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Automated Smart Attendance System Using Face Recognition

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Abstract: ***In the human body, the face contains many important details, so the face is the most significant factor in identifying a person. There are several main ways to detect the presence of a person. Biometrics for capturing attendance. This is a time consuming process. In this paper, we will use a collection of rules to develop a model that classifies each character's face from the captured images. The HOG algorithm for recording student attendance. HOG (Histogram of Oriented Gradients) is one of the methods used to represent and classify images, is a common and effective method, and was chosen for its robustness against changes in pose and lighting. .. The proposed ASAS (Automated Smart Attendance System) captures images and compares them to the images stored in the database . The database is updated during student enrollment using an automated process that also includes names and role numbers.***

Key Terms: HOG, python, ASAS

I. INTRODUCTION

Image processing is a technique for performing operations on an image to enhance it or obtain useful information. This is a method of signal processing where the input are an image and the output is either and image or an image property or function . Image processing single of the fastest developing technologies nowadays and can be joined into some new application . Biometrics or fingerprint scanning's one of the existing methods that take time because students need to explicitly state their impressions on the machine. However, it does not take long to explicitly recognize the face, and it is much shorter than other methods such as biometrics. Face recognition is knowledgeable and can classify or verify creatures based on digital images. Different kinds of face recognition techniques include [1] feature-based [2] knowledge-based [3] appearance-based [4] template matching. The image is just a two-dimensional statement. It is defined by the mathematical function f (x, y). Where the two horizontal and vertical coordinates are x and y. The value of the function f (x, y) at each point indicates the pixel value of the image at that point.

A. Eigen Faces

The unique surface approach is based on the mathematical method PCA (Principal Component Analysis). This approach has been successfully used to reduce the dimensions of the image. Face detection and image identification primarily use principal component analysis by examining principal components that numerically decompose faces into feature vectors. The details of the feature vector can be found in the covariance matrix.

B. Fisher Faces

The implementation of the fisher face technique is based on the principle of Eigen face. Fisher faces are based on the Linear Discriminant Analysis (LDA) technique, which is an appearance based methodology. LDA is based on the notion of labels such that when the requisite dimension is projected onto the image, PCA searches for the highest variance in the matrix. It is possible to maximize the disparity between class means. The key ideas are to maximize the ratio between class scatter and its matrices, which is achieved using LDA . Fisher's face has the disadvantage that it is more difficult to find a projection of the facial space than an eigenface. Calculating the ratio of interclass variation to infraclass variation takes a long time. The calculation of the average image for each class is performed first.

II. RELATED WORK

Most government and agency certification systems rely on behavioral and physical condition-based security data called biometrics. Biometric systems process raw data such as fingerprints and derive valuable properties from it. The characteristics describe the type of data provided to the biometric system and make decisions accordingly. Much research has been done on the different methods available to implement effective attendance monitoring systems. These methods differ in the type of input method used, the type of data processing used, and the controller used to implement the system. In this section, we will look for different solutions with the strengths and weaknesses of each system.

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The first system, an attendance system with NFC technology and integrated cameras on mobile devices (Bhis, Khichi, Korde, Lokare, 2015). Near field communication is types of short-range radio communication that occurs among dual devices, one active and the other passive . The two devices are mostly induction coils that can respond to electromagnetic induction. Active devices are used to create electromagnetic fields of a particular radius and intensity. It was used to implement attendances systems. For example, schools may give students uniquely programmed NFC tags with unique identification numbers. When attending a class, the instructor brings an NFC reader and the student needs to swipe the NFC tag near the leader, the instructor's phone says. This information is then sent to the school's database to mark student attendance. However, this system is vulnerable to spoofing, which allows one person to sign in to another. Other related systems that use biometrics (fingerprint recognition, RFID, etc.) to identify end users are time management systems used by many universities, institutions, and schools. However, these systems also pose privacy issues. These schemes are also physically damaged by the user. Therefore, additional maintenance costs are incurred. The idea we propose deprives everyone of physical access to automated systems.

III. PROPOSED METHOD

The main purpose of this project is to solve the problems of the old attendance system while recreating a whole new and innovative intelligent system that can bring convenience to the facility. In this project , an application is being developed that can recognize each person's identity and ultimately store the data in a database system. Apart form that, an excel sheet is created which demonstrations the students attendance and is directly mailed to the respected faculty. Histograms of Oriented Gradients, also known as HOGs, are a functional descriptor like Canny Edge Detector. SIFT (scale invariance and feature conversion). It is used in computers visions and image processing's for object recognition purposes. This technique counts the occurrence of gradient directions in the localized part of the images. This methods is very similar to the Edge Histogram and Scale Invariant Feature Transformation (SIFT).

