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INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

AN INSPECTION ON OFFLINE SIGNATURE AUTHENTICATION

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ABSTRACT

In the era of emergent technology, security is that the foremost anxiety to avoid replicas and counterfeits. There are diverse Biometric systems that enable in personal identification, amongst those verification systems, one system is Signature Verification System. Signatures are substantiated discrimination on-line and offline systems. Every human being has their own writing style and hence their signature is used in the financial domain for identity verification. So it is necessary to develop a technique which is efficient in verifying the Handwritten Signature is correct or forge. This paper describes the consequence of offline systems the survey of numerous methods related to offline signature verification systems.

KEYWORDS: Signature, Off-line Signature Recognition and Verification, Global features.

INTRODUCTION

SVRS (Signature recognition and verification system) could be a system capable of with efficiency addressing two individual however powerfully connected tasks: (1) identification of the signature owner and, (2) call whether or not the signature is real or forger. Reckoning on the particular desires of the matter at hand, SRVSs square measure typically categorized in 2 major classes: on-line SRVSs and off-line SRVSs. The distinction of on-line and off-line lies in however knowledge square measure obtained [1]. Within the on-line SRVS knowledge square measure obtained victimization associate electronic pill and alternative devices. within the off-line SRVS pictures of the signatures written on a paper square measure obtained employing a scanner or a camera. The aim of off-line signature verification is to determine, whether or not a signature originates from a given signer supported the scanned image of the signature and some pictures of the first signatures of the signer. The purpose of off-line signature verification is to decide, whether a signature instigates from a given signer based on the perused image of the signature and a few images of the original signatures of the signer.

A signature forgery means an attempt to copy someone else signature and use them against him to steal his identity there can be basically three types of forgeries [2].

- Random Forgeries: the signer just knows the name of the person whose signature is to be signed.

- Simple forgeries: the signer knows the signature shape and has seen the signature examples prior to signing.

- Skilled forgeries: the signer knows the signature shape very well and has practiced the signature prior to signing it.

Signature verification cannot be done by character recognition as a result of the alphabets of signature cannot be browse out severally and it seems as a picture with some curves representing the genre of a personal. So, a signature image is thought-about as a special distribution of pixels representing genre instead of a set of alphabets. Thus, isolated approaches were needed for biometric authentication and character recognition.

LITERATURE REVIEW

There are several implementations for signature recognition and verification.

Mujahed,nijad n sara IEEE2014 "Offline Handwritten Signature Verification System Using a Supervised Neural Network Approach"By uses Artificial neural network based on the back propagation algorithm for recognition and verification. The aim of this work is to limit the computer singularity in deciding whether the signature is forged or not.

Sisodia K., Anand S., 2009,"On-line handwritten signature verification using artificial neural network classier". 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. An efficient Static Signature Verification (SSV) system consists of rigorous preprocessing and feature extraction followed by a classifier.

Neural networks (NNs) have been a fundamental part of computerised pattern recognition tasks for more than half a century, and continue to be used in a very broad range of problem domains. The two main reasons for their widespread usage are: 1) power (the sophisticated techniques used in NNs allow a capability of modeling quite complex functions); and 2) ease of use (as NNs learn by example it is only necessary for a user to gather a highly representative data set and then invoke training algorithms to learn the underlying structure of the data) [11].

McCabe A., Trevathan J., Read W., 2008, "Neural network-based handwritten signature verification", This paper presents a method for verifying handwritten signatures by using a NN architecture. Various static (e.g., height, slant, etc.) and dynamic (e.g., velocity, pen tip   pressure, etc.) signature features are extracted and used to train the NN.

Kiani V., Pourreza R., and Pourreza H.R., 2011, "Offline signature verification using local radon transform and support vector machines". In this paper propose an effective method to perform off-line signature verification based on intelligent techniques. Structural features are extracted from the signature's contour using the Modified Direction Feature (MDF) and its extended version: the Enhanced MDF (EMDF). Two neural network-based techniques and Support Vector Machines (SVMs) were investigated and compared for the process of signature verification. The classifiers were trained using genuine specimens and other randomly selected signatures taken from a publicly available database.

Tingmei Wang, Ge Chen, and Zhansheng Chen 2009 Analysis and Application of Iteration Skeletonization Algorithm in Recognizing Chinese Characters Image. paper studied several image skeleton extraction algorithms and compared extraction effects based on different Chinese characters by making computer programs.

Miss. Komal R. Hole, Prof. Vijay S. Gulhane, Prof. Nitin D . Shellokar April 2013   "Application of Genetic Algorithm for Image Enhancement and Segmentation"   This paper introduces various approaches based on genetic algorithm to get image with good and natural contrast. The image enhancement is the most fundamental image processing tasks. And Image Segmentation is very difficult task. This paper includes the definition of image enhancement and image segmentation and also the need of Image Enhancement and the image can be enhanced using the Genetic Algorithm and the Image Segmentation using Genetic Algorithm.

Sanket rege1, rajendra memane2, mihir phatak3, parag agarwal june 2013 '2d geometric shape and color recognition using digital image processing' The paper discusses an approach involving digital image processing and geometric logic for recognition of two dimensional shapes of objects such as squares, circles, rectangles and triangles as well as the color of the. The methods involved are three dimensional RGB image to two dimensional black and white image conversions, color pixel classification for object-background separation, area based filtering and use of bounding box and its properties for calculating object metrics.

