

Library Management Using Real Time Face Recognition System

Vyavahare M.D, Kataria S. S

Abstract- This paper an automated system for human face recognition in a real time background world for a large homemade dataset of persons face. The task is very difficult as the real time background subtraction in an image is still a challenge. Addition to this there is a huge variation in human face image in terms of size, pose and expression. The system proposed collapses most of this variance. To detect real time human face Ada Boost with Haar cascade is used and a simple fast PCA and LDA is used to recognize the faces detected. The matched face is then used to mark attendance in the laboratory, in our case. This library management system is real time attendance system based on the human face recognition with a simple and fast algorithms and gaining a high accuracy rate. There two data base one is student data base and other is library data base system.

Keywords:- PCA; Principal Component Analysis,2. Fast PCA; Fast Principal Component Analysis,3. LDA; Linear Discriminant Analysis , 4.Ada Boost ;Adaptive boost ,5. GUI; Graphical user interface.

I. INTRODUCTION

The real time face recognition is important for build today electronic security system . in the real time face recognition there are three process like face detection ,feature Extraction and face recognition as shown in fig. 1.1 The topic of real time face recognition for video and complex real-world environments has garnered tremendous attention for student to attend class daily means online attendance system as well as security system based on face recognition. Automated face recognition system is a big challenging problem and has gained much attention from last few decades. There are many approaches in this field. Many proposed algorithms are there to identify and recognize human being face form given dataset. The recent development in this field has facilitated us with fast processing capacity and high accuracy. The efforts are also going in the direction to include learning techniques in this complex computer vision technology[1].

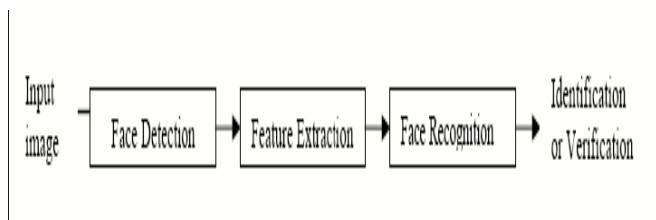


Fig.1.1. Basic Block Flow Diagram Of Face Recognition System.

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In this paper two data base are their like student data base and other library books data base. The student data base design by using MATLAB and library data base by using .NET .Over the last ten years or so, face recognition has become a popular area of research in computer vision. Face recognition is also one of the most successful applications of image analysis and understanding. Because of the nature of the problem of face recognition, not only computer science researchers are interested in it, but neuroscientists and psychologists are also interested for the same. It is the general opinion that advances in computer vision research will provide useful insights to neuroscientists and psychologists into how human brain works, and vice versa[8].

II. SCHEME OF IMPLEMENTATION

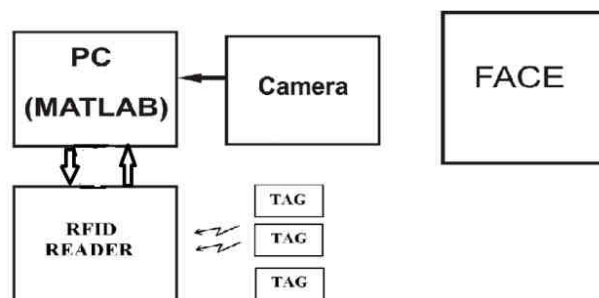


Fig. 2.1 Block Diagram of library management System.

The block diagram of library management system like pc(MATLAB), camera ,RFID reader and tag as shown in fig 2.1 .the MATLAB is used to recognise face of student and .NET is used to find out the result of tag . the tag is represent of books and there are different tag are used for different book . Camera are used to capture photo of student for verify sample image and equivalent image and also use to design student data base system .

The attendance of each individuals entering in to the Library and going out from the Library is being recorded and an excel sheet is maintained. This excel sheet have various attributes, such as identified person's name, person's enrolment number, date of detection, time of detection, and detection and recognition time in milliseconds, which is useful for marking the attendance and deciding that the person should get full stipend or not. This module combination of MATLAB and .NET 2008.

2.1.FACE RECOGNITION TECHNIQUES

2.1.2.Face detection

Face detection is a technology to determine the locations and size of a human being face in a digital image. It only detects facial expression and rest all in the image is treated as background and is subtracted from the image. It is a

special case of object-class detection or in more general case as face localizer. Face-detection algorithms focused on the detection of frontal human faces, and also solve the multi-view face detection problem [4]. The various techniques used to detect the face in the image are as below:

2.1.2.1. Face detection as a pattern-classification task:

In this face detection is a binary-pattern classification task. That is, the content of a given part of an image is transformed into features, after which a classifier trained on example faces decides whether that particular region of the image is a face, or not [3][4].