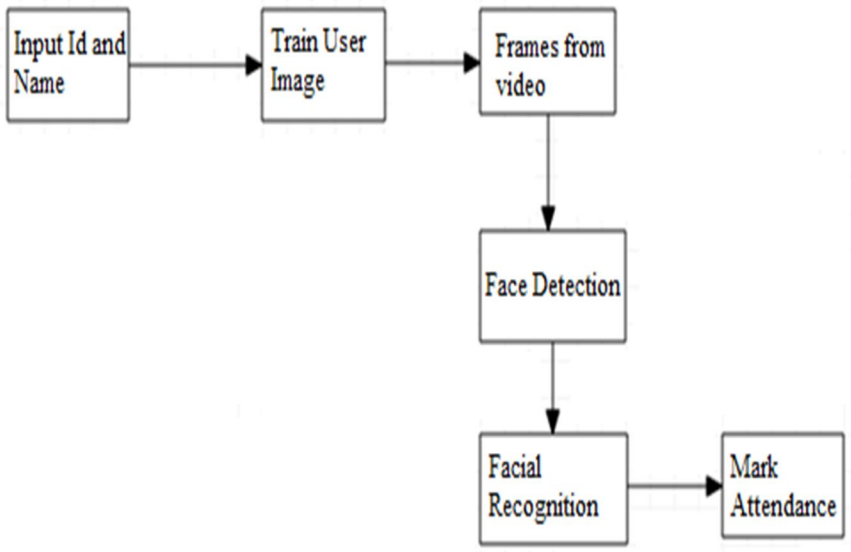


Figure 1: Flow chart of the future technique for face recognition attendance system

The HOGs descriptors focus on the structures or the shapes of objects. It is superior to any edge descriptor because it uses both gradient magnitude and angle to calculate features. For areas of the image, use the magnitude and direction of the gradient to generate a histogram.

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IV. METHOD OF IMPLEMENTATION

A. *Face Recognition Module*

In this module, images with various facial expressions are saved in a folder, and the images are fetched and displayed from this folder. The Local Directional Number Pattern (LDN) method has similarities on the face, but it is very difficult to artificially imitate because of the large differences in age, skin, color, and gender.

B. *Administrator Function Module*

Update laws, manage user information, send confirmations to users, cancel user registration, manage user accounts, and update news.

C. *User Function Module*

Register their information, create an account, select a demo test to pass this test, view the results of the demo test at that time, view student information, and the law updated by the administrator Show the rules.

D. *Specification Module*

In this project, we have prepared student details to manage all records such as student profile issuance, registration, attendance, address, etc. Once all these get computerized to work efficiency of the employee will get increases.

E. *Reporting Module*

The Student Attendance Management System is designed to automate the process of registering student profiles and publishing monthly attendance reports, including various reports. The system can carry out daily activities.

F. *Preprocessing*

This is primarily intended to reduce noise effects, lighting differences, color intensity, backgrounds and placement. The correct recognition of image depends upon quality of captured image; lighting condition. Recognition rate can be improved by performing pre-processing on the captured image .

G. *Student Management*

This Constitutes The First Phase Of Our Project Module. This Section Consists Following Parameters: [1] Student Registration Form: The Student Appears As A New Candidate for Registration. Registration Consists of Totaling Each Candidate's Personal Details. [2] Student Face Detection: The newly registered candidate's face gets detected for the very first time and stored in the database .

H. *Attendance System*

This is the next phase of the project module . Individual students are identified by extracting the common features of each individual using the image integration method. The candidate's presence is then flagged only if the face image is matched against the image stored in the database and the facial features of the newly captured image match's the image already stored

I. *Face Recognition and Attendance*

Next the face detection phase the following is face recognition . This can be achieved by cropping the first detected face from the image and compare it with the database . This is called the selection of region of interest . In this way faces of students are verified one by one with the face database using the Eigen Face method and attendance are marked on the server . Face Recognition techniques are used in our system .

J. *Noise Filtering*

Since the input image is captured by the camera, many noise sources can be present in the input image. There are many techniques for noise reduction. Low pass filtering in the frequency domain is a good choice, but it also removes some important information in the image. Our system uses median filtering to eliminate noise in histogram-normalized images.

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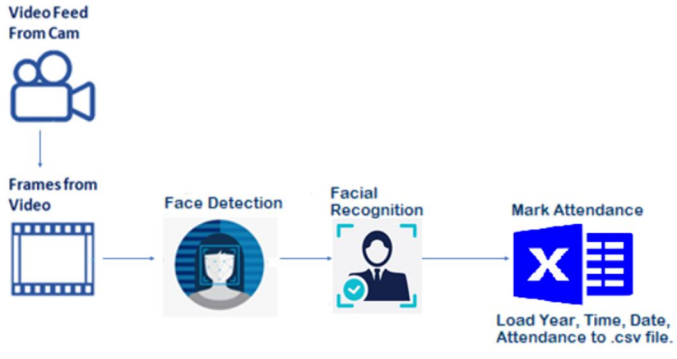


Figure 2: System Architecture for face recognition attendance system.

