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Handwritten Signature Verification Using Neural Network

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Abstract - *One of the foremost difficulties in scheming Dynamic Handwritten Signature Verification system is to find the most distinguishing features with high perceptive capabilities for the verification, particularly, with regard to the high variability which is inherent in original handwritten signatures, coupled with the possibility of counterfeits by imitating having close resemblance to the original counterparts. This work presents a systematic approach to DSV using feed forward ANNs. This signature verification system using neural network for verification reduces the complexities in signature verification.*

Key Words: Handwritten Signature Verification, Pre-processing, feature extraction, feed forward Neural Networks, PC tablet.

1. INTRODUCTION

Handwritten Signature verification is the technique used to verify whether human being signature is genuine or forged. Biometrics is the identification of an individual depending on physiological or behavioral characteristics of his or her. Physical characteristic are fingerprints, face, palm or iris whereas characteristic behavior includes signature or voice are used to confirm user's identity. Signature authentication is classified as static and dynamic authentication. Forgeries are of three types skilled, unskilled and random forgeries. Skilled forgeries occur when a forger imitates an actual signature exactly. Random forgeries occur when a signature is signed by an unknown person in place of user signature. Unskilled forgery means the forger just makes attempt to sign not well versed with the work [1].

Verification is of 2 type's static and dynamic signature verification [2]. Static verification is used when a signature is written inert such as bank cheques and the PC comprehends the picture scan then classifies it with the reference signature of the user [8]. The dynamic verification uses a signature which is signed on a data acquisition device such as a PC tablet and is read on online, and classified with the signatures on file of the user to check for verification. The signature was acquired using a digitizer tablet. 3 Features were extracted and stored in the computer. These features were not sufficient to build templates for data base. On the whole features calculated taking into account the signature features taken and then evaluated analogous attribute values for all sample signatures and a typical uniform vector used as an outline of database [5].

In the following sections, we describe the approach taken by us in building the prototype system for dynamic signature verification. In section 2, data collection and pre-processing is discussed followed by feature extraction in section 3. Section 4 explains the methodology and working of the system. The experimental results are given section 5, where it is seen that feature selection plays an important role in the performance of a system. Finally the conclusions are presented in section 6.

2. DATA COLLECTION AND PRE-PROCESSING

Data collection is an important part of the signature verification process. It is necessary that the data obtained must be accurate. This part of the menace may be solved using several digitizing tablets available that can accurately capture the data from the signature. WACOM tablet with a pressure sensitive pen was used for data acquisition (see Fig. 1). Using the pressure sensitive pen, the user does signatures on the tablet pc which acquires the signature.

Fig -1: Wacom tablet.

The tablet captures the position coordinates *x*, *y*, and the velocity. 10 signature samples collected from same person or

from different persons and is followed by preprocessing. The signature samples were divided into two parts (training and testing). 10 signature samples were used for training while 10 signature samples were used for testing purpose.

3. FEATURE EXTRACTION

Feature extraction is generally considered the most significant step for dynamic handwritten signature verification system. This process usually used to identify a set of features that distinctively verify the signature. The accuracy of a signature classification primarily relies on extraction phase. The features acquired must be weighing among true and counterfeit signature.

In this work dynamic features are used that validate the acquired input signature. Parametric based approach is opted for extraction of features and features namely x–y coordinates and velocity are extracted. The extracted features are then trained and stored as a database [3]. Similarly test signatures are obtained followed by preprocessing and feature extraction used for verification purpose.

4. METHODOLOGY

To execute authentication of a signature, numerous ladder must be done. Authentication experiment is carried out with artificial neural net base classifiers. The project exertion has to be proceeding out in many steps. Basically a sequence of handwritten signatures are taken from the signature acquiring device and given to the computer (Refer Figure 2). These acquired signatures are preprocessed and then features like x -y coordinates and velocity are extracted. These features are worn to guide the classification.

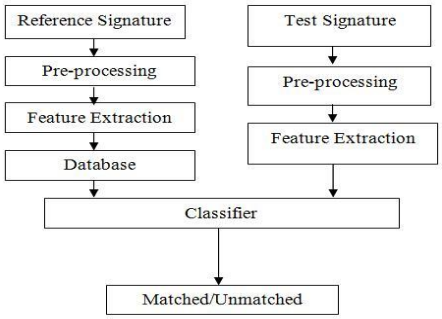

Fig- 2: Block diagram of Dynamic Signature Verification.