2.1.2.2. Controlled background:

In this technique the background is still or is fixed. Remove the background and only the faces will be left, assuming the image only contains a frontal face [3].

2.1.2.3. By color :

This technique is vulnerable. In this skin colour is used to segment the colour image to find the face in the image. But this has some drawback; the still background of the same colour will also be segmented [1].

2.1.2.4. By motion:

The face in the image is usually in motion. Calculating the moving area will get the face segment [3]. But this too have many disadvantages as there may be backgrounds which are in motion.

3.1.2.5. Model-based:

A face model can contain the appearance, shape, and motion of faces [3]. This technique uses the face model to find the face in the image. Some of the models can be rectangle, round, square, heart, and triangle. It gives high level of accuracy if used with some other techniques.

2.2. Face Recognition

Face recognition is a technique to identify a person face from a still image or moving pictures with a given image database of face images. Face recognition is biometric information of a person. However, face is subject to lots of changes and is more sensitive to environmental changes. Thus, the recognition rate of the face is low than the other biometric information of a person such as fingerprint, voice, iris, ear, palm geometry, retina, etc. There are many methods for face recognition and to increase the rate [1].

2.3. MATLAB DESCRIPTION:

MATLAB is a high-level technical computing language and interactive environment for algorithm development, data visualization, data analysis and numeric computation. Using the MATLAB product, we can solve technical computing problems faster than with traditional programming languages, such as C, C++ and FORTRAN. MATLAB is an integrated technical computing environment that combines numeric computation, advanced graphics and visualization and a high-level programming language.

The MATLAB can be used in a wide range of applications, including signal and image processing, communications, control design, test and measurement, financial modelling and analysis and computational biology. Add-on toolboxes (collections of special-purpose MATLAB functions,

available separately) extend the MATLAB environment to solve particular classes of problems in these application areas. MATLAB provides a number of features for documenting and sharing our work. We can integrate our MATLAB code with other languages and applications and distribute our MATLAB algorithms and applications.

2.4. .NET Description

The .NET Framework consists of the common language runtime and the .NET Framework class library. The common language runtime is the foundation of the .NET Framework. You can think of the runtime as an agent that manages code at execution time, providing core services such as memory management, thread management, and remoting, while also enforcing strict type safety and other forms of code accuracy that promote security and robustness. In fact, the concept of code management is a fundamental principle of the runtime. Code that targets the runtime is known as managed code, while code that does not target the runtime is known as unmanaged code. The class library is a comprehensive, object-oriented collection of reusable types that you can use to develop applications ranging from traditional command-line or graphical user interface (GUI) applications to applications based on the latest innovations provided by ASP.NET, such as Web Forms and XML Web services.

The .NET Framework can be hosted by unmanaged components that load the common language runtime into their processes and initiate the execution of managed code, thereby creating a software environment that can exploit both managed and unmanaged features. The .NET Framework not only provides several runtime hosts, but also supports the development of third-party runtime hosts.

III. Design/Layout

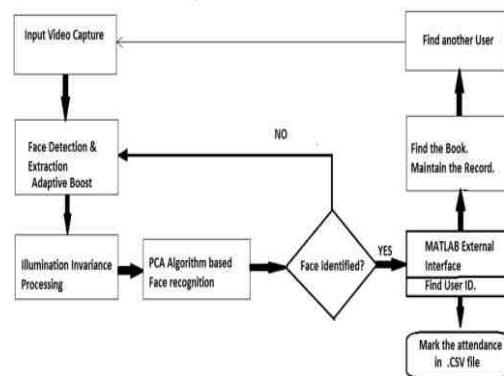


Fig. 3.1 flow chart of library management system

The flow chart of library management system as shown in fig 4.4. there are different flow blocks input video capturing ,face detection extraction adaptive boost ,illumination invariance processing, PCA algorithm based face recognition, face identified ,find the book maintain the record ,MATLAB External interface and find another user etc. in this system identify attendance of student.

IV. Advantages

1. easy to issue books
2. easy to verify for higher authority
3. easy for implementation of project
4. very good attendance system
5. save time
6. good efficiency
7. moderate cost etc.

V. Disadvantages

1. difficult for design .

VI. Results

The system proposed is a real-time system. It takes input image through a web camera continuously till the system is shutdown. The captured image are then cropped by the Face Detection module and saves only the facial information in JPEG format of 100 x 100 matrix size. This is a colour image matrix having three layers. The layers are for red, green, and blue colour in the image. The images are saved in a sequence of their occurrence time. That is, the face which is detected first is saved first in the database and the next is saved at the next place in data base. The name of the face image is simply the numbers with extension .jpg. These numbers are the sequence number generated at the time of capturing. There are two factors for having filename as the number 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, at the time of training the system sequentially takes the training dataset of face images. It's very easy to create database of Eigen face using this method as any for loop is capable to increase the sequence number till three End of file. While if the file name is something, say text, then this would have been difficult to do. After creating the database the system is trained itself by calculating the face space. This is done by using the principal component analysis algorithm followed by linear discriminant analysis algorithm. These two algorithms are explained above. They reduce the dimension of the face space. These face space keeps on changing after each modification made to the TRAININGDATABASE. The image which is detected by the web camera are saved in another file/folder called TESTDATABASE, they are also in number.jpg format, e.g. 1.jpg, 194.jpg.number.jpg format, e.g. 1.jpg, 194.jpg. Therefore issued books information , collection of books information and in-out data information are easy provided from this library management system .

