

eFACE RECOGNITION SYSTEM

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Abstract

Person identification through biometrics continues to be a challenging task for smart applications. Face recognition is much more complicated if it is to be accomplished with specified reliability. The secured transaction or access is the need of the hour and is increasingly becoming difficult in a company or government organization. In this paper Face recognition system has presented as an attractive solution to address many contemporary needs for identification and secured verification of the person. The implementation has been accomplished by using ARM-9(S3C2440) microcontroller with Linux operating system. The proposed recognition technology uses face as unique verification information and can be used in a wide range of operating environments from individual home to most common public places. Face Recognition System focuses on technology of contactless man and machine interface and is highly accurate and reliable.

Index Terms: ARM9, GSM, WEB CAMERA.

1. INTRODUCTION

In contemporary widely networked world, the need to maintain the security of information or physical property is becoming both increasingly important and difficult. Face recognition is one of the few biometric methods that offer the merits of both high accuracy and low intrusiveness. It has the accuracy of a physiological approach without being intrusive. Now a day's security is a major problem all over the world which demands robust solution. Face recognition is the latest technique being tried out for crime detection all over the world. Face recognition software analyses the spaces and angles of up to 80 key points on a person's face. Data from only 14 to 20 such points is adequate to create a unique digital "face print" that can be compared with the information in an existing database. Face recognition technique presented can make use of images even from surveillance cameras. The technology can be used for several security related applications at public places such as stadiums, railway stations, bus stations and airports.

The face recognition solution facilitates no physical interaction on behalf of the user. It is accurate and can be used for high enrolment and verification rates. It eliminates the requirement of an expert to interpret the result. It can make use of existing hardware infrastructure, such as the cameras and image capture devices with no problems. It is the only biometric that allow you to perform passive identification in an one too many environment (e.g.: identifying a terrorist in a busy Airport Terminal. A face recognition system would allow user to be identified by simply walking past a surveillance camera. Human beings often recognize one another by unique facial characteristics. Automatic facial recognition is based on this phenomenon. Facial recognition is the most successful form of human surveillance. Facial

recognition technology is being used to improve human efficiency while recognizing faces and is one of the fastest growing fields in the biometric industry.

1.1 MICRO Controller (MINI2440)

In this paper, ARM-9(S3C2440) microcontroller acquires and Stores different views of faces. The ARM-9 micro controller which is heart of the system performs required monitoring and controlling actions. It compares and processes the specimen data acquired with that of the data base and the output is given as when the matching takes place. The Linux operating system is stored in ARM-9 microcontroller on chip memory. The LCD block has two modes i.e. Admin mode and User mode. In Admin mode it captures the pictures in .png format and stores into database. In user mode it compares the pictures stored in database and give appropriate output result. As and when the actual capture and stored capture matches, the GSM module sends message to control room Interrupt is given to the GSM module by the ARM-9 microcontroller as when the acquired data is matched.

1.2 Basic Concept of Pattern Recognition

Face Recognition Solution is a leading provider among the biometric recognition systems. The system presented in this paper is an advanced face recognition system which can be used for several security based applications. The facial recognition solution offered has the advantages of low cost and fast as well as free of hassles which are involved with

other biometric or ID card/Password based technologies. The proposed recognition technology uses face as unique verification information and can be used in a wide range of operating environments from individual home to most common public places. Face Recognition System focuses on technology of contactless man and machine interface and is highly accurate and reliable. There is a huge scope for scientific and mathematical analysis in the process of face recognition: Pixel Arithmetic for readers who are interested in the mathematical perspective and representation of pixels in face recognition applications. Apart from face recognition there exist several biometric systems such as signature, finger prints, voice, iris, retina, hand geometry and ear geometry. Among these systems, facial recognition appears to be one of the most universal, collectable, and accessible systems. Biometric face recognition, otherwise known as Automatic Face Recognition (AFR), is an attractive biometric approach, as it is based on the same identification techniques adopted by humans to recognize a one person. One of its main goal is the understanding of the complex human visual system and the knowledge of how humans identify faces with high accuracy.

