HUMAN FACE RECOGNITION ATTENDANCE SYSTEM

Anmol Agarwal, Mohd Saqlain, Yash Sharma, Gaurav Agarwal
Department of Computer Science and Engineering (Datascience).
ABES Engineering College Ghaziabad(032)

ABSTRACT

In the technologically and technologically advanced era, face recognition—the procedure of figuring out faces and validating their identity via way of means of the use of photograph processing strategies in pc vision—has grown in significance. The majority of the downsides that manual attendance systems present are eliminated when the system is automated using face recognition, including the loss of valuable class time, the ease with which attendance records can be altered, proxy attendance, and an insecure system. The automated attendance system proposed in this research uses face popularity generation included with Haar_cascade classifies to stumble on face and Linear Binary Pattern bar graph system getting to know approach to become aware of faces.. An attendance log in the record of attendance database is automatically updated with the attendance.

By utilizing a large and correct training data frame, processing techniques, and Haar_cascade classifies, the suggested system in this paper also identifies problems that rise when developing a face identification system, such as data gathering time, image characteristics like size, performance, and intensity settings, and directions of faces. When two faces with identical traits are recognized by facial recognition software, it might lead to inaccurate findings, which is another issue with the technology. The proposed system resolves the problem by including a sex classification module that applies the Linear Differentiation Analysis model and results the species of the students of the classroom in response to switch-on the face recognition module's output to be verified. The device gives practical, cost-powerful answers for resolving numerous problems with guide attendance control device and facial reputation technology.

Keywords: OpenCV, Haarcascade, Linear Discrimination Analysis, Viola-Jones, Linear Binary Pattern Histogram

INTRODUCTION

Our society's top priority is education, and one of the key components of the educational system is attendance. Since a few decades ago, the majority of classrooms have used an attendance method that involves teacher and student contact and pen and paper for recording attendance. Such a manual way of keeping track of attendance wastes valuable instructional time raises the cost of the class's resources, requires teachers to mark students' attendance and consolidate their records, and is prone to human mistakes and student misconduct. In the digital technology, fingerprint attendance systems have increasingly become used in classrooms over the past few years to address these shortcomings of the manual system.

Biometric systems examine bodily physiological characteristics. Alvarez and Galton created the first biometric method for criminal identification in 1982 using fingerprint scanning. Numerous physiological biometric techniques, such as biometric matching, eye matching, sign matching, geometry matching, and pupil face recognition, were utilized in attendance systems. . Students' biometric data is kept in a database so that it can be used to identify them during the attendance process. The physical movement required by these systems for each student to get to the system whose records the knowing or deliberate features for marking the attendance causes chaos in the classroom. This type of system takes less use of time than human making attendance system in the

written manner and eliminates problems like student transgression and human error which is very good solution or advantage over man made attendance systems; however, it still takes some time to register attendance. Additionally, because human interaction is required throughout the registration of biometric features, a few mistakes may also get up in biometric attendance systems, which include wrong finger placement on a fingerprint sensor more than one instance or an unidentified eyeball via way of means of an eyeball detector because the eye is blinking or facing in the wrong direction. Therefore, it was essential to minimize any human interaction throughout the attendance recording process to conserve time and human effort effectively as well as to maintain a strict attendance recording system for the aim of enhancing student security and staff responsibility. Neglecting attendance records concerns can have major repercussions, including staff employees or the educational institution being subject to fines or legal action. Therefore, an automatic attendance system with a facial recognition algorithm was designed to address these issues.

An automatic attendance system is also known as facial recognition attendance system is a biometric technology that normally records every student's attendance by detecting and recognizing each of their faces while they are all present in the classroom. Ideally, this recorded data is then sent to a system or a related device, which may compute each student's attendance and store and update the pertinent data in a database. Compared to traditional and other attendance monitoring methods, automated attendance systems are more dependable, stringent, and effective, increasing the capacity and result of both teachers and students as well as effective time use. The challenges that arise when making an facial recognition attendance system include how to get accurately extract results from the facial and automatic recognition algorithms such that haar_cascade etc used in the system and reduce the rate of failure; how to increase the efficiency of the algorithms to extract accurate results; what procedures should be used to ensure the dependability of the attendance recording system; and which external resources should be used. These challenges are addressed in this study with excellent accuracy and efficiency, using the methodologies and mechanisms suggested.

