ANN based Signature Verification System

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Abstract— Now a days security is the most important thing. Everywhere we saw personalization of the each things. There is unique identity provide through the signature. we use for the uniqueness as our ID proof, voting card, pan card etc. at the same time the secondary part of the each person uniqueness is signature, figure print, voice, heart sound, iris recognition, palm print etc., In this pepper we verify the signatures and provide its security. We know that there is professional forgeries they can missuses your signature. In bank transactions, cheques, legal documents, fax money transfer, entry application, and password substitution we need to sign for completion of these processes. For the signature security we use the feature extractions, image processing and neural network. The experimentation of the proposed system will perform the offline signature verification and detection. If the stored data of signature will match with the input signature then it will be successfully verify and detected by itself.as the same time we highly provide security of the signature using artificial neural network (ANN).

Key words: ANN, Offline Signature Verification, Feature Extractions, Pre Image Processing

I. INTRODUCTION

The security requirements now a today's society has major aspect. Signature has been beneficial for personal identification. It is universal identity of the each person. It is an authorized tool. Signature verification used to detect crime and reducing fraud. The signature verification has an advantage over other forms of biometric security verification techniques [8]; including fingerprint, voice, iris recognition, palm prints, and heart sound recognition. Signature verification becomes a very sensitive issue in daily banking. The Chase Manhattam bank was the first bank to test a signature verification application.

Signature verification is two types

1) Online signature verification: - this is the dynamic type of signing. In this technique uses special type of pen that is stylus pen. When the person signed then signature is captured by pressure sensitive tablets that extract dynamic properties like stroke, overall speed of the signature and the pen pressure at each point that make the signature more unique and more difficult to forge it is for the all shape of the signature. In small personal devices are the application area of the signature which is secured the data and authentication of individual.
2) Offline signature verification:-this is the static type of signing.it is a typical verification process which we use a simple pen for signing. In the offline signature verification techniques, images of the signatures written on a paper are obtained using a scanner or a camera. Then we go for all the feature extracted processes and then the signature will verified accurately.

Types of forgery:-there are three types of forgery

1) Random forgery: - It is the type of signature in which the person doesn't know identity.
2) Simple forgery: - It is the type of signature in which a person knows its shape but done without practicing the signature. There are also subtypes of amateur and professional. This forgery is produced by an individual who has professional expertise in handwriting analysis. Amateur also two subtypes homemade and over the shoulder. When the forger has a paper copy of a genuine signature and opportunity to practice the signature at home. Over-the-shoulder forgeries are produced immediately after the forger has witnessed a genuine signature being produced.
3) Skilled forgery: - It is the type of forgery which is a kind of genuine signatures.

Off-line data is a 2-D image of the signature [6]. Offline signature is sometimes complex due to the absence of stable dynamic characteristics. There have hard signature stroke because of its uncongenial writing styles. The non-repetitive nature of variation of the signatures, because of age, illness, geographic location and might be to some extent the emotional state of the person, accentuates the problem [11]. All these cause together for a large intra-personal variation. It is for financial transactions these signatures play an important role. Many times we sign cheques for the purpose of money retrieval. Our signature is also needed in places where our agreement or any consent is required. But many a times our signatures are on the pin point of frauds. Many times our signatures are misused for money. Some people imitate our signatures with intent to make money. Even though this is a punishable offence we need to curb it. Whenever we want to retrieve money from bank we use cheques for that purpose. Usually the cheque is taken in the back room and then it is verified manually by a person present over there using our previous documents which are signed and stored. This is known as manual verification. from the stored reference signature compared with sample signature, we could deside whether the signature is genuine or forgery .Off-line verification refers to when the signature is only available as a static image, typically obtained after it has been written on paper using a variety of writing instruments, with no reference to the sequence and timing of the pens trockes, which created the signature. When the sequence of the pen-strokes is available the process is referred to as on-line signature verification.in this processing we study about all the documents signatures.

