Signature Verification based on Reduced Size Fast Correlation

Shradha Chadokar
M.Tech. Scholar, Department of CSE
O.I.S.T., Bhopal (M.P.), India

Jijo S Nair
Asst. Professor , Department of CSE
O.I.S.T, Bhopal (M.P.), India

ABSTRACT
In this dissertation work, performed an far-reaching experimental study to minimize time of recognition and verification and increase the great accuracy of signature sample which extract some features from signature sample in their training phase. In previous research on signature verification was based on similarity training of machine used in neural network has shown better accuracy than other techniques but somewhere neural network is complex in operation for example different algorithms for supervised learning. So in this work feature extraction and then it's database has been prepared which takes less time than supervised training in NN is used and for verification, correlation is used to match features of signature with the database which is also easier in operation and faster in processing then BP algorithms in NN. In this system more than 400 signature samples as used for recognition, and it gives far-accuracy than NN system.

Keyword
Image Pre-processing, Biometrics, Feature Extraction, noise reduction technique and Off-line Signature Recognition and Verification.

1. INTRODUCTION
Signature verification is the process used to recognize hand-written signature of an individual. The signature is widely used as a means of personal verification emphasizes the need for automatic verification. Problem identification and personal verification is a growing field of research. Verification can be performed either offline or online based on demand or u can say another names is Dynamic and Static Signature verification. In Dynamic signature verification technology uses the behavioral biometrics of a handwritten signature to confirm the identity of a computer user. This is done by analyzing the speed, shape, stylus pressure, stroke, and timing information during the act of signing.In Static signature verification users write their signature on paper, it is digitize through an optical scanner or via a camera, and the biometric system recognizes the signature analyzing via its shape. This group is also known as "off-line". In this paper, presented a method for off-line signature verification using a Correlation methods and extract the signature samples based simplest form. Preprocessing of a scanned image is necessary to isolate the signature part and to remove any spurious noise present, Before extracting the features. The system is initially trained using a database of signatures obtained from the person whose signature must be authenticated by the system. For each subject, an average signature is obtained by integrating the above features from a set of his / her genuine signature samples. The average signing acts as the control model against a test signature claimed. Extraction of the signature sample is based on Image binarization, Features Extraction, Clipped and reduced size and finally verify the authenticity of the signature which serves as measure of similarity between the two Signature Sample. If this distance is less than a predetermined threshold (corresponding to the minimum acceptable level of similarity), the test signature is checked to that of the other according to the detected object as a counterfeit. The details of preprocessing as well as the features represented above are described in the document as well as details of implementation and simulation results. There are some limitations and advantages or different types of methods also scope to improve the method are discussed.

2. SIGNATURE VERIFICATION
There are three major steps in the implementation of verification and recognition signature, and each of these three stages consists of many methods that contribute to improved results. These steps are:

• Image pre-processing

• Feature extraction

• Methodology

2.1 Image Pre-Processing:-
The image pre-processing is a large number of techniques exist for manipulating and editing images. It is the first step in the signature verification and recognition. It improved product of higher accuracy rate results. After an image is acquired, it goes through the different levels of processing before being ready for the next step of feature extraction. Here are the reasons why the image pre-processing is important:

• This improves the comparison between the images. It creates a level of similarity between the general characteristics of an image, such as the phase size.

• There are two types of signatures that differ depending on the tool that was used in writing as the type of pen / pencil, ink, pressing the hand of the person who signed is known as recognition dynamic signature. In recognition of offline signature, these facts are not important, and must be removed and correspondence should be based on the characteristics most significant off-line.

• Noise reduction, elimination of defects and image enhancement.

• Improve the superiority of image information.

• The image pre-processing vary depending on the area that the image belongs to this area. It makes the feature extraction process, which depends mainly on matching. The techniques used in this process may differ. Some basic techniques that are used for the signature recognition, including; reading, viewing and resizing the image, it also uses segmentation, binarization, thinning and improvement.