LITERATURE REVIEW

The machine approaches detecting faces withinside the a photo with the aid of using the usage of the set of steps of Viola-Jones detection, which makes use of a couple of classifiers of the Haar cascade, which makes use of the AdaBoost studying set of rules.[1] The machine procedures detect faces within the photo by using a photo with the use a photo via way of means of the usage of the set of rules of Viola-Jones detection, which makes use of a couple of classifiers of the Haar cascade, which makes use of the AdaBoost learning set of rules. Histogram equalization is applied to the extracted faces to enhance image quality in terms of contrast and intensity. The PCA Algorithm which also act as a human face recognizer, extracts features from enrolled students' data that the histogram (LBPH) method uses for comparison and recognition of each student's face. All present students' attendance is then recorded in the database.[2]

As a result, a parallel analysis of the two algorithms, Haar-Cascade and Kanade-Lucas-Tomasi, is carried out.[3] While the object was moving, the system managed to capture an image of it, and the camera was installed as a security camera. The received photograph has been divided into the subsequent categories: going through forwarding; left or right to shoulder; up - ground; and down-ground. Bright, extremely bright, dark, and very dark subcategories were created from the first three categories. Kanade-Lucas-Tomasi only detected 45% of the complete outcome, but Haar-cascade detected 87% of it.[1][2] It was found that, in addition to the face which could find the Kanade-Lucas-Tomasi algorithm in photographs, Haar-cascade was able to recognize faces in five images that the Kanade-Lucas-Tomasi algorithm was unable to. Thus, the Haar_cascade algo functions in all circumstances.

Using 4^{th} step pre-processing, detect process and extraction process, and matching—this work approached to attendance recording problem. The algorithm for face detection is applied to the pre-

processed photos. The discovered face is and clipped or kept in a system for testing purposes in future. Following the extraction of the features from group of cropped faces, pca is used to save the features for the set of training photos. Individual student face photos from the training set—which use for differentiation during the human face recognition step—were captured with or without spectacles. This system's drawback is that it cannot distinguish between faces with comparable facial traits.

The region of the face between the mouth, chin, and nose contains structural clues that can be used to determine a person's gender, such as the amount of facial hair present and how rough or smooth the skin is.[4] The system put forth by the authors of this research makes use of this data to create a system for gender classification that functions by being broken down into four parts.[5]

1. The image used by the system is grayscale. The relevant face components, namely the chin and mouth, are extracted in the first stage the use of a version primarily based totally on a geometrical approach, in which the location containing the decrease face components is chopped beneath the nose. The bar graph method used to find every horizontally box of pixels underneath the nose and further to clipping off the non-face pixels of the picture vertically.

2. Gary Scale Level Co-occurrence Matrix (GLCM), a tool for analyzing data related to skin texture, is created.

3. The GLCM is used to compute the variance feature, the contrast in between connected pixels in the photo, and the dissimilarity functions of the image.

4. The (SVM) Support Vector Machine and (PNN) Probabilistic Neural Network are not unusual place classifiers that use schooling statistics and vectors to behavior sample matching or sample categorization. Finally, those trends are used to categorise genders

The study uses a measure of facial distance to classify gender in a Human face recognition attendance system. The frontal view of the face is photographed, and by improving the image quality, several visual aspects are processed for it.[6] Noise reduction is done for improved image quality, color conversion is done for better feature extraction, and face detection is completed to identify the facial region in the image. On the pre-processing output, facial feature extraction is carried out using mathematical procedures with the aid of Mat lab. An set of rules that divide the face picture into 4 elements or locates or calculate the distance in the eyes, mouth, and nose, the period and Face width and eyebrow thickness makes use of the essentials of the 4 elements of the picture to extract local geometric features. The algorithm use this collected information to find fractional ratios of the inter-ocular distance, lip-nose, nose-eyes, and lips-eyes. Based on minimum criteria values established for every fractional ratio, gender classification can be carried out utilizing these ratios.[7]

PROPOSED ALGORITHM

The system we propose in our docs, "Automation of Attendance System Using Face Recognition and Classification," records or analyses student database with attendance in a auditorium or large crowd place very effectively, with high rigidity and reliability, by systematically using a variety of algorithms. It then stores the attendance data of students who are present and who are not present in a class and make updation in the database regarding attendance.

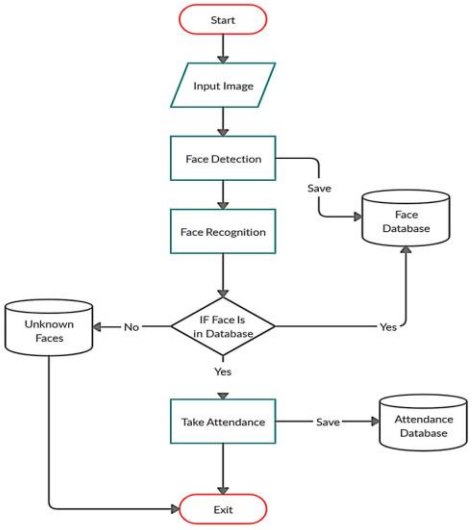


Figure 1. Block diagram of proposed system

Stage 1st – Utilizing a camera, the system's first stage entails image acquisition. We are using the system camera to capture images. By averaging the colors that stand out the most and least, the OpenCV cvtColor function converts images to grayscale. The luminosity method, part of the cat color method, converts an RGB image to grayscale by computing a weighted average. The following equation is used to calculate brightness, r is for red, g is for green and b is for blue.

