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A Review on Enhanced Offline Signature Recognition Using Neural Network and MDA

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ABSTRACT: Biometric identify the physiological or behavioural characteristics which capability is to reliable for distinct between an authorized person and an imposter. Signature verification systems defined as offline which is static and online which is dynamic. Here this paper presents the neural network and mda with surf feature which is based on recognition of offline signatures system that is skilled with low resolution which scans the signature images. The person signature is important biometric quality of a human being which can be used to authenticate human identity where signatures handled as an image and recognized by using computer vision, neural network and mda with surf feature techniques. Develop fast algorithms for signature recognition with the help of modern computers. Paper having off-line signature recognition & verification using neural network and mda which proposed surf feature where signature is captured and present to user in an image format. Verify the signature which based on parameters that extracted from the signature using various image processing techniques. Off-line signature recognition and verification implementation for this proposed work use the Matlab software.

KEYWORDS: Off-line signature recognition, neural network, MDA, Biometric.

I. INTRODUCTION

The biometrics have a significant advantage over traditional authentication techniques namely passwords, PIN numbers, smart cards etc due to the fact that biometric characteristics of the individual are not easily transferable are unique of every person and cannot be lost, stolen or broken and one of the biometric solutions depends on several factors which include:

- User acceptance
- Level of security required
- Accuracy
- Cost and implementation time

Signature verification method reviewed in this paper and benefits the advantage of being highly accepted by potential customers.

Off-Line or Static Signature Verification Technique

Technique based on static features of the signature which are invariant where in this sense signature verification becomes typical pattern recognition task which knowing that variations in signature pattern are inevitable. Signature authentication task can be narrowed to draw the threshold of the range of genuine variation. Where the offline signature verification techniques images which signatures written on paper are obtained by using a scanner or camera.

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Artificial Neural Networks

This composed of interconnecting artificial neurons and either be used to gain understanding of biological neural networks and also for solving artificial intelligence problems without creating a model of real biological system. The nervous system of real biological is very difficult where artificial neural network algorithms attempt to abstract this complexity and focus on what may hypothetically matter most from an information processing point of view. When performance are good then measured by good predictive ability, low generalization error, performance mimicking animal and human error patterns that use one source of evidence towards supporting the hypothesis that the abstraction which capture something important from the point of view of information processing in the brain. Another incentive for these abstractions is to reduce the amount of computation required to simulate artificial neural networks so as to allow one to experiment with larger networks and train them on larger data sets.

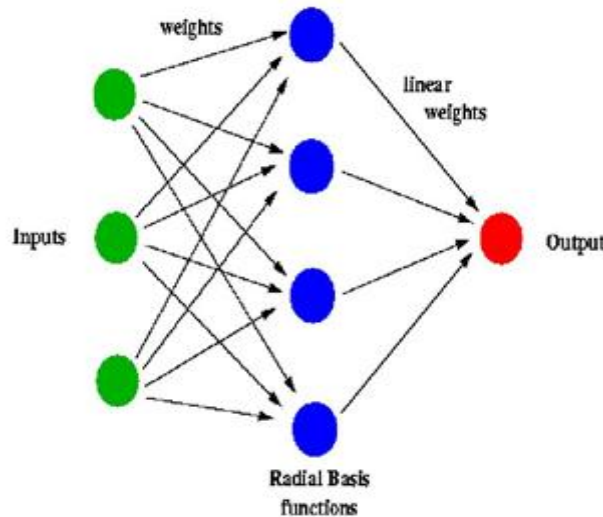


Figure1: Artificial neural network

Here these are ANN mathematical models which mimicking biological neural networks where they consist of a group of connected which representing the neurons of the brain. It represented by a diagram of nodes in various layers with weighted connections between nodes in different layers. Where RBF network is an ANN that uses radial basis functions as activation functions where RBF networks typically have three layers that are input layer, hidden layer with a non-linear RBF activation function and an output layer with linear activation functions and the most popular form is given below:

$$\tilde{y}(x) = \sum_{i=1}^m \underbrace{\omega_i}_{\text{weights}} \underbrace{h_i(x)}_{\text{hidden units}}$$

Where, Φ is the activation function.

Multi-linear Discriminant Analysis(MDA)

MDA has the following characteristics:

- 1) Multiple interrelated subspaces can collaborate to discriminate different classes.
- 2) MDA algorithm avoids dimensionality of the cursor and serves the small sample size problem
- 3) In the learning stage computational cost is reduced.

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$$S_B = \sum_{j=1}^{\prod_{o=k}^{m_o}} S_B^j, S_B^j = \sum_{c=1}^{N_c} n_c (\bar{Y}_c^{k,j} - \bar{Y}^{k,j})(\bar{Y}_c^{k,j} - \bar{Y}^{k,j})^T$$
$$S_W = \sum_{j=1}^{\prod_{o=k}^{m_o}} S_W^j, S_W^j = \sum_{i=1}^N (Y_i^{k,j} - \bar{Y}_{c_i}^{k,j})(Y_i^{k,j} - \bar{Y}_{c_i}^{k,j})^T$$

Where,

$$Y_i = X_i \times_1 U_1 \cdots \times_{k-1} U_{k-1} \times_{k+1} U_{k+1} \cdots \times_n U_n$$

II. RELATED WORK

AshwiniPansare, Shalini Bhatiaproposed Off-line Signature Verification Using Neural Network where introduced a number of biometric techniques that have been proposed for personal identification in the past. Among the vision-based ones are face recognition, fingerprint recognition, iris scanning and retina scanning. Voice recognition or signature verification is the mostly known among the non-vision based ones. The method presented in this paper consists of image preprocessing, geometric feature extraction, neural network training with extracted features and verification. Verification stage includes applying the extracted features of test signature to a trained neural network which will classify it as a genuine or forged.

