Offline Signature Verification using Artificial Neural Network

Dhvani Patel
Student
Department of Computer Engineering
Atharva College of Engineering, Mumbai,
Maharashtra, India

Nehal Ghosalkar
Student
Department of Computer Engineering
Atharva College of Engineering,
Mumbai, Maharashtra, India

Aruna Pavate
Assistant Professor
Department of Computer Engineering
Atharva College of Engineering,
Mumbai, Maharashtra, India

***Abstract*—Signature verification is generally used for personal verification. But, it has a usual problem of getting exploited for forgery thus an automatic signature recognition and verification system is required. Verification can be accomplished using either Online or Offline based systems. Offline systems work on the scanned image of a signature, whereas Online systems use dynamic information like speed, pressure etc. of a signature during the time when the signature is made. This project presents an offline signature verification technique using artificial neural network on given dataset. Geometric features have been used to extract information from the images and stored in database. In this paper, preprocessed datasets of a scanned signature image are used. The system is trained using a database of signatures obtained from authenticated users. Then artificial neural network (ANN) is used in training and verification of signatures: genuine or forged. Simulation results shows that the technique is robust and clearly differentiates between genuine and forgery signatures.**

Keywords— Offline Signature, Artificial Neural Network, Signature Verification, Forgery Signature.

I. INTRODUCTION

In a world which is advancing towards technology, signature still plays the most vital role in identification of a particular person. As years pass by, cases of forgery is also increasing in a great number. Thus, an automated signature verification system is demand of the time to improve the authentication process and provide secure means for authorization of legal documents. The signature verification systems help to differentiate between the original and fake signatures. There are two types of verification system, dynamic and static systems. Currently, online signature verification is being used, which provides more accurate result than offline system. In online systems, user signs on electronic devices such as touch screen or Tablet PC with the help of an electronic pen, and characteristics such as stroke length, pressure exerted, writing speed are used for verification. In offline signature verification, the signature is done on the paper and is scanned to convert it into digital form. Signature verification is done by comparing the signed signature with the template signature already stored in the database at the time of training data.But the problem associated with online verification system is additional cost to the system and it consumes more time to verify a signature. Offline system overcomes this problem by eliminating the additional cost of equipments. Also, it consumes less time compared to existing systems.

In this paper, we focus on extracting preprocessed data from the database to train and test the network using neural network techniques to classify a signature as genuine or forgery.

The rest of the paper is organized as follows. Section 2 is literature review and section 3 explains the proposed system. In section 4, conclusion of the paper is stated.

II. LITERATURE REVIEW

The area of Handwritten Signature Verification has been largely researched in the last decades and still remains as an open research problem. This report focuses on offline signature verification, characterized by the usage of static images of signatures, where the objective is to distinguish if a given signature is produced by the claimed individual, or a produced by an impostor.This section presents an overview of how the problem has been handled by several researchers in the past few decades and the recent advancements in the field. Gulzar A. Khuwaja and Mohammad S.Laghari [1] suggested Offline Handwritten Signature Recognition usingBiometrics, which refers to identifying an individual based on his or her physiological or behavioral characteristics, has the capability to reliably distinguish between an authorized person and an imposter. This paper presents a neural network based recognition of offline handwritten signatures system that is trained with low-resolution scanned signature images.

Shashi Kumar D R and K B Raja [2] proposed Off-line Signature Verification Based on Fusion of Grid and Global Features Using Neural Networks .In this paper

Off-line Signature Verification Based on Fusion of Grid and Global Features using Neural Network (SVFGNN) is presented. The global and grid features are fused to generate set of features for the verification of signature.

AnkitArora, Aakanksha S. Choubey [3] In the investigations, characteristic features (set of sections, projection, proportion coefficient, centre of gravity) have been tested separately, and the influence of the each feature has been observed.

Prashanth CR [4] proposed a DWT based Off-line Signature Verification using Angula Features. It presents DWT based Off-line Signature Verification using Angular Features (DOSVAF). The signature is resized and Discrete Wavelet Transform (DWT) is applied on the blocks to extract the features.

V Bharadi [5] suggested Off-Line Signature Recognition Systems. In this Handwritten signature is one of the most widely used biometric traits for authentication of person as well as document. The performance metrics of typical systems are compared along with their feature extraction mechanisms. Mohammed A. Abdala [6] proposed Offline Signature Recognition and Verification

Based on Artificial Neural Network. A system is designed based on two neural networks classifier and two powerful features (global and grid features).The designed system consist of three stages which is pre-processing, feature extraction and neural network stage. Nilesh Y. Choudhary, Dr. Umesh. Bhadade [7] presented Signature Recognition & Verification System Using Back Propagation Neural Network. In this, off-line signature recognition & verification using back propagation neural network is proposed which is based on steps of image processing, invariant central moment & some global properties and back propagation neural networks.

