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Automatic Attendance Using Face Recognition

Ms. Pooja Humbe, Ms. Shivani Kudale, Ms. Apurva Kamshetty
Trinity College of Engineering and Research
University of Pune, India
humbepooja888@gmail.com
shivanikudale0@gmail.com
apurvakamshetty@gmail.com

Ms. Akshata Jagtap, Prof. Krushna Belerao
Trinity College of Engineering and Research
University of Pune, India
akshatajagtap36566@gmail.com
krushnabelerao@gmail.com

Abstract— Human face detection and recognition is an important technology used in various applications such as video monitor system. Traditional method for taking attendance is Roll Number of student and record the attendance in sheet which takes a lot of time. Because of that systems like automatic attendance is used. To overcome the problems like wastage of time, incorrect attendance, the proposed system gives a method like when he enters the class room , system marks the attendance by extracting the image using Principal Component Analysis algorithm. The system will record the attendance of the student automatically. The student database is collected, it includes name of the students, there images and roll number. It carries an entry in log report of every student of each subject and generates a pdf report of the attendance of the student.

Keywords- *face detection and recognition, Principal Component Analysis(PCA), MySQL, feature extraction.*

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I. INTRODUCTION

Student should attend the lectures regularly. This has at the end of a semester constituted part of student final grade .To mark attendance manually which take a lot of time from the teaching process. To create and maintain the record of attendance is compulsory in all schools, colleges. Hence there are so many approaches of taking attendance like, automatic attendance. Image processing is a special kind of signal processing which performs operations on images, to extract useful data from it. Input is image, and output is image with great features. A Face Recognition system is an application of image processing which performs two major tasks of identifying and verifying a person from an image .In traditional attendance system there are some issues like fake attendance , time consumption, manipulation of attendance and information cannot be secure. It is an application of identifying or verifying a person from a digital image. It is by comparing some facial features from the image and a face database. Nowadays digital ease of use is very popular than pen and paper.This digital growth results is popular for less time consuming and accurate user identification and verification. So, there are number of algorithms are available from which we included Principal Component Analysis (PCA) algorithm.

II. LITERATURE SURVEY

Image processing is consists of the input image, a photograph; the output of may be an image or a set of characteristics or parameters respect to the image. Image processing is classified into two types. They are,

1. Analog image processing
2. Digital image processing

Two dimensional analog signals is processed by analog image processing. Digital image processing is the use of computer algorithms or image processing on digital images. Digital image processing is performed on a two dimensional image by a digital computer.

Facial recognition technology is a new way of identify people. It works by picking faces out of a crowd, obtaining the measurements and comparing it to the images already present in the database. The manual method will be replaced by automatic attendance system , which is takes a lot of time and is hard to maintain.

In general, there are two known approaches to HFR, i.e. feature-based and brightness-based approach. The feature- based approach uses key point features of the face, such as edges, eyes, nose, mouth, or other special characteristics. Therefore, the calculation process only covers some parts of the given image that have been extracted previously. On the other hand, the brightness-based approach calculates all parts of the given image. It is also known as holistic-based or image-based approach.

Eigenface Approach

Eigenface approach is used ,it transforms faces into a set of characteristics, eigenfaces which is considered as training data. Recognition is done by projecting a new image in the eigenface subspace, in which person is classified by comparing its position in eigenface space with the position of known individuals.

Set of eigenvectors are known as eigenvectors if they are used for human face recognition. The covariance matrix of the probability distribution is used for derivation of eigenvectors. To construct the covariance matrix, eigenface form a basic set of all images. To represent the original training images, it produces dimension reduction by allowing the smaller set of basis images Classification can be achieved by comparing how faces are represented by the basis set.

1. In this paper , Initially video clip of classroom is taken and is stored in the database, then video is converted to images, then apply the face detection techniques to detect the faces and then features extraction is done by Histogram of Oriented Gradients and Local Binary Pattern algorithm. [1]
2. In this paper, a method for student attendance system in classroom using face recognition technique by using Discrete Wavelet Transforms and Discrete Cosine Transform to extract the features of student's face which is followed by use of Radial Basis Function for classifying the facial components. [2]
3. In this paper, the proposed system describes a method like when he enters the class room and marks the attendance by extracting the image using Personal Component Analysis algorithm. The system will mark the attendance of the student and it will maintain a log of each student of each subject and also generates a pdf report of the student attendance. Using Simple Mail Transfer Protocol the report will be sent to the faculty and also to the parents. [3]

III. SYSTEM REQUIREMENT

A. Software

PP Controller

XAMPP Controller is open source cross-platform, web server solution database free software which contains the MariaDB database Apache HTTP Server, and interpreters for scripts which are written in the Perl and PHP programming languages.

