Touch Screen based Dynamic Signature Verification

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ABSTRACT
Forgers try to mimic the look of a signature. We hereby develop software which examines how a person signs, that is, it works on the concept of the "dance of the pen". Dynamic Signature Verification (DSV) technology uses conventional signature capture devices and moreover, helps to prevent forgeries, by verifying the signature dynamically, and considering various parameters like smoothness of the signature curves, time required to sign, etc. This way it proves to be much efficient compared to traditional offline verification systems.

General Terms
Pattern Recognition, Security, Biometrics

Keywords
Offline signature verification, FRR, FAR, resistive touch screen weighted averaging.

1. INTRODUCTION
Authentication of a user to access important documents or highly important data is extremely important and is a form of efficient and secure system. Out of the many forms of authorization, signature is the most socially acceptable form of user authentication. We are developing a system for signature verification called as "TOUCH SCREEN BASED DYNAMIC SIGNATURE VERIFICATION". This system takes an input in handwritten format through a touch screen, interprets the signature, and verifies it with the correct signature and gives the output as whether the user is an authenticated user or not.

As the name suggests, here we will use a touch screen for drawing of the free hand graph or sign on it using stylus. The touch screen that will be connected to the hardware unit is used as the input source of the signature. After the connection setup, detection of the stylus will be done on the basis of X-Y co-ordinates. This will then be transferred to the PC software which will replicate the curves made on the touch screen. The signature will be stored in the database, and when the person signs on the touch screen, it will be matched with the stored image and the signature would be verified on the basis of various dynamic characteristics of the signature.

2. EXISTING SYSTEM
Existing system for signature verification is an offline based signature verification, wherein, the signature of a user is manually verified by other person. A person used to be hired to authenticate the user by verifying whether the user's signature is correct or not. Because of this, the authentication was totally dependent upon the person who verifies the signature.

The major drawback of this system is that it simply authenticates the person by manual matching of current signature with the previously stored signature. With this method, there is very less chance of detecting forgeries. There might also be times when an unauthorized person is given access because of the erroneous system.

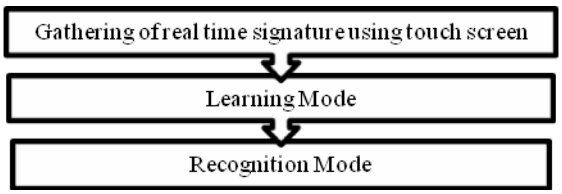
On the other hand, even if the person is an authenticated person, but his sign has a slight mismatch compared to his stored signature, he is considered as unauthenticated person. This is a major reason of loss to the person who is genuine and still has been denied authentication. Apart from this, since the user authentication was very much dependent upon the person who verifies the signature, there is a very huge probability of partiality. The person can be bribed by an unauthenticated user and the person could be given access to the system. This makes data or system, whatsoever is secured, to lose its security

3. PROBLEM DEFINITION
Confidentiality of data is lost if an unauthorized user gets an access to it. Thus, it is very important that data can be safeguarded by means of an accurate and efficient form of authentication. The objective of our project is to develop a signature recognizing & signature verification program which would recognize the signature and verify it from the information gained from the signature.

We know that each user has a different signing pattern as their identity. However, many a times this signature is mimicked and an unauthenticated person gets the access. On the other hand, sometimes a slight mismatch in the signature can declare the authenticated user as unauthenticated. The project is being developed so that this does not happen, that is, an unauthenticated user should not get any access, and at the same time, authenticated user should not be considered as unauthenticated. We first store the signature from a new user and verify it with the current signature.

Each individual has its own signing style (pattern), hence the copying of signature is very difficult. Since this authentication system does not require password. This system can be useful for various kinds of data protection.

4. PROPOSED SYSTEM



Gathering of real time signature using touch screen:

The user would input his signature through the medium of touch screen. This signature would then be transferred to the PC, wherein it would be processed. All this would be done in real time, hence the name real time signature gathering.

Learning Mode:

Learning mode involves learning about the signature by processing the signature. The signature processing includes recognizing various parameters like time delay, smoothness and size of the image. Once the parameters are calculated, they are stored in database, for matching them with further input signature. This can be told as the system is learning the signature of an individual.

Recognition Mode:

Recognition mode involves verifying whether the signature of a person matches with the one stored in database during learning mode. This mode also has the same steps as recognition mode but, here, instead of storing the image parameters in database, they are matched with the existing records in the database

