Attendance Monitoring System using Remote Videos

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Abstract **- The proposed visual system monitors the student attendance in seminars and lectures. Basic idea is to estimate the number of people in the room using face detection algorithm. An Attendance Monitoring System using face detection is one of the important research topics in computer technology. Viola-Jones Algorithm is used to detect the human faces. The attendance system is proposed using surveillance camera which is used to record the attendance of students in a classroom with some time interval in a day. This automation reduces human efforts of paper work, maintaining the attendance registers, generating reports as needs of academics. Further it may be used for anomaly prevention (e.g. cheating) and in specific cases for security or legal matters.**

Keywords: Face Detection Algorithm, Viola-Jones Algorithm.

I. INTRODUCTION

Face recognition is a well known research area which takes more attention of many researchers in computer technology. The human face recognition from video sequences is a challenging task, because there are variations present in the background of the images, facial expression and illumination. Most of face detection methods focus on detecting the frontal face of human and ignore other things like buildings, trees and background in image. Face detection and recognition is often referred to as characteristic of person face image input through camera. It measures overall facial structure, distances between eyes, nose and mouth.

II. RELATED WORK

Qiang-rong, Jiang, and Li Hua-lan (2010), have presented the research on detecting human faces in color image and in video sequence has been attracted with more and more people, but automatic human face

detection from images in surveillance and biometric applications is still a challenging task due to the computation in accuracies and the continuous nature of some transformations. The author propose a novel face detection algorithms based on combining skin color model, edge information and features of human eyes in color image. Experimental results show the accuracy and robustness of the algorithm by testing a great deal of face color images.

M. I. Razzak, M. K. Khan, K. Alghathbar and R. Yousaf (2010), have presented the approach for Face recognition has great demands in human recognition and recently it becomes one of the most important research areas of biometrics. The author present a novel layered face recognition method based on Fisher's linear discriminate analysis. The basic aim is to decrease FAR by reducing the face dataset to small size by applying layered linear discriminate analysis. Experimental and simulation results show that the proposed scheme has encouraging results for a practical face recognition system.

K. Seo, W. Kim, C. Oh and J. Lee (2002), have presented the approach for Face detection and facial extraction is necessary first-step in face recognition systems. These tasks are one of the visual tasks, which humans can do effortlessly. However, in computer vision terms, this task is not easy. The author presents new active contour model using color information for extracting facial features and, we describe a new algorithm for detecting human faces and facial features, such as the location of eyes, nose, and mouth.

Yi Zhu and Florin Cutu, propose to use half-face templates to detect faces with large depth rotations. Experimental results show that half-face templates significantly outperform whole-face templates in detecting faces having large out-plane rotations and performs as well as whole-face templates in detecting frontal faces.

Paul Viola and Michael Jones, describe a visual object detection framework that is capable of processing images extremely rapidly while achieving high detection rates. There are three key contributions. The first is the introduction of a new image representation called the "Integral Image" which allows the features used by our detector to be computed very quickly. The second is a learning algorithm, based on Adaboost, which selects a small number of critical visual features and yields extremely efficient classifiers. The third contribution is a method for combining classifiers in a "cascade" which allows background regions of the image to be quickly discarded while spending more computation on promising object-like regions. A set of experiments in the domain of face detection are presented. The system yields face detection performance comparable to the best previous systems Implemented on a conventional desktop, face detection proceeds at 15 frames per second.

III. PROPOSED SYSTEM

The study of existing attendance systems, their advantages, and limitations proposes the new attendance system. The two main phases of proposed system are training phase and testing phase explained in following subsections.

In Training Phase, there are two main steps are explained in following points:

A. Face detection

In this phase, we take the video captured by the surveillance camera for the student registration purpose. The Viola-Jones face detection algorithm is used to detect the faces from the video. This algorithm is widely used for object detection task. Viola-Jones face detector also known as Haar classifier because they uses Haar functions. Haar features contain a complete set of two dimensional Haar functions used to encode appearance of objects such as nose, mouth and eye.

The Haar features consist of two or more rectangular regions enclosed in the template. It is used to sums up the pixel intensities in the regions, which helps detection of facial image from video. By using this approach we get face detection ratio, this is calculated by using the following equation.

No. of face detected = Face detection ratio / Total no. of faces in video × 100 %

But there is fault detection takes place, the face like shapes such as spots or things present in the background are detected as face. This is one of the major drawbacks.

B. Feature Extraction

After detecting the faces from the video, the feature is extracted using the Principle Component Analysis method. This method is used to reduce the dimensionality of data space to the similar feature space. PCA performs mathematical operations in face recognition. Here we create the database of student faces to calculate the eigen-values and corresponding eigen-vectors. To calculate eigen-value, first calculate the mean and standard deviation of face images stored in database. Then by using this value, we calculate variance, covariance and corresponding covariance matrix. And finally from the covariance matrix, PCA calculates the eigen-value and corresponding eigenvectors.

In the surveillance camera, there are a partial face of students is also captured. So we calculate the eigen-value of students in different angle and stored in the database. There is a registration of the students that include information like name, roll number, class and face image and this information is stored in the database. In Testing phase, we are going to partition our data set into two parts namely training data set and testing dataset and this partition will be done randomly. The input image will be matched with the image from the data set. So the attendance of the student will be considered if it is present in the database. The modern technique will be used to get more accurate result.

