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Real-Time Attendance system based on video surveillance system

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Abstract - **This paper presents the real-time system for student's attending for a large amount of made dataset for a whole class face. The real-time attendance system task is very difficult to evaluate the attendance by recognizes the face in different the environment. Human face image in term of challenges of pose and expression to identify the person is huge variation of the system. and this is used to avoid the proxy in attendance. The proposed system is used to detect the face using Adaboost with haar cascades and identification for PCA with LDA and is used to build the real time face recognition system in multiple faces. the system is used to avoid the man power to take attendance.**

Keywords: Principal Component Analysis (PCA), Linear Discriminate Analysis (LDA), Haar Cascade Classifier.

1. INTRODUCTION

Over the years, so real time attendance system for identifying human face has challenging area of research in computer vision. Due to increase in terrorism, the needs for automated systems increase more. The most importance biometric system which have been used during these years are real time face recognition system, face detection, fingerprint recognition, speech recognition hand geometry and iris retina. Since the last decade, there is a view of increasing high rate of crime and fraud in the world. Automated face identification system for the real time attendance system to avoid the man power to take the attendance manually.

The topic of real time attendance system from live streaming and video has generated more attention for student and also provide the security system based on student identification. real time attendance system is a big challenging problem and last few decade, more attention to avoid the student identification and in this field many approaches are used to identify from the given class student dataset. The recent development in this real time attendance system field has facilated us with high accuracy and fast processing based on given dataset. There are many existing technique to identify or detection of face and recognize them but the systems technique are not to efficient to have fully automated real time attendance system.

2. PROBLEM STATMENT

The difficulties in real time attendance system are very natural. The human identification of face image in real time can have many problems like pose problem, facial expression, illumination problem, and background reflection problem. This problem creates a serious issue to identify the student and these problems are used to reduce the accuracy of a system. One of the big problem is occlusion, i.e. glass, scarf etc. used to identify the persons are entering into the lab/ class room.

3. RECOGNITION TECHNIQUES

3.1 Face detection

Face detection is an algorithm to design the system for detection of faces in the image or video frames. The technique is to determine the location size of student having the face in the image. It is focus on the frontal face detection and also solves the problem in multi view face in the images. The technique is also used to detect the facial expression in the image to treated as background which is subtracted from the images

3.1.1 Binary pattern -classification problem:

In this technique, the content so given part of image is transferred into feature vector. Classifier which provides the information to detect the particular region of the image is a face or not. Classifier provides to resolve the challenge problem to detect the false detection. Classification is done based on the feature of image.

3.1.2. Background subtraction:

In this techniques remove background to detect the foreground object into the image and also only face will crop into image. It contain only image are frontal face.

3.2.3 Color and Motion:

In this technique, color image of segment are used to find the face present in the image or not but the background has still same color will also be segmented in the image. Motion technique is used to find faces in segmented

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image which may face are background image are in motion.

3.1.4 Model based detection

In this technique, we can detect the face in face mode can be appearance, shape, and motion of face. This technique used to find rectangle, round, square, heart and triangle of models. Based on these models to detect faces into images this technique gives very high accuracy compared with some other techniques.

3.2 Face Recognition

It is technique to recognize the person face in the image or motion picture with given dataset of face image. Technique recognition is big challenging task in real time moving object to recognize. The biometric system is used to recognition the face along with particular data set. recognition ratio rate of the face is less compare with the other biometric details information of a person such a voice, ear, iris, retina, plan geometry and fingerprint etc. recognition are many methods and to increase the identification rate. Some of commonly used methods are to recognize the face.