5. ALGORITHM

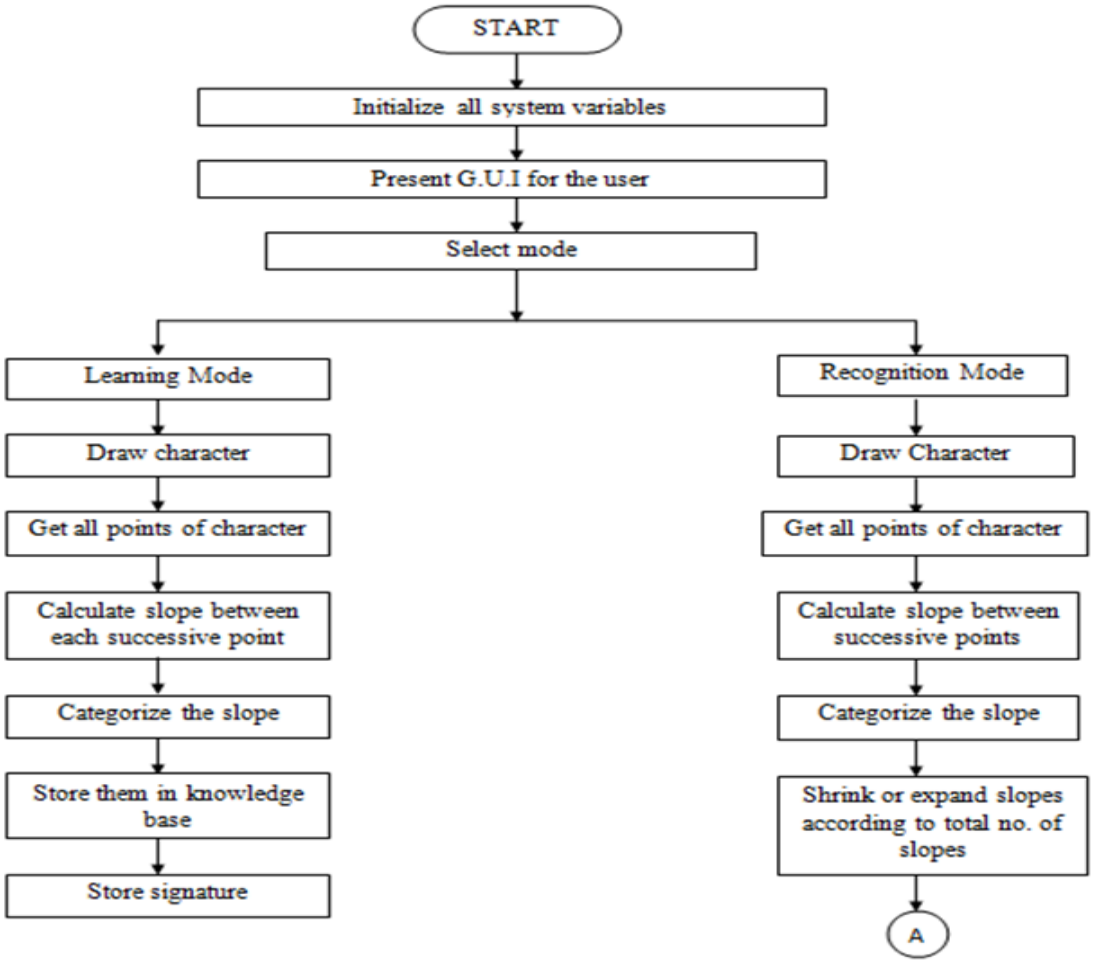


Fig. 5.1 algorithm

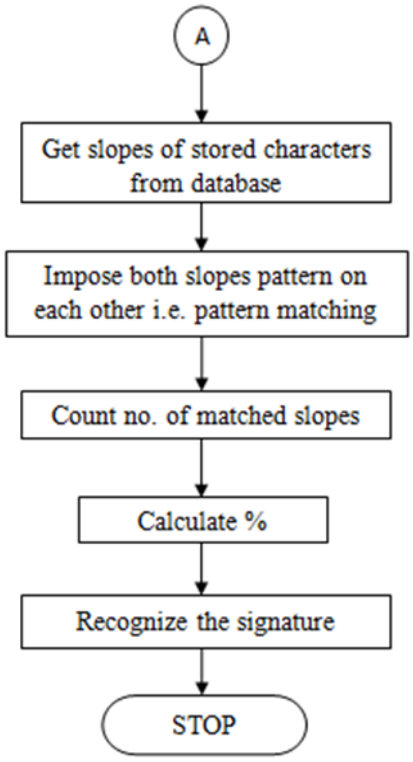


Fig. 5.2 algorithm(ctnd)

6. IMPLEMENTATION

Power Supply

This unit will supply the various voltage requirements of each unit. This will consist of transformer, rectifier, filter and regulator. It will convert 203V AC into desired 5V or 12V DC.

Microcontroller

This unit is the heart of the complete system. It is actually responsible for all the processes being executed. It will monitor and control all the peripheral devices or components connected in the system. In short we can say that the software intelligence of the project resides in the software code embedded in the microcontroller. The controller used here will be of AVR family. The code will be written in Embedded C and memory using a programmer. This unit requires +5V DC for its proper operation.