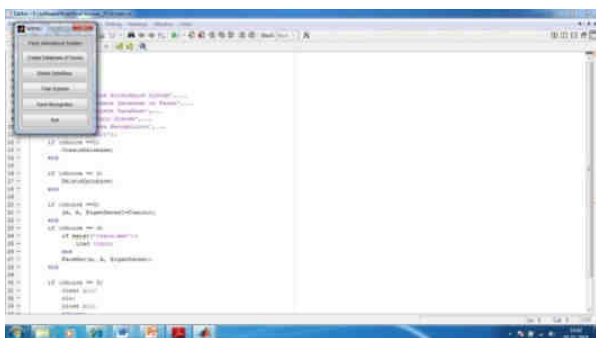


Fig A. student data

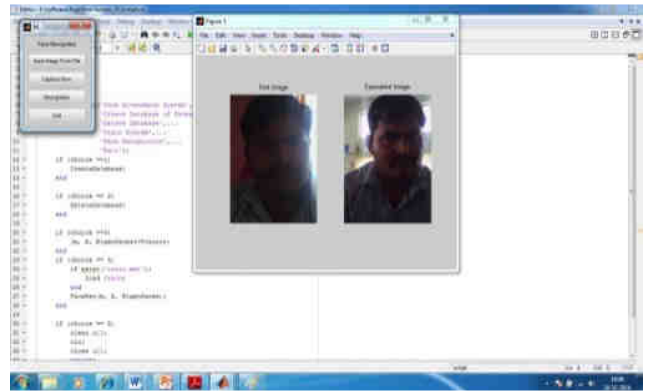


Fig B. match test image and equalized image

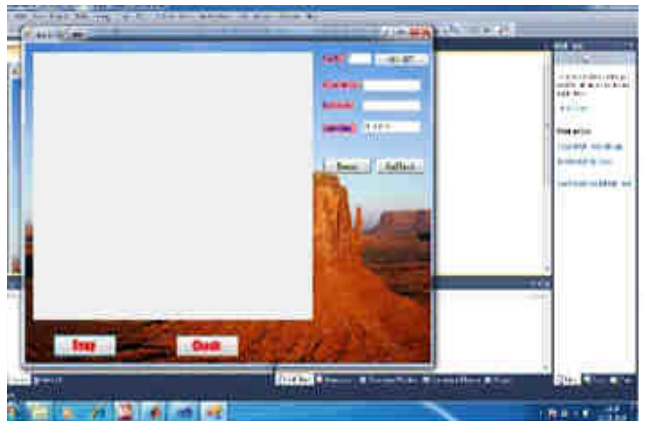


Fig. C. window of library management system

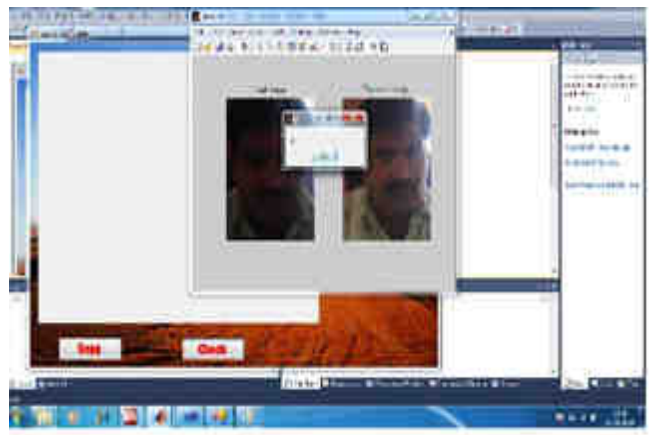


Fig. D. issue book to student

VII. CONCLUSIONS

The system has been tested on a wide variety of face images, with many emotions and many different angles other than frontal face image and to provide the security for person entry or out from the library, whether the person is authorized or not. The system is giving very high accuracy. The system is capable of using multi cameras as the capturing device simultaneously and providing the detail of person of recognize whether is valid or not. If valid then record the time of the person and when person out from the room or lab then record the time of out .Thus, the system is good and efficient for general purpose like online attendance system into the class room or lab or any industries etc.

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