The methodology for categorization of handwritten signature is as follows:
1. Acquire Dynamic Handwritten Signatures.
2. Enhance signatures by preprocessing to remove noise.
3. Dig up an assortment of features.
4. The extracted features are trained using Artificial Neural net.
5. Obtain the test signatures then preprocessing and feature extraction is done.
6. Perform the classification using the feed forward neural net with data set.
7. Do the verification.
8. Make judgment as matched or unmatched

a) Reference Signature Acquisition-The DSV system can acquire about 10 reference samples using the Wacom tablet. These samples are preprocessed and then the features x-y coordinates and velocity are extracted.

b) Test Signatures Acquisition-The test signatures are acquired using the tablet and a special pen.10 test samples are acquired**.**

c) DSV system using NNs-For the dynamic handwritten signature verification we use a feed forward neural network. Firstly the neural networks train the acquired reference samples. Then this trained sample is compared. A neural network gives a better efficiency: cache Delayed Inputs, flatten Time, memory Reduction for DSV system. The feed forward MLP NN is designed with 6 layers, with acquired test sample and signature verified as genuine or counterfeit. Algorithm used in the neural networks verification is as follows:

- Data division-It is used to divide the destination into 3 sets namely training validation and testing.
- Training- It uses scaled conjugate gradient method.
- Performance- Mean Squared error is used to measure the feed forward neural network performance.
- Default –It selects the derivative function.

Finally the signature matched or unmatched is displayed (Refer Figure 3 &4).

Fig – 3: Verified output is genuine.

Fig -4: Verified output is counterfeit

5. RESULTS

The outcomes of the DSV system is explained, all the 10 samples are verified and tabularized. The Signature

classification system using the feed forward NNs results are discussed here (Refer Table 1).

Table -1: DSV system Outputs.

[1]	Skilled fake	Unmatched
[2]	Genuine	Matched
[3]	Skilled fake	Unmatched
[4]	Genuine	Matched
[5]	Genuine	Matched
[6]	Random fake	Unmatched
[7]	Unskilled fake	Unmatched
[8]	Random fake	Unmatched
[9]	Unskilled fake	Unmatched
[10]	Genuine	Matched

The 10 reference signature samples acquired are compared with test signatures and verified as Genuine or counterfeits.

6. CONCLUSIONS

The performance of the DSV is examined using feed forward ANNs. Features namely x and y coordinates, velocity were extracted trained and used for verification using feed forward neural networks which is the highlight of this project. Therefore, the computational difficulty in dynamic signature verification could be minimized using the neural networks as a classifier. Thus we can conclude that using neural networks in a verification system as a classifier provides with the option of easy classification and also achieves better performance.

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REFERENCES

[1] Baca Miroslav, Koruga Petra, Fotak Tomislav, Basic on-line handwritten signature features for personal biometric authentication, Opatija, Croatia, May 23-27, 2011.

[2] Ghazaleh Taherzadeh, Roozbeh Karimi, Alireza Ghobad Hossein Modaberan Beh, Evaluation of online signature verification features, ICACT, 2011.

[3] Jaspreet Kour, M.Hanmandlu.A.Q Ansari Online Signature Verification using GASVM, International Conference on Image Information Processing (ICIIP), 2011.

[4] Nan Xu, Li Cheng, Yan Guo, Xiaogang Wu and Jiali Zhao, IEEE, 2011.

[5] Tong Qu, Abdulmotaleb EI Saddik, Andy Adler, A Stroke Based Algorithm for Dynamic Signature Verification Niagara Falls, IEEE, May 2004.

[6] Kaiyue Wang, Yunhong Wang and Zhaoxiang Zhang, On-line Signature Verification using Wavelet Packet, Beihang University, Beijing, 100191,China, IEEE,2011.

[7] Donato Impedovo and Giuseppe Pirlo, Automatic Signature Verification: The state of the Art, IEEE, November 3, 2008.

[8] A.K Jain, F. D. Griess and S. D Connell, "On-line Signature Verification," Pattern Recognition, Vol. 35, No.12, pp. 2963-2972, 2002.