Nilesh Y. Choudhary, GF'S GCOE, Jalgaonhere proposed the signature recognition & verification system using back propagation neural network. This introduced off-line signature recognition & verification using back propagation neural network is proposed where the signature is captured and presented to the user in an image format. Signatures are verified based on features extracted from the signature using Invariant Central Moment and Modified Zernike moment for its invariant feature extraction because the signatures are Hampered by the large amount of variation in size, translation and rotation and shearing parameter.

Qiong et al. proposed Offline signature recognition based on PCA and Linear Discriminate Analysis LDA. PCA is mainly used for dimensional reduction technique and LDA is performed to optimize the pattern class. For the experiment they used their own database and they achieved better recognition rate from PCA compared to (LDA). In this thesis it discus and compare the result about PCA with RT and PCA without RT technique for Offline signature recognition purposes.

Xiaofeng proposed efficient generic on-line/offline signature without key exposure. In this method they introduced a special double trapdoor hash family based on discrete logarithm assumption to incorporate to construct more generic offline/online signature scheme without key exposure.

Asmashakil presented effect of different features performance on Hidden Markov Modeling based on Online and offline signature verification system. For offline signature verification pixel density, center of gravity, distance and angle are considered.

III. PROPOSED ALGORITHM

Here this provides the operations that are involved in signature feature extraction which is discussed below in detail.

1. Collect sample signatures and preprocess.
2. Add reference signature in to database.
3. Find out the reference signature from these sample signatures.
4. Load the signature from the database of the images.
5. Load the matching purpose image from the database of the images.
6. Find the feature extraction of the both image and by the feature extraction it done the matching processes.
7. After the extraction process make grid feature extraction for finding the feature of the images and recognition of signature using the Neural Network and MDA.
8. Enhance the percentage of genuineness than obtained previously.

Block Diagram of Proposed system:The following diagram depicts the steps of proposed work and the steps used to make an efficient result.

STEP 1: Load input signature.

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STEP2: Pre-processed it and then extract features with surf feature.

STEP3: Check whether the database is present or not. If Not, then create a database and if Yes, then go further step.

STEP4: In this recognition using neural network and multilinear discriminant analysis.

STEP5: Display the results obtained.

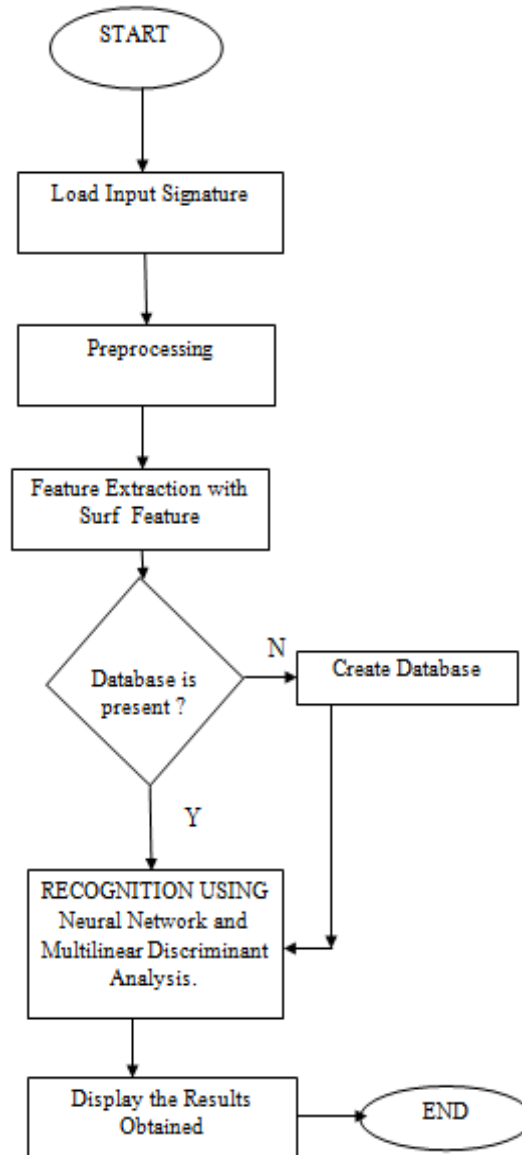


Figure2. Block Diagram of Proposed System

IV. CONCLUSION

Neural networks establish their success in many applications as their ability to solve some problems with ease. The main features which can be associated to ANN and its ability are to learn nonlinear problem offline with selective training which can start sufficiently accurate response.



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