Ankit Arora and Aakanksha S. Choubey [8] proposed "Comparative Analysis of Off-line Signature Recognition". In the investigations, characteristic features (set of sections, projection, proportion coefficient, centre of gravity) have been tested separately, and the influence of the each feature has been observed. The test gave information about changes co-efficient FAR (False Accept Rate) and FRR (False Reject Rate).

Suhail M. Odeh[9] presented "Off-line signature verification and recognition: Neural Network Approach", It presents a method for offline signature verification and recognition by using MLP neural network that used four features; eccentricity, skewness, kurtosis, and orientation, which can be extracted by image processing.

MujahedJarad, Nijad Al-Najdawi, and Sara Tedmori [10] suggested Offline handwritten signature verification system using a supervised neural network approach. Signatures can be perceived as a behavioral biometric and this paper evaluate the performance of an Error Back Propagation (EBP) Artificial Neural Network (ANN) for authenticating these. The work done has provided encouraging results and has re-confirmed the ability of Artificial Neural Networks to recognize patterns and in this case their skill to generalize.

Subhash Chandra and Sushila Maheskar [11] presented the application of geometric based feature extraction on offline signature verification. The performance of the proposed method is examined using Back propagation learning technique, with 18 sets of different users having varying number of training and testing samples. Experiments were conducted on CEDAR dataset.

III. PROPOSED SYSTEM

In this paper, we focus on extracting preprocessed data from the database to train and test the network using neural network techniques to classify a signature as genuine or forgery. The recognition and verification of offline signature samples using artificial neural network is relevant as it follows a paradigm which models human learning patterns.

A. Data Acquisition/Signature Database

The signature database is collected from MCYT-75 offline signature corpus database. Each signature is done using a WAMCOM Intuous inking pen. In which 15 genuine and 15 forgery signature samples are given for each of 75 users in database. The forgery signature in the MCYT database is the mixture of random, simple and skilled forgeries.

B. Training Stage

A training stage consist of following two steps

- Retrieval of a signature image from a database.
- Neural network training.

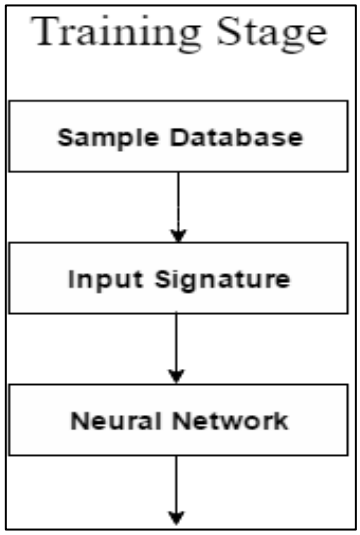

Fig. 1.Training Stage

C. Testing Stage

A testing stage consists of following two steps

- Retrieval of a signature to be tested from a database.
- Checking output generated from a neural network.
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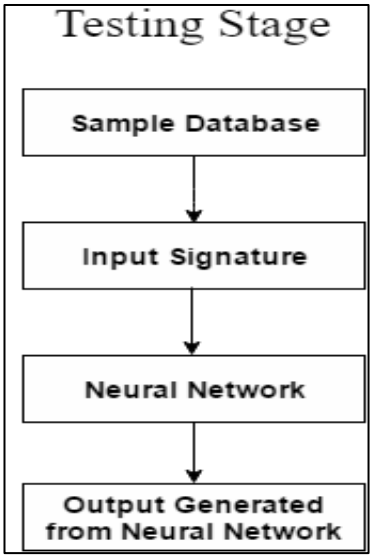

Fig. 2.Testing Stage

D. Verification

The preprocessed data from the database is taken as an input array to the back propagation network. The selected feature vectors are directed as input to the neural network. The trained neural network is used to check whether the signature is genuine or forged. If the signature is match then it shows genuine otherwise forgery.

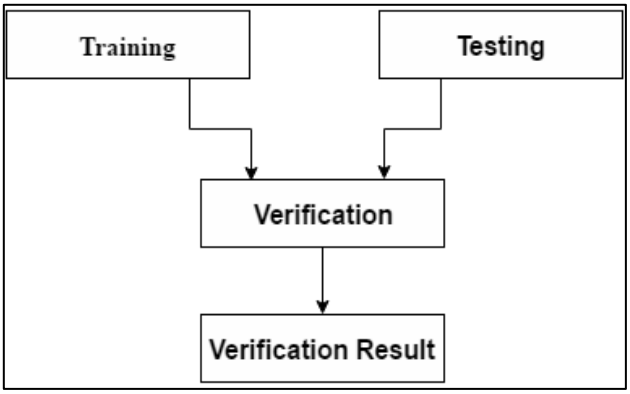

Fig. 3.Verification

IV. CONCLUSION AND FUTURE SCOPE

The performance of the proposed method is examined using Back propagation learning technique, with 18 sets of different users having varying number of training and testing samples. Experiments will be conducted on CEDAR dataset. In terms of future work, this project will be implemented and in a further implementation stage will opt for bettertraining and verification method to improve the accuracy of the offline signature verification system.

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