2.2 Feature Extraction

Feature extraction is the second important step in the recognition of signature and verification. The essential function of this step is to generate features that can be used for comparison. Since the question of the signature verification process is a highly sensitive, more of a function action must be generated to improve the accuracy of results. The term function refers herein to a certain characteristic that can be measured using algorithms designed; which can then be recovered by "extracting". For this signature recognition and verification research, four main functions will be extracted.

These features are: Eccentricity, skewness, Orientation.

2.2.1 Eccentricity: - Eccentricity is defined as the central point of an object. If the signature image of the eccentricity is the focal point of the signature. It need to know the focus of two images for comparison and it is importance of this features. After identifying the central point, then it can compare the features around them. If there is a deviation in the focal point of image, which indicates a possible imitation of the signature, but it is not sufficient evidence by itself. The central point is obtained by applying the ratio of the largest to the minor axes of the image.

2.2.2 Skewness:- Skewness is a calculation of symmetry, or more accurately, the lack of symmetry. A distribution, or data set, is symmetric if it has the same left and right of the central point "The Skewness can be defined according to a variable data Y1, Y2, ..., YN, as follows.:

Where Y is the average, N is the number of data points and S is the standard deviation. The measurement of the Skewness determines how the lines are bent each segment signature. The percentage of this position is then calculated and extracted. Moreover, this percentage is compared to the available image in the database. The importance of this feature is that it measures the symmetry that is an important aspect of a signature. Most signatures are complicated with edges, twists, width and height, which twists is a very important aspect for the measurement and comparison.

2.2.3 Orientation

Orientation defines the direction of the signature lines. This feature is important because it lets us know how the signer has reduced signature, which came first letters highlighting the direction angles and peaks. The orientation feature is used to calculate the direction of the optimal dominant peak in each block of a signature. The orientation is acquired by applying the ratio of the angle of the main axis. The orientation of the signature may be found by using the "regionprops" MATLAB function, wherein the angle between the x axis and the major axis of the ellipse with the same times as the second-region.

3. LITERATURE SURVEY

[1] S Luiz Oliveira et al., [2] in 2007 proposed a model independent of the writer that reduces the problem of pattern recognition for 2-class problem. For improving the system performance, Receiver operating characteristic curves are used. The impact of fusion strategies to combine the partial decisions are classified by SVM.

[2] D. Jena, B Majhi *et al*., [4] in 2008 proposed a off-line signature verification system which is based on selecting 60 feature points element. The classification of the feature points uses statistical parameters like mean and variance to identify skilled and unskilled forgeries.

[3] Ning-Ning Liu; Ding Yi-Wang [7] in 2008 proposed verification system online signature exploit local and global information fusion using two stages is presented. In the first stage, the overall information is extracted as a vector of dimension 13 and recognized by the majority of the classifiers, and then the local information is extracted as time functions of various dynamic properties and recognized network BP neural classifier. By combining global and local information and the introduction of an improved algorithm dynamic time warping and a standard feature measure, our method achieved an average ERA of 4.02% on SVC2004 public database (first signature competition audit 2004) Task2 compared to 6.90% in the first place SVC2004.

[4] Ramachandra et al., [1] in 2009 proposed robust verification offline signatures based on global features for skilled and random false. The model extracts features that are preprocessed by normalization, binarization and thinning. The feature extraction technique consists of global characteristics such as maximum horizontal histogram, aspect ratio and maximum vertical histogram, horizontal and vertical center of the signature and the signature area. Ghandali and Moghaddam [3] in 2009 proposed a system based on image registration model, discrete wavelet transform and image blending. Signatures of formation of each person are trademarks of overcoming the problems of shift and scale. The multiple instances of each signature are registered merged to produce ground reference signature. In the phase of classification Euclidean distance is used.

[5] V. Nguyen et al., [5] in 2009 proposed a signature verification using global features, which are derived from the total energy of a writer uses to create the signature. The overall features are vertical and horizontal projection of a signature, the distance between the strikes of an image and the aspect ratio of the signature. Support vector machine is used to classify the extracted features.