$$Y == 0.299r + 0.578g + 0.114b$$

Step 2ND – Subsequent stage of suggested approach entails facial recognition from the pre-processed image. Due to its excellent efficiency and accuracy in detecting faces in a variety of lighting conditions and face orientations, Haarcascade classifiers have been employed by us to do face detection. In the Viola and Jones face detection system, the input of both faces and non-faces is used to construct the system. Images without any faces are referred to as negative photos, whereas images with faces are referred to as positive images. This algorithm is used to recognize positive images by distinguishing between faces and non-faces. In appellation of its application in the search for the presence of the relevant feature in any given photograph, Har features are comparable to convolution kernels. The focus attention on areas of the photograph where each type of Haar_cascade function is in output when Haar feature is applied to a given image.

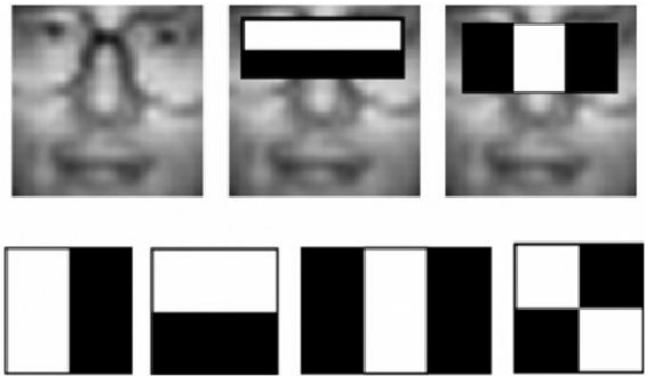


Figure 2. Haar features used

Each character is represented through an unmarried value, that's the distinction among the sums of the pixels beneath neath the white rectangles (representing a mild zone) and people who are black (representing a darkish region). The photograph has represented the use of an indispensable photograph, wherein every black or white rectangle withinside the photograph, where each black or white rectangle in the photograph is simply represented by its corner pixels to speed up calculations. Then, the machine learning technique AdaBoost is used to remove unnecessary and unrelated aspects of the face of face detection. AdaBoost accomplishes this by choosing a few weak classifiers—features that are important for identifying faces. The process then creates a "strong classifier" that correctly distinguishes between a face and a non-face. By creating mixture of the susceptible f1(x), f2(x), f3(x), and so on, and assigning weights 1, 2, 3, and so on to every week's classifier, the strong classifier, F(x), is created:

x==y2

$$f(y2) = a11f1(y2) + a22f2(y2) + a33f3(y2) + \ldots$$

the final results of the robust classifier are tremendous then the face is located, else the face isn't detected.

Step 3rd –Human Face popularity makes use of the facial photo that has already been extracted, cropped, and enlarged with the aid of using the Haar-cascade technique. Local Binary Pattern Histogram (LBPH), a face popularity set of rules presented with the aid of using OpenCV, is then used to come across and discover the image's distinguishing features The student information database that we generated and

maintained in LBPH contains training datasets of student data that include their facial features from various orientations of their faces. By contrasting already processed data (supplied by current working database) with the training dataset, LBPH extracts faces to carry out face recognition (student information database).

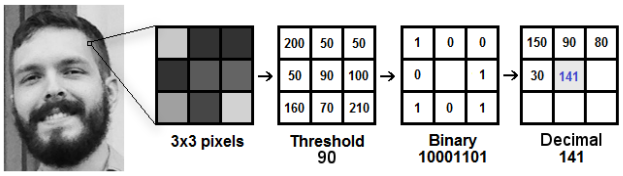


Figure 3. Steps of the LBPH algorithm

The image generator does face feature extraction; to achieve this, it creates an intermediated image from the live image to define the original image conceptually by emphasizing t the facial function of the photo. We used a sliding window to symbolize the photo in a matrix shape for this concept, with every pixel withinside the matrix being represented in phrases of the pixels at once adjoining to it inside a given radius. This affects the outcome of a 2d array represented in binary keys, which produces the interposed photo. A histogram of the photo has produced the usage of this intermediate photo, representing the face in phrases of its retrieved facial traits. The generated paragraph is compared to the bar graph of the faces saved withinside the education database to provide the face with a satisfactory bar graph match. This face is the result of the face reputation algorithm, and it's far stored and recorded withinside the presence directory.