NetBeans

NetBeans is written in java,it is a software development platform. Applications are developed from modules. Applications are designed on the NetBeans Platform, with integrated development environment (IDE), it can be extended by third party and other developers.

Frontend

Java Advance(JSwing,Applet)

Backend

MySQL

B. Hardware

Camera

Specifications

Pan Angle: 360 degree

Connectivity: Ethernet, Fireware Focus Range: 100-150cm

It has Night Vision and Devices: Laptop, PC

Video Sensor Resolution: 1280*720 pixel Still Image Sensor Resolution: 720 MPHD

IV. METHODOLOGY

The first step is that, the staff is provided with their own Username and Password to Log-in. Next step is, the training image and their features are stored in the database. Then, testing image features are compared with the training images. Once the image is identified, the attendance will be registered. Finally, the attendance details of the student are send to staff and parent through E-Mail.

1. Login.
2. Staff & Student Information.
3. Update Attendance.
4. Feature Extraction.
5. Feature classification

V. SYSTEM ARCHITECTURE

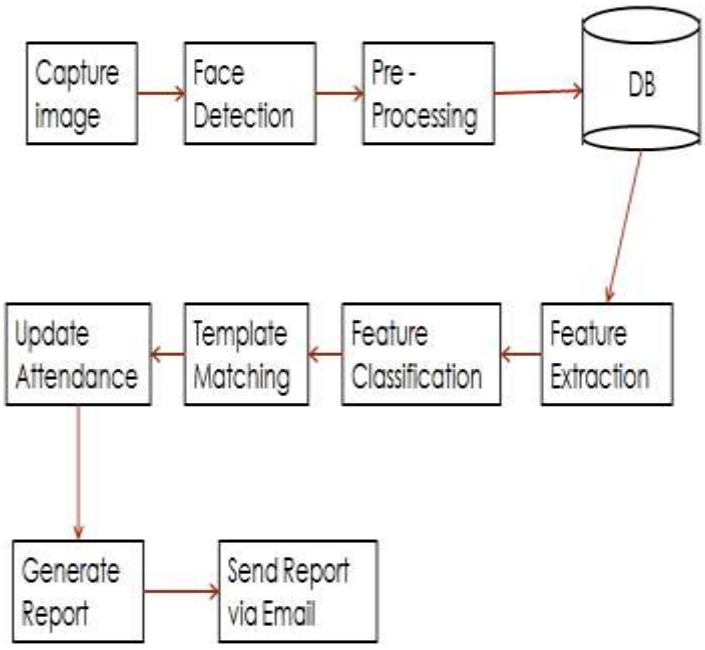

Figure 2. System Architecture

Image Acquisition

Images can be acquired by facial-scan technology from camera that captures images of better quality and resolution.

Pre-processing

First Image is cropped from acquired image. Then cropped images are resized to some pixels for face recognition. These resized images are converted from RGB to Gray level.

Database (DB)

It stores the pre-processed images for further processing and results.

Template Matching

It compares match templates against enrollment templates. In identifying a single individual from a large database, facial scan is not so effective as iris scan. After large-scale facial-scan identification searches, numbers of matches are returned.

Face Recognition

For face recognition or detection it compares selected facial components from the image and a face database, it identifies or verifies a person in image.

Face Database Generation

Original face database consists of images of all students having 5 images per student. With change in intensity of light and various facial expressions, the original database images are acquired at various interval of time.

VI. ALGORITHM

Principal Component Analysis (PCA)

In this , a face contains set of important feature and these are called Principal Components or Eigen Faces. By implementing PCA Technique facial features are extracted from original database.

Usage of PCA algorithm

1. For data analysis
2. In data mining and machine learning.

Benefits of PCA Algorithm

1. Very robust to outliers and data corruption
2. Speed and performance is good.
3. Identifying moving objects
4. Facial recognition.

Steps

1. Reduction of data into single vector.
2. Calculate mean of the data.
3. Calculate the covariance matrix.
4. Compute the eigenvalues and eigenvectors of the covariance matrix.
5. Choosing component and forming a feature vector.
6. Deriving new data coordinates.
7. Approximation.

VII. CONCLUSION

The automated student attendance system using human face recognition technique works nicely.The automatic attendance management will replace the traditional method, which takes a lot of time and is hard to maintain.

Certainly, it is improved for better result particularly by paying attention in feature extraction or recognition process. This improvement may help the recognition process become more robust.

VIII. FUTURESCOPE

The current developed software is installed on the system, i.e. it is a desktop application, and it will be used for some institute. But later it can be updated so that it will be operate as online application. Currently, the system has reached up to some great accuracy level for partial and dense images. It can further be improved to obtain higher accuracy level. It can be automatically updated by the use of the concept of Internet of Things.

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