[6] Ahmed, K.; El-Henawy, I. M.; Rashad, Mr. Z.; Nomir, O., [6] in 2010 presented a method signature verification innovative online using PCA to reduce the dimensions of time signature. The resulting vectors are subjected to a PCA multilayer perceptron (MLP) neural networks with sigmoidal activation function and EBP.

[7] Pal, S.; Chanda, S.; Pal, U.; Franke, K.; Blumenstein, M. in 2012, proposed a job in the field of biometric authentication, identification of automatic signing and verification has been a strong area of research because of the social and legal acceptance and intensive use of the written as an easy method for authentication signature. Signatures provide a safe means for confirmation and authorization in legal documents. The encoding function is based on the fusion of Gabor filter-based features with features surf (G-surfing).

4. PROPOSED METHODOLOGY

The aim of proposed scheme is to provide the Signature Verification based on Reduced Size fast correlation. It basically correlates the similarities of the signature samples by the help of feature extraction.

1.) Add New Signature

2.) Create Image Database

3.) Recognition/Identification and Verification

I. Open an Image

II. Browse Signature Sample

III. Clipped and Reduced Image

IV. Verify that signature sample Genuine or Fraud

The Proposed Methodology steps:-

- The main Objective is "Signature Verification is based on Reduced Size Fast Correlation".
- Similarity measures from signature sample by the help of Feature extraction.
- Proposed methodology evaluated on the basis of complexity which is quite lesser than previous method and recognition time which is also short.
- Proposed methodology is based on reduced size fast correlation, which enhanced the speed of the verification.

In our Proposed methodology there is no training phase from sample only prepared features database from signatures.

4.1 Proposed Algorithm

The Proposed Methodology steps-:

1. Add signature Sample with Unique ID in Database.
2. Database Loading.
3. Take Signature Sample From the user.
4. Compare signature with all the record in database and prepare similarity table.
5. Verify the signature.
6. The result show the name of the user to verify fraud or not.