3.2.1 Eigen faces

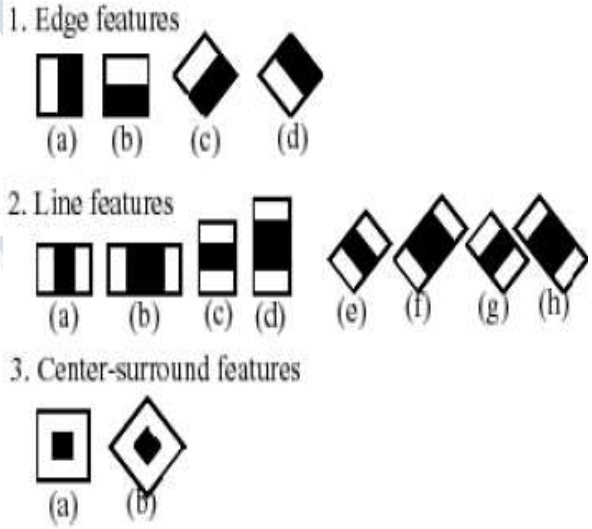
Eignen faces are one of approaches to recognition of faces. it is also known as karhunen-loeve expansion, in this approach the find the eigen value and eigen vector of all the images in the dataset and finding the co-effient of face image. Principal component analysis to find the eigenvalues, eigenvector and is also used to find the analysis the representation of face in the image. In eigen image weights are obtained by face image. In mathematics, the matrix consists of the set of eigen faces of eigenvectors are used to solve the identification of face problem in the field of computer vision. Principal components of faces are find eigen vectors of the covariance matrix of the face image is the eigen face[3]L.Zho and proposed method to find the huge images of covariance matrix. each was taken with different condition effect are illumination effect, this method of face recognition is not must affected by the lighting effect and results similar results of different lighting condition[4].

3.2.2 Fisher face

Fisher face is used the both principal Component analysis and Fisher linear discriminate analysis to produce the projection matrix and it is quite similar to eigen face approach. Successful method for recognition of faces in the motion images in fisher face method to find the minimizing class information within each class of images and maximizing the class separation the problem with variations in the same images with different conditions of lighting effect can be occur. it required each face of huge dataset to be trained and result more accurate as compare to PCA.

4.1.1 Haar Cascade Classifier

Haar classifier is a classifier which is application of machine learning algorithm approach for the real time or live streaming of the visual object detection. This classifier is given by viola & jones. This classifier detect object in the image. The important feature is quickly rejects regions that has unlikely not contained in the object. haar cascade classifier object detection is the haar-like features. The features not only intensity values of a pixel but also change in contrast values between adjacent rectangular pixels groups. The haar like feature value is calculate the difference between the sum of the pixel grey level values within the white and black rectangular regions [5].



4.2. Face Recognition

4.2.1. PCA and Fast PCA (Principal Component Analysis)

Face recognition, it is a technique is used in biometric system to recognize the object or face and it is used for verification and authentication local and global features based on extraction for face to calculate co-variance matrix of group of images whereas local feature technique for auto-correlation matrix is computed for face.

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1. Choose , the number of principal axes or eigenvectors required to estimate. Compute covariance Σ_x and set ← 1
2. Initialize eigenvector φ of size × 1 e.g. randomly
3. Update φ as $\varphi \leftarrow \Sigma_x \varphi$
4. Do the Gram-Schmidt orthogonalization process

$$\varphi_p \leftarrow \varphi_p - \sum_{j=1}^{p-1} (\varphi_p^T \varphi_j)\varphi_j$$

5. Normalize φ by dividing it by its norm: $\varphi \leftarrow \varphi / \|\varphi\|$
6. If φ has not converged, go back to step 3
7. Increment counter ← + 1 and go to step 2 until equals

Linear Discrimnant Analysis(LDA)

Linear Discriminant Analysis (LDA) is a recognizing technique. it is used to finds the vectors in the image space for that best discriminate among classes. each class of all the sample between-class matrix S_A and the within-class scatter matrix S_{WT} are defined. The goal is to maximize S_A while minimizingS_{WT}, in other words, maximize the ratio det|S_T|/det|S_W| .

This ratio is maximized when the column vectors of the projection matrix are the eigenvectors of (S_{WT}^-1 × S_A).

The scatter matrices are defined as:

S_A = ∑C N_i ($ClasAvg_i$ - AvgFace) ($ClasAvg_i$- AvgFace)^T

5. IMPLEMENATATION DETAILS

The real time attendance system is built into modules: face detection for the detection of student face and generating log file for date & time for face detected and face recognition module for identification of student entering into lab. Modules three for design the prototype of overall system to generate the log file for the student.