II. LITERATURE REVIEW

The last few decades, many approaches have been developed in the pattern recognition area, which approached the offline signature verification problem. Sansone and Vento (2000) increased performance of signature verification system by a serial three stage multi-expert

system. Bank Justino E et al [1] described about the off line verification system. M. Hanmandlu oposes an off-line signature verification system using Hidden Markov Model[5]. the HMM-based on-line signature verification system from Universidad Politecnica de Madrid competing in the First International Signature Verification Competition (SVC 2004) has been used[6].R. Sabourin proposed handwritten signature verification system based on Neural 'Gas' based Vector Quantization[9]. Vélez, Sánchez and Moreno (2003) propose a robust off-line signature verification system using compression networks and positional cuttings. Arif and Vincent (2003) concerned data fusion and its methods for an off-line 104 signature verification problem which are Dempster- Shafer evidence theory, Possibility theory and Borda count method. C. Quek used line segment distribution of sketches for Persian signature recognition. In this introduction to new graphometric based features are based on curve defined in it.

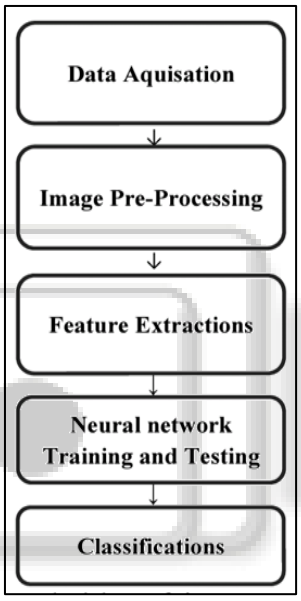

Fig. 1: Methodology of Signature Verification

III. PROPOSED METHODOLOGY

In this pepper we introduced the following techniques for the verification of the signatures.

1) Image acquisition
2) Pre-image processing
3) Features extractions
4) Neural network training and testing
5) Classifications

1) Image Acquisition

It is the first step of signature verification of various folks used for the verification which is digitally collected by scanning Each signature is scanned and convert into binary image at a resolution of 300 dots per inch, after which median filtering is applied for removal of noise. On average, a signature image has a width of 400 to 600 pixels and a height of 200 to 400 pixels. Using a database of signature, some signatures were used in the training phase and the some were used for testing. The images are in RGB color scale. In this we used .jpg color images (RGB images).

2) Pre-Image Processing

This is second step of signature verification. Preprocessing phase, the enhancement of the input data is generally based on techniques originating from standard signal processing algorithms when static signatures are considered, typical preprocessing algorithms concern signature extraction noise removal by median filters and morphological operators signature size normalization, binarization thinning and smearing. A successful implementation of this process developed improved higher accuracy rate and results.

3) Feature Extractions

This is the very important step. Due to binary image features are extracted. And In the database all extracted features are stored. Feature extraction is the most important step. Later on whenever a test signature image is input to the system; its features are extracted and compared with the stored features in database. For this signature recognition and verification research, four main features will be extracted. These features such as eccentricity, skewness, kurtosis, orientation [1].

Features extracted for off-line signature verification can be broadly divided into three main categories:

1) Global Features
2) Local Features

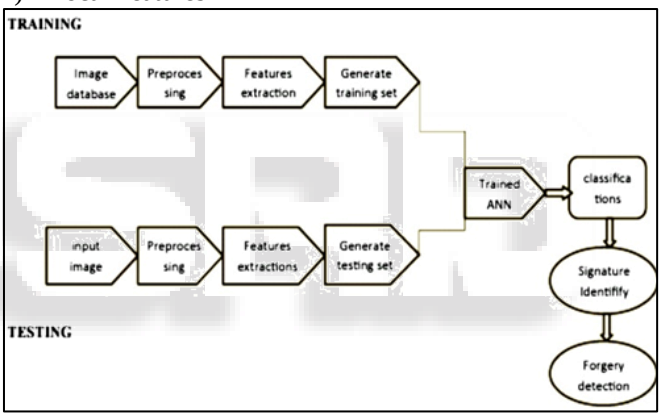

Fig. 2: Verification of Signatures System

a) Global features

The signature is seems as whole and features are extracted from all the pixels confining the signature image. Based on the style of the signature, different types of Global features are extracted. Signature area (Signature Occupancy Ratio), Signature height-to-width ratio (Aspect Ratio), Maximum horizontal histogram and maximum vertical histogram, Image area, Signature height, Horizontal and vertical center of the signature Image area, pure width, pure height, Vertical projection peaks, and Horizontal projection peaks [10].

b) Local features

Local features are extracted from a portion or a limited area of the signature image. It applied to the cells of a grid virtually super imposed on a signature image or to particular elements obtained after signature segmentation [10]. The geometrical and topological characteristics of these features are calculated of local segments, like a curvature, position and tangent direction.

c) Geometric features

These features describe the characteristic geometry and topology of a signature and preserve their global as well as

local properties. These features have capability to tolerate with distortion, certain degree of translation, rotation variations and style variations.

