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Research Article

Secured Lip Biometric based Authentication System

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Abstract

The proposed system is to develop an authentication system based on lip gestures. Lip password verification is an important research topic in the area of biometric authentication. In this project the work is done in such a way that the lip gestures are captured using webcam. In this paper, we shall concentrate on digital lip-motion based SPV, in which a lip password (i.e. the password embedded in the lip motion) based SPV is presented. Definitely, password protected SPV system will hold a double security to the system, where a speaker is verified by both of lip password and the underlying characteristics of lip motions simultaneously. In that a given lip image is compared with the database images and the accessing permissions will be provided only to the authenticated.

Keywords: *Lip images, ARM, Matlab*

1. Introduction

Mostly there are two representative works towards lip motion segmentation using visual speech signals purely Visual speech recognition and utterance segmentation based on mouth movement, Digital Image Computing Techniques and Applications, adopted motion history images (MHIs) to compute the intensity variations via a whole region-based shape descriptor (called Zernike moments) and spine curve fitting techniques to generate the difference between consecutive frames. Accordingly, some peak points can be detected to represent the starting and stopping positions of the subunit elements; attempted to locate the boundaries of subunit by utilizing the velocity of the lips from image sequences that are estimated by a combination of morphological image processing and block matching techniques. From a practical viewpoint, both MHIs and lip velocity are required to compute the whole regional characteristic in each frame, whose computation is quite laborious. By rule of thumb, the mouth areas of a lip-password consisting of isolated words always change significantly over time. The position with minimum mouth point always represents the status of mouth closing or intersection point between subunit utterances. Based upon this information, we present a simple but effective lip motion segmentation approach to segment the lip-password sequence into several distinguishable subunits according to the variations of mouth areas. The basic idea is to investigate a Lip password verification technique which is not costly to develop, is reliable even if the individual is under different emotions, user friendly in terms of configuration, and robust against imposters. In Lip password verification application, the Lip passwords are processed to extract features that are used for verification. The features are selected based on certain criterions. Mainly, the features have to be small enough to be stored in a smart card and do not require complex techniques.

Block Diagram

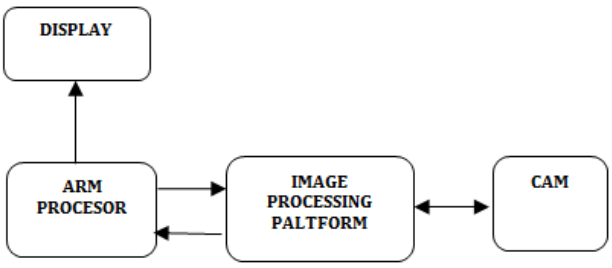

Fig 1: LIP – Password system

2. Design and Implementation

This project verifies the lip gestures and according to that an authentication will be provided to the user for further accessing. Then the user have to sign the pad in front of camera unit. Then camera captures the lip image and sends the data to server section through serial communication. In server unit some database is already stored. If the present captured lip image and entered captured images are matched then only further processing is continued in this section. If the lip

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gesture is not matched in this unit, then it will be considered as unauthorized image and access will be denied.

The signature verification is only processed in MATLAB. MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. Typical uses include

- Math and computation
- Algorithm development
- Data acquisition
- Modeling, simulation, and prototyping
- Data analysis, exploration, and visualization
- Scientific and engineering graphics
- Application development, including graphical user interface building

A graphical user interface (GUI) is a graphical display in one or more windows containing controls, called components that enable a user to perform interactive tasks. The user of the GUI does not have to create a script or type commands at the command line to accomplish the tasks. Unlike coding programs to accomplish tasks, the user of a GUI need not understand the details of how the tasks are performed.

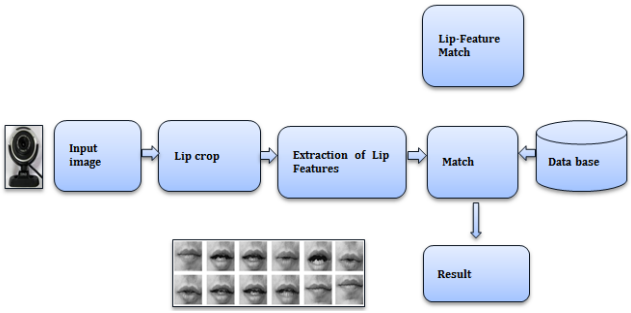

Fig: 2 LIP verification process

In this paper, we shall concentrate on digital lip-motion based SPV, in which a lip password (i.e. the password embedded in the lip motion) based SPV is presented. Definitely, password protected SPV system will hold a double security to the system, where a speaker is verified by both of lip password and the underlying characteristics of lip motions simultaneously. That is, the target speaker saying the wrong password or an impostor even knowing the correct password will be detected and rejected as well. In general, the password utterance comprises several visibly distinguishable units (i.e., subunit). Each subunit indicates a short period of lip motion and always has diverse styles between different elements. To investigate the lip password in detail, these subunits should be considered individually instead of taking into account the whole utterance as the basic processing unit. To this end, we firstly present an effective lip-motion segmentation algorithm to segment the password sequence into several subunits. Then, we integrate HMMs with boosting learning framework associated with the random subspace method (RSM) and data sharing scheme (DSS) [4] to model the input subunit sequence discriminatively so that a precise decision boundary is formulated for these subunits verification. Finally, The speaker is verified based on all verification results of the subunits learned from multi-boosted HMMs.