Module1:

Step 1: Installed two camera one for entry door and other is out door

Step 2: when student entry into the lab, entry camera the live stream then make the video and convert into frames and generate log file for entry (detection time & date)

Step 3: once detection of person, generate the log file for in entry record for detection time & date

Step 4: each frame of video and apply the face detection algorithm (haarcascadef frontalface) to detect the frontal faces of student

step 5: each frame of detected face and crop the faces into the detected frame and store into separate folder for generated Dataset of student Logfile Detected face of attendance is records according to the system date and time in excel sheet (attendence.xls)

Module II

Step 6: Once the student face detected then apply face recognition for identification of student. Here PCA and LDA approaches for training dataset and also input the test dataset.

Step 7: Comparing the input test face with whole data set of student of particular section. If the match the system generate the result authorize student and will consider the into attendance system. If it is not matched, then that student is not in that lab and system will generate not authorized student.

Step8: once the student is recognize the system will generate the Student face, Student Name & Rollno display

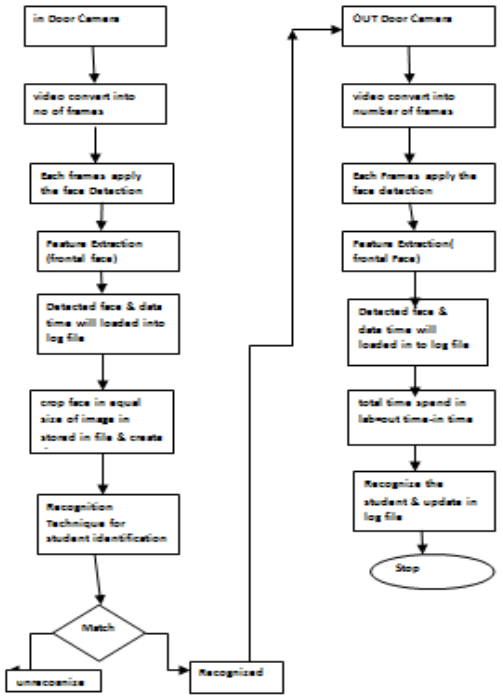
Module III

step9: once the lab over student out from the outer door and system detect the student and generate the out time entry in log file

Step10: calculate the total duration of student attend the lab (detected outer camera detection face time - detected in camera detection) and generated into the log for the student attendance.

Step11: Repeat same processes apply for all those who are entering into the lab.

Flow chart of implementation of system



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6. RESULT AND DISCUSSION

The system proposed is a real time attendance system. it takes input from the surveillance camera images continuously till the system is logout. Detected images are then cropped and saved in the JPEG format of 100 x 100 matrix size. The face which is detected first is saved first in the dataset and then database table which consist of student information, the name of the face image is simply the number with extension .jpg. Sequence numbers are generated when the image is capturing. There are two factors for having file name. First is that it clearly indicates the sequence of the person they have come in-front of the camera. And the second factor is, training the system sequentially precede the training dataset of face images. In the dataset there are 1000 samples, 5 image of each student in different position with different emotions. The face image is of 100 x 100 each in this system.

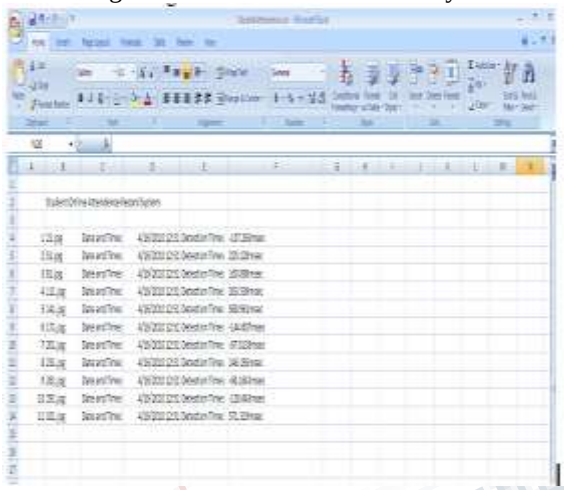

Table 6.1 Attendance System file for detected faces

Figure 3. Face recognition module

7. CONCLUSION

The system developed that has been tested with various dataset of face images with many emotions and many different angles. System is providing the security for person or student entry in or out from the class room or lab and also check the person is authorized or not. This system capable of using two surveillance cameras as the capture the device simultaneously and once person is recognized then it is valid or not. It will record the person entry time and the time when the person is out from the class or lab then the recorded time will be noted and finally system will find duration of the person spend time in the class or lab by our time subtracted with person entry time.

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