V. EXPERIMENTAL RESULTS

We understand that the Eigen face and the fisherman's face are the calm life of two in two and the true life of two in two, respectively. We cannot guarantee the two best two gentle two conditions. HOG is an extension to overcome this framework. After testing the face recognition algorithm with a series of volunteers, we got highly accurate results. After performing all the steps of implementation, you will get the following results: The enrolled students will be successfully generated and saved in the records folder. Registered Student Face Recognition , the following are implementation tests and their results during the attendance registration process, where one student is recognized as attending and registered and another student is recognized as absent and registered. It is shown that it was not. Attendance registration user interface. Then an e-mail message is dispatched from the laptop to the teacher.

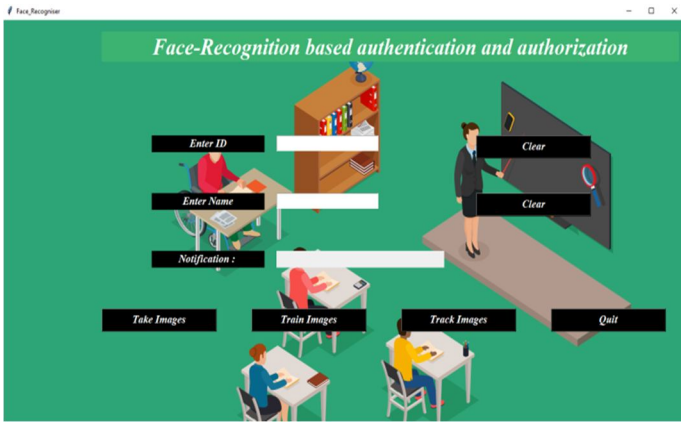


Figure 3: GUI window for proposed work