Stage 4th – Face recognition comes next. This can be done by cropping the image to only include the first detected face and then comparing it to the database. The choice of the region of interest is what this is known as. In this approach, the Eigen Face technique is used to compare each student's face to the face database, and the server records each student's attendance. In our system, face recognition methods are applied. The remaining faces will be labeled as absent, while the faces that are recognized will be recorded as present. There will be an SMS option so that the status of a student's attendance or absence can be sent. There is a sheet called Export to EXCEL that may be used to print the attendance information.

For similar use withinside the category process, the LDA approach calculates parameters: a degree of intraclass scatter (covariance) and a degree of interclass scatter. These parameters are used to research the inter-magnificence variations and intraclass similarities. By calculating the likelihood that a given input belongs to each class using these variables, LDA predicts the class of the input; as a consequence, the class with the highest probability receives output as the classification outcome. To solve the shortcomings of manual and biometric attendance systems, the suggested method successfully automates a classroom attendance system utilizing face recognition. It is a portable, reasonably priced system that is simple to set up in classrooms. The automated attendance system with gender classification that is being presented has increased dependability and produces outcomes with great coherence and correctness, allowing faculty members to use their time in a wholly useful way without worrying for human attendance infractions.

RESULT

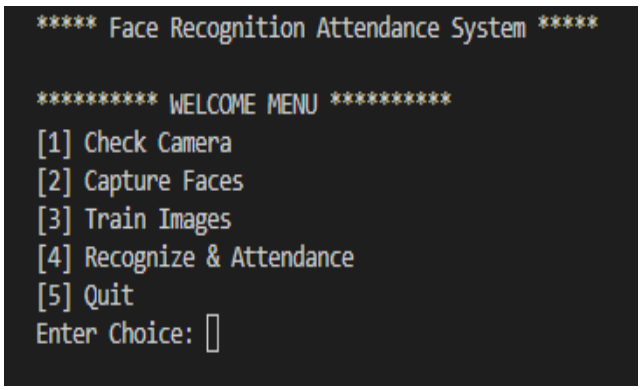


Fig.5: welcome menu

In the welcome menu, there are several which are followed to take attendance.

1. check camera

Fig.6 : camera check

When we press 1 than the camera will pop-up ,
For checking that camera is working properly or not.

2. New face registration

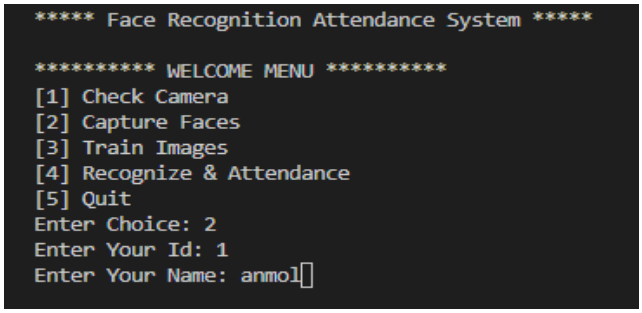


Fig.7: new face recognition

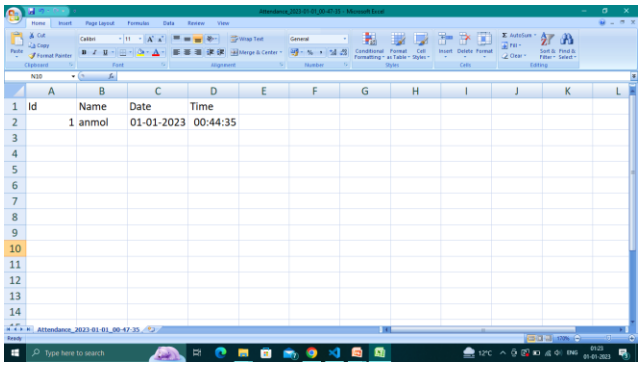
In this when a new face comes in front of the camera Then that face will be captured by the camera and saved in the database and then it will train the image further.

3. Recognize Face

Fig.7: Face recognize

When we are in front of the camera for attendance then the picture will detect by the camera and it will match with the database if the photo will match above 60 % then it will take attendance.

4. Attendance



Id	Name	Date	Time
1	anmol	01-01-2023	00:44:35

Fig.8 : attendance log

As attendance will taken then the details of the candidate will be automatically saved into the attendance log in exel sheet.

CONCLUSION

Building an automatic attendance system with a recorded output of classroom sessions is crucial to enabling the lecturer or faculty to record students' attendance with the least amount of human intervention (and thus with the least amount of human mistakes). The gadget is fairly cost-powerful because of the utilization of the Raspberry Pi3 and Pi camera. In order to create a secure gadget, Linear Discriminations Analyzer is combined. This increases the system's efficiency and dependability in recognizing students' faces.

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