4) Neural Network Training and Testing

Neural networks are same as neurons of brain which perform a specific task within given instruction. Neural network learn the instructions throughout the testing from fig.2.these are very helpful for the pattern recognition of the signatures and hard to derive by humans or by simple technique. We will have been faced lots of problems to detection of signature when it's signed by skilled forgery. Thus we need more advance technique to verify such types of signature authentication.in proposed pepper we use ANN.[2] Artificial Neural Network (ANN) which uses a four-step process: separates the signature from its background, normalizes and digitizes the signature, applies moment invariant vectors and finally implements signature recognition and verification, was successful in the verification of signatures that ANN was trained for, but has a poor performance when ANN was not trained for.[1] signature classified in two ways. First, identify certain pixels that can inform structure pattern of signature. This method is used when the features have to be reviewed have simple structure pattern. Therefore this method is called multi-structure algorithm. When the feature has a complex pattern, recognition using second methods that is ANN with multi-layer perceptron (MLP) architecture3].

Neural networks from fig.3 shows highly reliable when trained using a large amount of data. They are used in applications where security is highly valued [2]. For signature recognition and verification several steps must be performed. In our proposed work basically we collect the scanned images of signature of different persons, basically we collect the 10 scanned images of individuals' actual signatures and there forged signatures. These images are stored in a database which we are going to use in training & testing of ANN, in our proposed work we have to use an interface with scanner for getting an image and these images are stored in a database. After preprocessing all signatures images from the database, features extraction will be used to extract various features of signature such as stroke, moment invariants, GLCM, color dominant, histogram that can distinguish signatures of different persons. These are used for training and testing of neural network. This phase is used during the run time implementation of the system. It consists of following steps. Unlike the training part where the images are automatically read from the training database, in the testing part, the image is manually selected from the testing database. In the testing part, the image selected goes through the same pre-process steps as in the training part in testing part the features of the selected image are calculated and stored. These values are then later used for the classification step. The features extracted in the testing phase are the same as that of the training phase and follow the same process. After the features are calculated, they are stored and are used to generate the testing feature set. This feature set is then fed into the trained ANN system. The last we verify signature and detect the forgery.

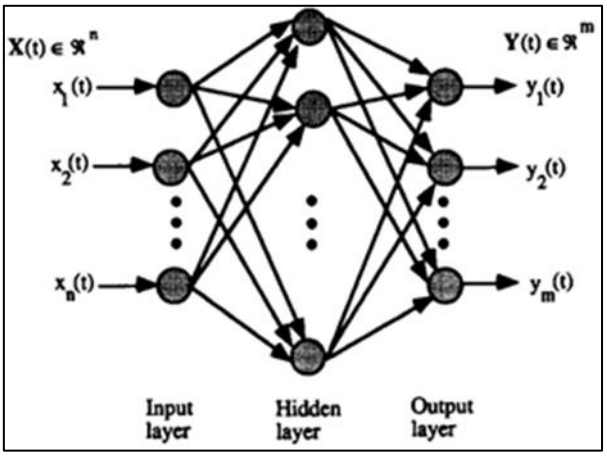

Fig. 3: Artificial Neural Network

5) Classification

This is the last step of signature verification. There are two types as following

1) Hamming Distance Window
2) Support Vector Machine

a) Hamming distance window

This feature extraction performs the task between train signature and input signature. This method shows the distance between two signatures, if this distance will minimum then the signature is genuine [4].

b) Support Vector Machine

Support Vector Machines (SVMs) were employed to construct the signature models [7]. SVM is machine learning algorithm and used for two class classification problem [4].this classifier verify the signature and detect the forgery.

IV. CONCLUSION

In this proposed pepper we use the artificial intelligences. With the help of neural network we identify the exact signature of the person. Also we can detect the forgery. From the various training and testing process we can find out the signature of any person. The proposed pepper can also determine the signature by using highly active ANN. When we take an input image then it compared with the database image then we measured the each features and similarity by using features extractions. And then it's forwarded towards the trained artificial neural network model. We get the exact signature identification. This model highly provides the security of the signature person.

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