MAX 232

This section will be used to convert TTL logic into RS232 logic and vice-versa. In TTL—logic 1 is +5V and logic 0 is 0V. In RS232—logic 1 is -10V and logic 0 is +10V. This unit will provide interface that is required to communication microcontroller with RS232 based devices using serial communication link. The MAX232 IC is dedicated for the logic convertor or level converter. This unit requires +5VDC for it proper operation.

Touch Screen

The 4-wire resistive touch screen is a common type of touch screen. Here, two resistive sheets are separated by a small distance. Electrodes are located along the top and bottom of one sheet and along the left and right of the other. To detect the vertical co-ordinate, a voltage is applied to **the** top electrode and the bottom electrode is grounded and voltage is measured at either the left or right electrode. A touch shorts the two sheets together, the resistance in the vertical direction forms a voltage divided and the voltage is read out through the resistance of the other sheet. The horizontal co-ordinate is read by same method, applying voltage across the left and right electrodes.

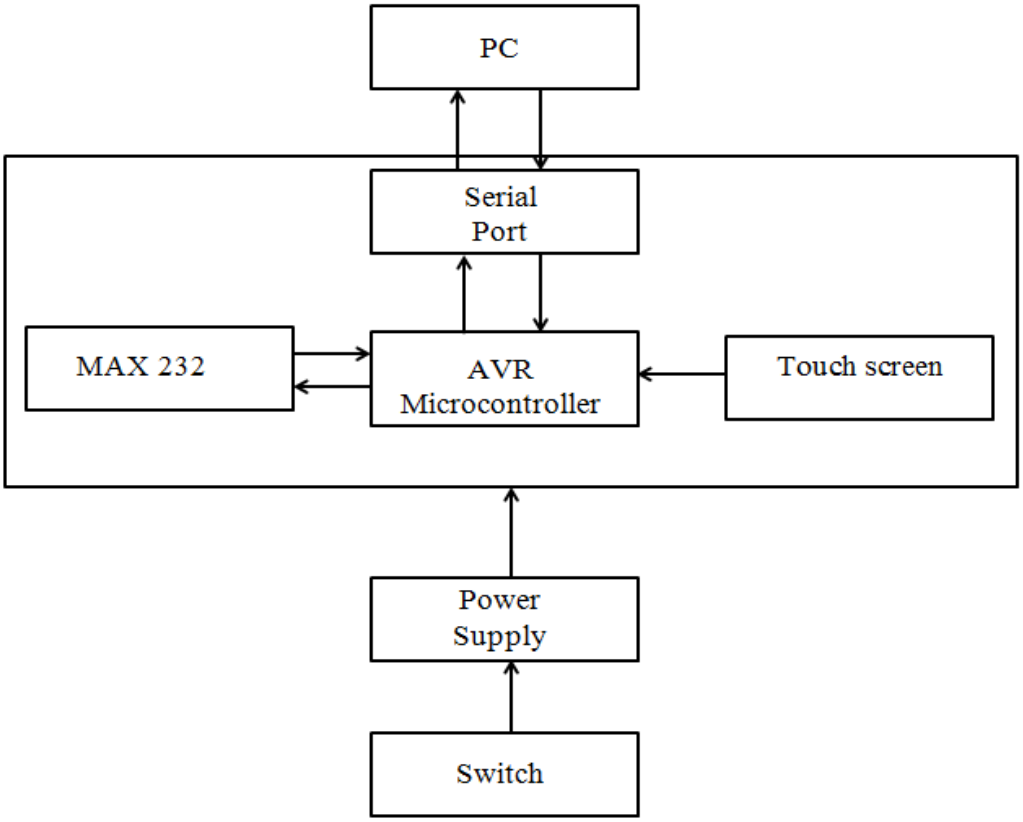


Fig 6.1 Implementation

7. SCOPE AND APPLICATIONS

The last decade has witnessed great interest in research on verification based on various authentication techniques. But signature has evolved to be the most socially accepted form of authentication method. This has paved the way for a large number of new techniques and systems and a growing interest in associated fields to support such systems.

Likewise, digital signature verification has expanded its horizon in many directions. The need of the hour is to establish how this technology can reach out to the common man and be useful in day-to-day life.

The system being developed has scope in various places that require signature authentication like banks, offices, ATM centers, intelligence bureaus etc. This will help in safeguarding documents and files, which are of utmost importance.

Though the following are some examples:

- This technology can be used as an input method for PDAs, Digitizers, Palmtops and Touch Screen PCs
- Can be used for interactive graphical interface for embedded systems
- Can for digitally signing the documents
- Can be used for automated signature verification in banks, ATM, etc

8. CONCLUSION

A new multi expert system for dynamic signature verification is presented in this paper. The system is based on stroke oriented description that includes time duration, smoothness and pressure of handwritten signatures suitable for multi expert verification. Each of the description parameter is verified into the representational domain in which the user is more stable. The final decision is performed by combining verification decisions at input level according to simple and weighted averaging.

The experimental results demonstrate the effectiveness of the proposed system and lead to investigate more accurately on the potential of dynamic signature verification by using multiple representational domains.

9. REFERENCES

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