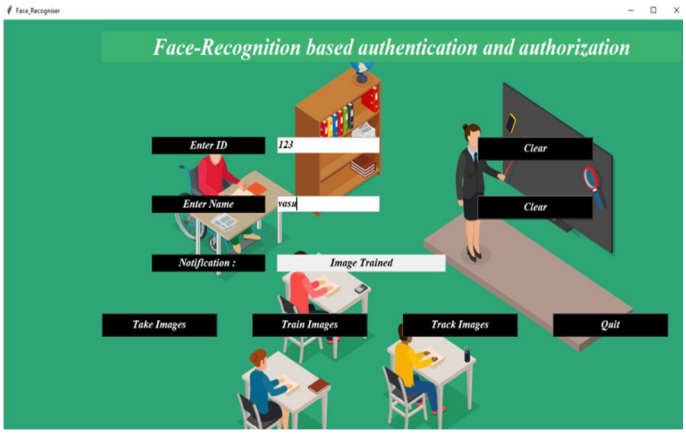


Figure 4. Data Entry process

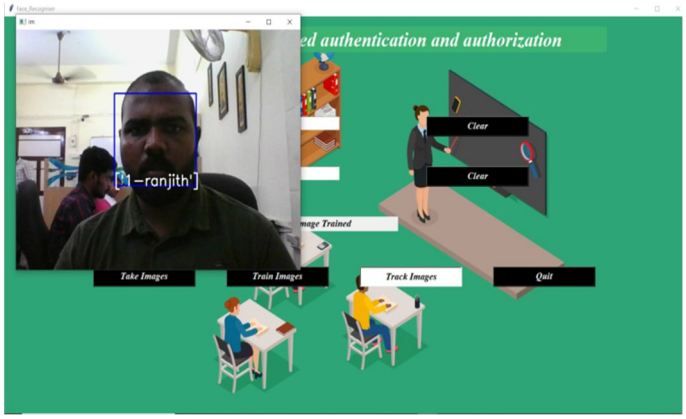


Figure 5: Output of the proposed system

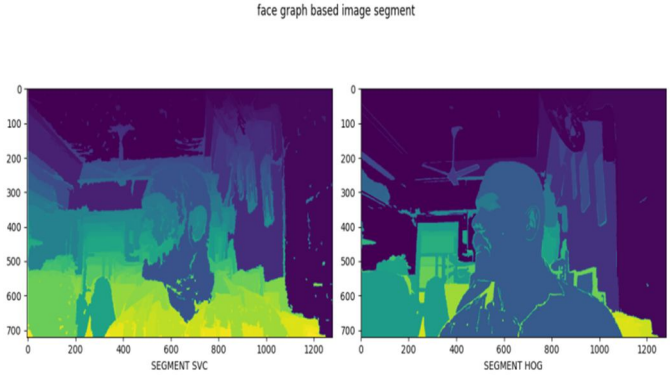


Figure 6: Local binary pattern histogram image

VI. CONCLUSION

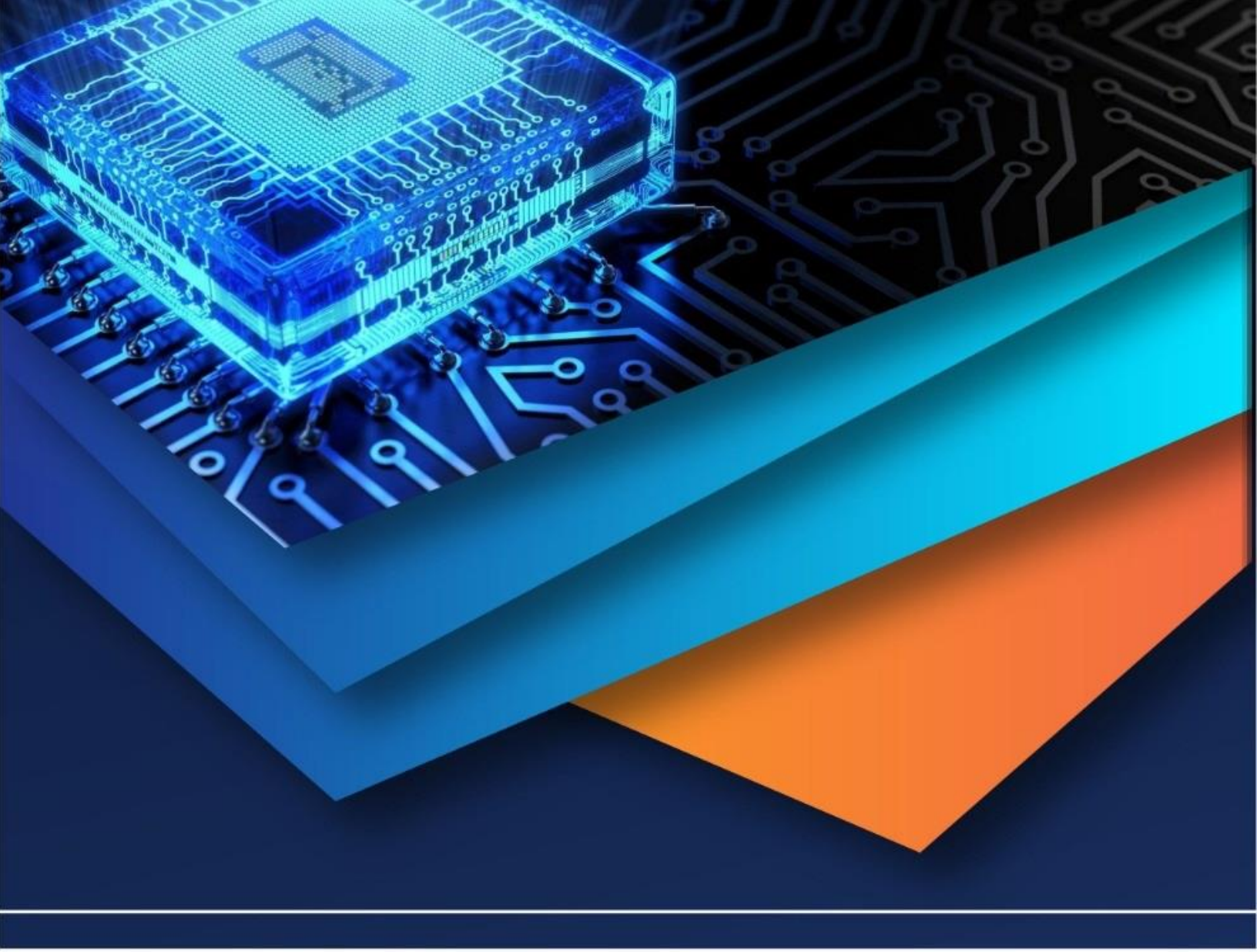
This model can be used to recognize a student's face and automatically mark the student's presence in real time without human intervention. Therefore, in a regulated environment, the proposed technique permits face identification and recognition. LBPH (Local Binary Pattern Histogram) for face detection and detection in specific areas within surveillance cameras. Reliable results have also been obtained for pose distribution and lighting, with good results from various experimental studies of this technique. This method reduces the time it takes to process the entire image. The future scope of this project can be extended to update the presence of multiple people.

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