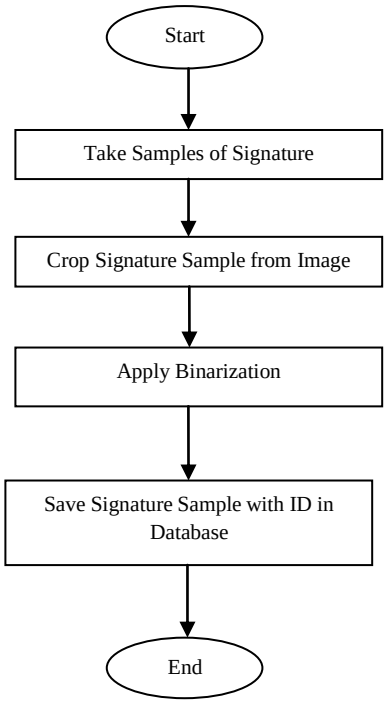


Fig1: Flow Chart of preparing database of Signature

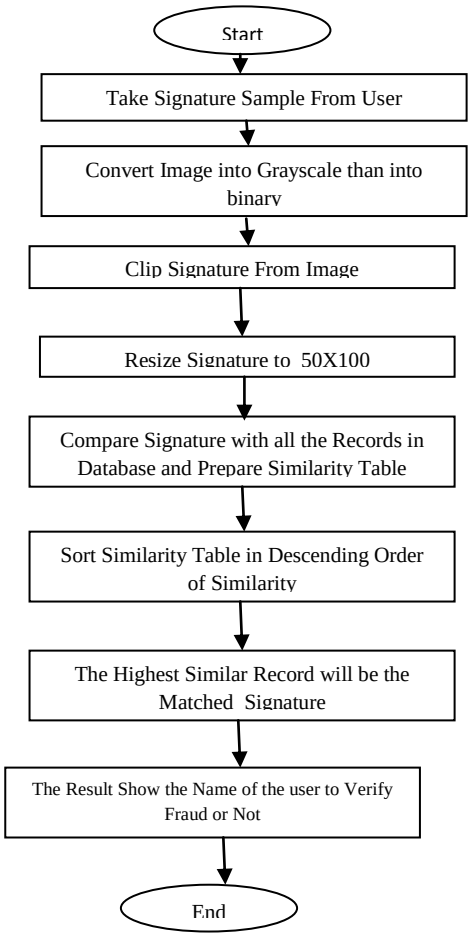


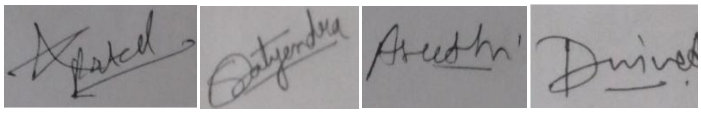
Fig1: Flow Chart of Verification

5. SIMULATION AND RESULTS

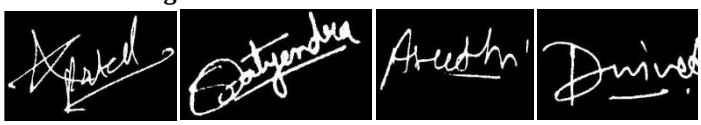
The simulation of the proposed Signature Verification methodology has been implemented on MATLAB simulation tool Release R2011a version 7.12. The simulation results shows the accuracy and experimental analysis of the proposed methodology in terms of accuracy rate, Number of signature and Similarity measurements.

The simulation results of whole Signature verification process is given in the figures shown below. In figure3 , the captured image, Binarized image, Clipped and resize images are shown.

Captured Image



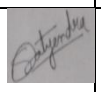
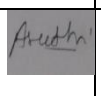
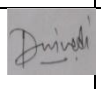
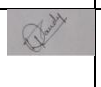
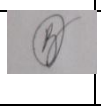
Binarized Image



Clipped and Resize Image

Fig3: Captured, Binarized, Clipped and Resize Images

Table 1. Matched Signature Table

ID Name	Image	Time	Number of Sample	Verification
1.		**1.475501 seconds**	**4**	Matched
2.		**1.395949 seconds**	**4**	Matched
3.		**1.588951 seconds**	**4**	Matched
4.		**1.421172 seconds**	**4**	Matched
5.		**1.388424 seconds**	**4**	Matched
6.		**1.355662 seconds**	**4**	Matched

Simulation has been performed on Computer system with :

1. Window 7
2. Home Basic
3. Intel core i3 processor
4. Ram 4GB
5. Clock Speed 1.80Ghz

Table2. Accuracy Measurements Table

Accuracy Rate				
Some Parameters are calculated		**Accuracy Rate**	**No. of Signatures**	**Recognition and verification Time**
Previous Work	NN	78.8 %	300 Samples	5 to 6 seconds
Our Proposed	SV RSF C	95.5 %	400 Samples	1 to 2 seconds

6. CONCLUSION

The proposed methodology of image retrieval is fast but there is always a provision of improvements in the existing system. There is a need of more efficient verification system. In future Measurement of higher similarity between the signature sample with great accuracy and less time consuming by using correspondence method to fine the great similarities. The performance of Signature Verification is also enhanced by the efficient methods. The great improvement of speed up the verification time and find out the fraud and genuine signature. Mainly signature verification systems are used in banking sector which need to be very secure.

7. FUTURE WORK

In Future there will be a need of more efficient verification engines which fastly complete the verification operation in different situation with large database because by the time, the number of signatures and database will increase drastically as the advancement of the system and technology. So the methodology have used till date need improvement with the hybrid structure of two methods or more.

8. REFERENCES

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9. AUTHOR'S PROFILE

Shradha Chadokar is research scholar and pursuing her Master of Technology Computer Science Engineering from Oriental institute of science and technology Bhopal, India She is very keen to study the Prompt Signature Recognition and Verification.

Jijo S Nair is completed his M. Tech. from MANIT, Bhopal in Computer Science Engineering. Presently he is Asst. Prof. in Department of Computer Science Engineering at Oriental Institute of Science and Technology, Bhopal. He has the core research are in the field of Image Processing.