1.3 Gsm Unit

The GSM unit sends the data to the control room which stores this data in its RAM. Similarly various other parameters are also stored in μC . Then after a specific match μC sends this data to the base unit (surveillance unit) with the help of on board GSM modem using AT commands. A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves.

1.4 Sms Sending Mode

In this mode the system sends SMS directly to pre-recorded numbers. The main blocks of this mode are microcontroller.

1.5 Web Cam

Web cam is a digital camera designed to take photographs and it is connected to microcontroller and it take a necessary action to take a photographs. These images are store in (.png) format and sent to microcontroller. When microcontroller receive this images then its takes a action to compare the database images and captured images. When both images are matched microcontroller send message to control room.

2. SYSTEM IMPLEMENTATION

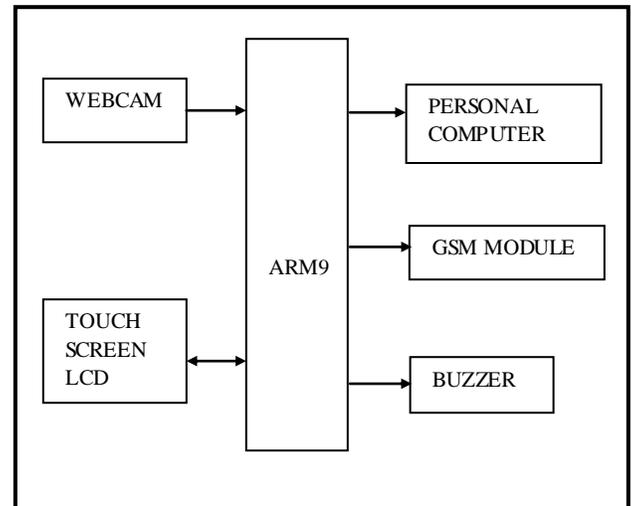


Fig-1: Block Diagram

2.1 Software Algorithm

- 1) Sensing the object.
- 2) Pre-processing feature extraction.
- 3) Eigen faces for recognition.
- 4) Compare contextual analysis in ARM processor.
- 5) Categorization of pictures.
- 6) Estimate the adaption learning.
- 7) input face detection.
- 8) In ARM preprocessing the images.
- 9) Comparing Threshold and Distance.
- 10) Output the position and Human face
- 11) Exit

2.2 Work Flow of the System

Fig-2: workflow chart of embedded face recognition system

Flow of Operation

The face-recognition system presented consists of three modules and each module is composed of a sequence of steps. The first module normalizes the input image. The goal of the normalization module is to transform the facial image into a standard format that removes or attenuates variations that can affect recognition performance. This module consists of four steps; figure 3 shows the results of processing for some of the steps in the normalization module.

In the first step low-pass filters or compresses the original image to remove high-frequency noise. An image is compressed to save storage space and reduce transmission time. The second step places the face in a standard geometric position by rotating, scaling, and translating the center of face to standard locations. The purpose of this step is to remove variations in size, orientation, and location of the face in an image. The third step masks background pixels, hair, and clothes. This prevents image variations that are not directly related to the face from interfering with the identification process.

Screenshots:



Fig-3: Mini 2440

2.3 Result

We continuously compare store database faces and present live faces. The μC stores all this data in the internal memory. If the μC found as and when the actual capture and stored capture matches, the GSM module sends message to control room it warns and necessary action will be taken.

3. CONCLUSION

Early attempts to make computers recognize faces were limited by the use of impoverished face models and feature descriptions (e.g., locating features from an edge image and

matching simple distances and ratios), assuming that a face is no more than the sum of its parts, the individual features. Recent attempts using parameterized feature models and multi-scale matching look more promising, but still face severe problems before they are actually implemented. Current connectionist approaches tend to hide much of the pertinent information in the weights that makes it difficult to modify.

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