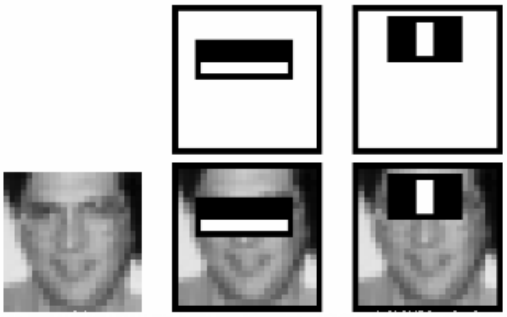
IV. ALGORITHM

The viola-jones algorithm is used to detect the human face from an image. The system takes some face images or non-face images as an input. After taking the input images the training phase will be start in which the system detect the face. In training phase two types of sets are included that is positive image set or negative image set. In positive image set all the images are face images and in the negative image set all the images are non-faces images.

The viola-jones algorithm has four stages.

A. *Haar feature selection*

All human faces share some similar properties. These regularities may be matched using Haar Features.



A few properties common to human faces are:

- The eye region is darker than the upper-cheeks.
- The nose bridge region is brighter than the eyes.

B. *An integral image*

In the subsequent step of the Viola-Jones face detection algorithm is rotate the input image into an integral image. This is completed by creation of every pixel equivalent to the total addition of all pixels above and to the left of the pixel.

This makes the computation of the addition to the entire pixels within any specified rectangle using only four values. In the integral image, these values are the pixels that correspond with the corners of the rectangle in the input image.

C. *Adaboost training*

Viola Jones algorithm use a 24x24 window as the base window size to begin evaluating all the features in any given image. For all feasible parameters of the Haar features like situation, degree and type, there is a need to calculate about 160,000+ features in any given window. This algorithm is used to evaluate huge sets of features for every 24x24 sub-window in any new image.

The basic idea is to eliminate a lot of features which are redundant and not useful. To select only those features that is very useful for us, which are done by Adaboost. Adaboost eliminate all the redundant features.

D. *Cascading classifiers*

Face Detection using Haar feature-based Cascade classifiers is an effective face detection method proposed by Paul Viola and Michael Jones.

It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect faces in other images. The cascaded classifier is collection of stages that contains a strong classifier. The work of every phase is to verify whether a particular sub-window is definitely not a face or may be a face.

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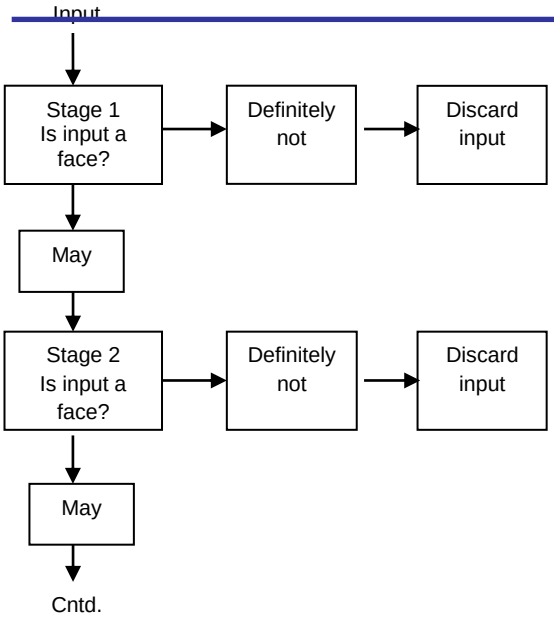

When a sub-window is classify to be a non-face by a given phase it is discarded. A sub-window classified as a may be face is passed on to the next stage in the cascade. It follows that the additional stages a given sub-window passes, the higher chance that the sub-window really contains a face.

V. APPLICATIONS

- Attendance system: Primary application being used in classrooms to take the attendance of the students.
- Network security: Face recognition which offers higher protection of access control and building security.
- Human face recognition has been widely used in other application such as video monitoring system/ surveillance system, human computer interaction.
- ATM: The software is able to quickly verify a customer's face.

VI. ADVANTAGES

- Avoid proxy attendance of students.
- Reduces the human effort of paper work.
- Eliminate duplicate data entry and attendance entry.
- Increased security and confidentiality.
- Real-time status tracking of leave requests.

VII. CONCLUSION

The face detection and recognition system will reduce the amount of work done by the lectures. There is no need for specialized hardware for installing the system as it only uses a computer and a camera. The camera plays a critical role in the working of the system hence the image quality and performance of the real time scenario must be tested especially if the system is operated from a live camera feed.

The system can also be used in permission based systems and secure access authentication for access management, hence video surveillance system for personal security or law enforcement.

VIII. FUTURE SCOPE

The scope of the project is the system on which the software is installed, i.e., the project is developed as a desktop application, and it will work for a particular institute or organization. But later on the project can be modified to operate it online. Also include adding several well structured attendance registers for each class and the capability to generate monthly attendance reports and automatically email.

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