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SIGNATURE VERIFICATIO USING MATLAB

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ABSTRACT : Offline signature verification is necessary to recognize authenticity and genuineness of a signature. Most offline verification schemes till now have required perfect alignment of the signature to the specified axes. However, there are situations when the sample to be verified may not be aligned to the required axis. In that situation the current verification schemes could reject the signature even though it may be genuine.
This verification can be done by using image processing techniques. Image processing is a method to perform some operations on an image, to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics associated from that image.
KEYWORDS: MATLAB, Graphical User Interface, Signature image.

I.INTRODUCTION

Signature has been the distinguishing feature for person identification. Even today an increasing number of transactions, especially related to financial and business are being authorized via signatures. Handwritten signature, one of the most widely accepted personal attributes for identity verification of the person. One of the ways to authorize transactions and authenticate the human identity compared with other electronic identification. Hence the need to have methods of automatic signature verification must be developed if authenticity is to be verified and guaranteed successfully on a regular basis. Approaches to signature verification fall into two categories: On-line and Off-line.

On-line data records the motion of stylus (which is also part of sensor) while the signature is produced, and includes location, and possibly velocity, acceleration, and pen pressure, as a function of time. On-line systems use this information captured during acquisition. These dynamic characteristics are specific to each individual and sufficiently stable as well as repetitive.

Off-line data is a 2-D image of the signature. Processing offline is complex due to the absence of stable dynamic characteristics. Difficulty also lies in the fact that it is hard to segment signature strokes due to highly stylish and unconventional writing styles. The nature and variety of writing pen may also affect the nature of signature obtained. The non-repetitive nature of variation of the signatures, because of age, illness, geographic location and perhaps to some extent the emotional state of the person, accentuates the problem.

II. LITERATURE SURVEY

According to the literature survey, many signature verification techniques have been proposed and implemented in the past and that includes the usage of Deep learning, Machine learning, Shallow conventional neural networks, Deep Multi Task Metric Learning, One-class hierarchical deep learning, Siamese Neural Network (SNN), Meta- learning etc.

III. CLASSIFICATION OF ANALYSIS SCHEME

The analysis schemes can typically be classified into two types, depending on the way in which the data is received. They are online and offline signature schemes.

Online Analysis Schemes

Online signature schemes the data is received through sensors. The data obtained is usually active data which includes the speed, acceleration, pressure, tip pressure, gradient etc. These data are usually intra-person invariant, that is they usually remain constant for a particular person. So, this type of signature verification is highly reliable and offers a high degree of accuracy. However, the basic shortcoming in this practice is the availability and costs involved in the procurement of highly sensitive instruments used for

obtaining and analysing the data. These constraints limit the usage of online identification. Online identification can easily be extended to various other domains like iris identification, fingerprint analysis, palm print analysis and retina analysis.

Offline Analysis Schemes

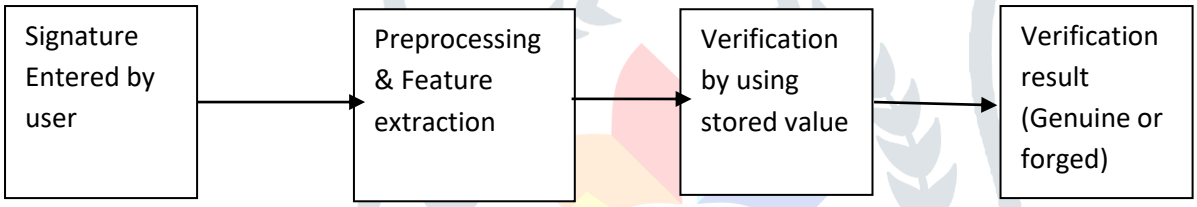
Offline analysis schemes involve extraction of passive data, the data which is obtained after the imprint is obtained by various third party hardware like cameras and scanners in a digital format. These methods are usually cost effective; however they lack the basic active information which could have been obtained from other active devices. The static information derived in an offline signature verification system may be global, structural, geometric, or statistical. Deals with signature images acquired by a scanner or a digital camera. Offline signature recognition and verification is a challenging problem as it is highly degraded. There are three types of images binary, grey scale, and colour images.

IV.TYPES OF FORGERIES

1.Random Forgery: Random forgery is done by a person who doesn't know the shape and structure of the original signature**. 2. Simple Forgery:** In this type of forgery the person concerned has a vague idea of the actual signature but is signing without much practice**. 3. Skilled Forgery:** This type of forgery considers appropriate knowledge about the original signature along with ample time for proper practice. Our proposed scheme eliminates random and skilled forgeries to a great extent.

V.IMPLEMETATION

Offline signature consists of some specific characteristics of any individual which need to be verified for forgery detection. But before that the signature must have gone through some preliminary steps like simplification of the signature, feature extraction, classification etc. To perform similarity checking between the test signature and the reference signature present in the database, some procedures need to be followed. 1. Collect sample signatures 2. Pre-processing 3. Feature extraction 4. Matching and verification



Pre- processing is the first step for the signature matching process where the input signature is simplified to match with the referenced one. After the simplification of the signature, it is necessary to find which features are present inside the signature. Then extract those features using proper methods and classifiers for verification.

VI.METHODOLOGY

1.DATABASE PREPARATION: Data for signature verification are acquired through scanners and cameras so that they are available in digital format. We require a square image with high resolution, and which is noise free. Signature should be made on an unscrambled blank sheet of paper and shot with a camera which is focused on the image. The image should then be modified to a square to be used.

2.PRE-PROCESSING: Signature acquired must be normalized, resized to proper dimensions, thinned and the background noise is eliminated. This gives a signature template which can be used for feature extraction. Some common operations of pre-processing are known as resizing, noise removal, thinning, smoothing etc.

3.FEATURE EXTRACTION: In feature extraction stage, the system extracts attributes or characteristics from a given image and records certain features, in order to yield ordered details in the form of an observation data.

4.VERIFICATION BY MATCHING: The extracted features are stored in knowledge base. Human signatures are dependent on various factors, the signature characteristics change with the emotional or mental condition of a person. The decision thresholds required for the classification are calculated by considering the variations of features among the training set. Selection of thresholds is application independent.

Graphic User Interface (GUI)

The Graphical user interface, developed in late 1970's by the Xerox Palo Alto research laboratory and deployed commercially in Apple's Macintosh and Microsoft's Windows operating systems, was designed as a response to the problem of inefficient usability in early, text-based command line interfaces for the average user. Graphical user interface would become the standard of user-centered design in software application programming, providing users the capability to intuitively operate computers and other electronic devices through the direct manipulation of graphical icons such as buttons, scroll bars, windows, tabs, menus,

cursors, and the mouse pointing device. Many modern graphical user interfaces feature touch screen and voice-command interaction capabilities.

VII.CONCLUSION AND FUTURE SCOPE

The system is robust and can detect random, simple, and semi-skilled forgeries but the performance deteriorates in case of skilled forgeries. By using MATLAB, we created a GUI which helps in reading the signature and then checking for characters and curves of signatures. We have distinguished between genuine and forged signatures with high accuracy using the MATLAB program.

The program we have written is very primitive compared to what should be implemented for live security systems and can be improved by:

- Making a machine learning neural network and training it to generate more accurate error threshold values that can improve the accuracy of the program.
- Increasing the database, we can have more data to train our algorithm which will also increase the accuracy of our program.

Results are expected to be more accurate if using more sample signatures. Accuracy of verification is expected to be better. More features can be extracted and add into the initial feature extraction system. Digital pad, digital pen can be used.

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