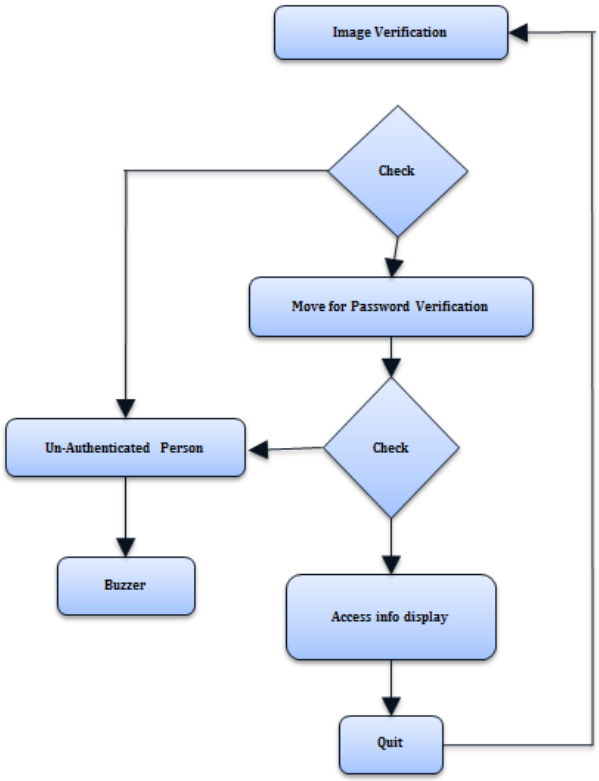

Fig: 3 Design Flowchart

3. System Hardware

ARM core

The ARM7 family includes the ARM7TDMI, ARM7TDMI-S, ARM720T, and ARM7EJ-S processors. The ARM7TDMI core is the industry's most widely used 32-bit embedded RISC microprocessor solution. Optimized for cost and power-sensitive applications, the ARM7TDMI solution provides the low power consumption, small size, and high performance needed in portable, embedded applications.

LPC2148 Processor

LPC2148 Microcontroller Architecture. The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro

programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory. The ARM7TDMI-S processor also employs a unique architectural strategy known as Thumb, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue. The key idea behind Thumb is that of a super-reduced instruction set. Essentially, the ARM7TDMI-S processor has two instruction sets:

- The standard 32-bit ARM set.
- A 16-bit Thumb set.

The Thumb set's 16-bit instruction length allows it to approach twice the density of standard ARM code while retaining most of the ARM's performance advantage over a traditional 16-bit processor using 16-bit registers. This is possible because Thumb code operates on the same 32-bit register set as ARM code. Thumb code is able to provide up to 65% of the code size of ARM, and 160% of the performance of an equivalent ARM processor connected to a 16-bit memory system

Camera

Fig 4: Camera

Once capture by the pc, the video stream could also be saved, viewed or sent on to different networks via systems like the net, associate degreed email as an attachment. Once sent to a distant location, the video stream could also be saved, viewed or on sent there. During this project we have a tendency to square measure used this camera for capturing the signatures and sent to server section through zigbee communication for image comparison and process on MATLAB in server section. Hence the camera is that the heart of this project.

LCD display

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal.

Fig5: LCD display

4. System software

In order to implement the lip password verification process, we need matlab platform here

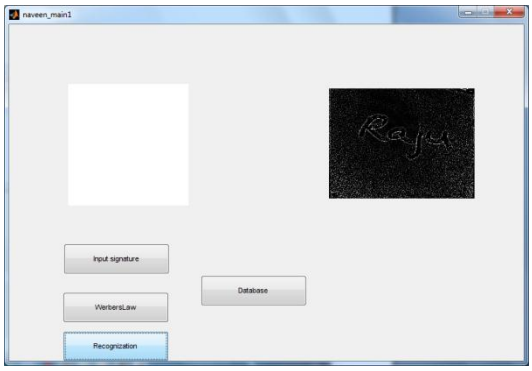

Fig 6: Matlab GUI for lip password

.In matlab, Initially the system takes the database lip image through camera and stored, After that , if the user gives any input lip image for verification, then the captured lip image will be compared with the data base lip image. Then the result will be sent to the processor through serial communication. While running the matlab code some optional window and selections buttons created using based on GUI to display and select the present process like data base image, input image, and recognize shown above.

Matlab concentrate on digital lip-motion based SPV, in which a lip password (i.e. the password embedded in the lip motion) based SPV is presented. Definitely, password protected SPV system will hold a double security to the system, where a speaker is verified by both of lip password and the underlying characteristics of lip motions simultaneously.

Conclusion

This project has been done based on the lip password verification and authentication in access. The authentication is done based on the lip gesture matching. It can able to bring a reliable assistance and security in electronics sector. This technique is highly secure and the user gets privacy in various aspects.

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