Toscana et al. developed off-line signature recognition system using five multilayer perceptrons, based on features extracted from the off-line signature. 950 signatures of 19 different persons were used to evaluate and test the system. The results showed that the proposed system achieved good recognition rate with simple signatures. McCabe et al., [9] presented a method for verifying handwritten signatures using neural network architecture. The developed system is based on features extracted from the handwritten signature. The extracted features were used to train the neural network. The results showed that the proposed system achieved good results with an overall error rate of 33% for the best case.

Offline Handwritten Signature Verification Using NN
Biometric recognition is expressed as automatic identification of an individual based on physiological and behavioral characteristics. Biometrics traits such as signature, voice, iris, fingerprint, are favored over traditional methods such as passwords and personal identification numbers as biometric characteristics of individual are unique and cannot be stolen. Under biometric methods, automatic signature recognition is a key research area because of the social, legal and wider acceptance of handwritten signature as method of identification. Signature recognition systems can be classified either offline or online. In the former, a signature is signed on a piece of paper and scanned to

a computer system. In the latter, signature is signed on a digitizer and dynamic information like speed, pressure is captured, in addition to image of the signature. Recognition decision is based on local or global features extracted from signature under processing. Excellent recognition results can be achieved by comparing the robust model of the query signature with all the user models using appropriate biometric recognition system.

Artificial neural network (ANN) is mathematical model inspired by the observation of neural network processing in biological neural networks. ANN aims to create a way to process the data rapidly just like the human brain. Artificial Neural Network consists of simple computational elements (called neurons) and connections between them with weights. The Threshold Logic Unit (TLU) is the first artificial neuron model proposed by Warren McCulloch and Walter Pitts in 1943. It mainly depended on the binary system where the inputs and outputs were binary, and used a fixed activation function. The basic components of a neural network consist of inputs with weights on input connections, input function which calculates an input signal entering to the neuron, an activation function that calculates the activation level in order to stimulate neuron production, and finally, an output function that calculates the output signal after threshold reaches specific level [12]. Incorporating artificial neural networks in the field of handwritten recognition is not unusual. Many ANN algorithms have been proposed for this purpose. However, those methods differ in algorithms, training, and other settings.
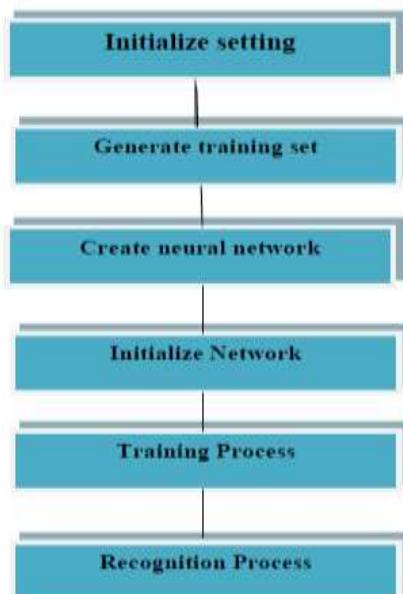

Fig.-1. Existing Signature Recognition Mechanism.

Initialize stage: - In this stage, the neural network is built by determining the network architecture (input units, output units).

Generate Training Set: - Learning algorithms depend on a training set, which is the set used to train particular neural network. In this work, the training set is created by transforming every signature into a two dimensional matrix.

Create Neural Network:-In this stage, the training set generated from previous step is fed into a multilayer network which contains multiple hidden layers.

Initialize process: - This stage specifies the weights which are available on every connection.

Training process: - The network must be trained on how to deal with the input to get the desired output. An activation function is applied to these inputs which results in activation level of neuron (output value of the neuron). Knowledge about the learning task is given in the form of examples called training examples.

Recognition Process: - The signature to be recognized is fed into the system as a matrix. In order to calculate the final values in the output layer, the highest percentage value of the output layer is taken.

Problem Identification
- Accuracy is less, which is measure in terms of
- FRR(False Reject Rate) , FAR (False Acceptance Rate.
- FAR-It can be described as the rate of the deceivers that the system recognized as authentic persons.
- FRR- It can be described as the rate of authorized persons who are not recognized correctly by the system.

Comparison
To produce the output of the system and to liken their approaches with others, the researchers have introduced a technique which divides the signature in two classes [3]: Class I and Class II .Class I represent genuine signature set and Class II represent forgery signature set. For Performance evaluation usually four types of categories are considered: 1)False rejection 2)False Acceptance 3)True rejection 4)True acceptance Thus , in total, there are four error rates: False rejection rate (FRR),False Acceptance Rate (FAR) ,True Rejection Rate (TRR) ,True acceptance Rate (TAR) based on these error rates the results of various approaches have been analyzed and techniques have been specified[1].

CONCLUSION
This paper presents a short-lived survey of numerous offline methods used by the investigators and it

highpoints the essential to mature more vigorous and more productive offline signature verification approach. The main benefit of using offline systems is legal responsibility in the presence of user and independence from carrying identity cards. As we saw in our study about various techniques and ANN provide significant FAR, FRR. From literature we can conclude that if Genetic algorithm will be apply for image segmentation than accuracy will increase.

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