattern (LBP):

It is a simple yet very efficient texture operator which labels the pixels of an image by thresholding the neighbourhood of each pixel and considers the result as a binary number. It was first described in 1994 (LBP) and has since been found to be a powerful feature for texture classification. It has further been determined that when LBP is combined with histograms of oriented gradients (HOG) descriptor, it improves the detection performance considerably on some datasets. Using the LBP combined with histograms we can represent the face images with a simple data vector. As LBP is a visual descriptor it can also be used for face recognition tasks

Haar Cascade

It is an algorithm that can detect objects in images, irrespective of their scale in image and location. This algorithm is not so complex and can run in real-time. We can train a haar-cascade detector to detect various objects like cars, bikes, buildings, fruits, etc. Haar cascade uses the cascading window, and it tries to compute features in every window and classify whether it could be an object. Haar cascade works as a classifier. It classifies positive data points that are part of our detected object and negative data points that don't contain our object. Haar cascades are fast and can work well in real-time. Haar cascade is not as accurate as modern object detection techniques are. Haar cascade has a downside. It predicts many false positives. Simple to implement, less computing power required.

3. IMPLEMENTATION
3.1 DATASET CREATION

The system creates its own data set by capturing the user images with the specified identification number. This asks for us to enter an identification number. After we enter, the webcam of the system automatically starts and captures the images of the person of the respective id.
The person whose id is being entered should be ready in front of the camera so that the face is captured.Then the captured images will be stored at the given location. The no of images should be captured can also be decided by us. Here I have asked the module to capture to 50 images. The images in the data set will be stored in the following format:

                    User.<id>. <image no>
          Suppose the id is 1:
               User.1.1 to User.1.50 are the images stored in the dataset for the person with id 1.
          Suppose the id is 2:
               User.2.1 to User.2.50 are the images stored in the dataset for the person with id 2.

Fig -1: Dataset is created and stored in specific location

3.2 TRAINING OF DATASET

Here, the previously stored dataset will be trained to the machine. It maps the user ids to the user faces. The images saved in the data set will be trained to the machine. It creates a array data structure and name it with the identification no of the person and learns the facial features of that person by storing it in the array. After successfully training the system generates a output message as "Trained Sucessfully".

3.3 RECOGNITION

When the data is successfully trained, we check whether it recognizes the faces correctly. If it recognizes the attendance will be marked in the XL sheet else if gives a message as unrecognized face. When the framework is set for taking attendance, the web cam automatically starts and tries to identify the people in front of the web cam. As it identifies, the data will be stored in the excel sheet.
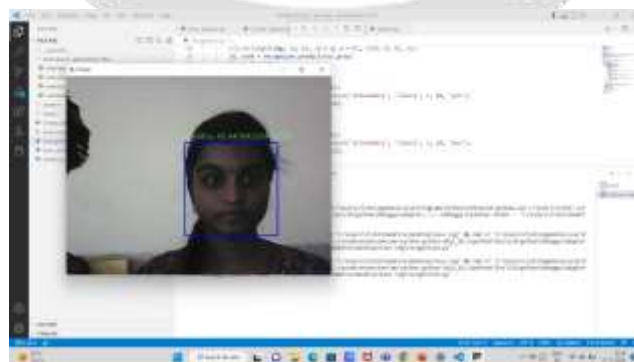
Fig -2: Recognition of the person

3.4 XL WRITE

When the face is recognized correctly, attendance will be marked at the specific id. The excel sheet will be automatically created with the file name as respective day date.

When the framework is set for taking attendance, the web cam automatically starts and tries to identify the people in front of the web cam. As it identifies, the data will be stored in the excel sheet. The excel sheet contains the name of the person and yes if he is present. This excel sheet is also created automatically with the file name as the date of the day the attendance is taking on. It uses the system date.

Fig -3: Attendance Storing in excel sheet

4. CONCLUSIONS

This face recognition based attendance system is both cost-effective when compared to manual attendances taking in the classrooms. The cost and time saved are even larger because the data acquired from the face recognition-based attendance system is accurate, easily accessible and can be retrived when lost. They use advanced computer vision algorithms to accurately recognize and identify individuals based on their facial features, making them a reliable and efficient option for organizations of all sizes.

5. REFERENCES

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