Person Identification Based On Handwriting

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Abstract— This design, implementation, and evaluation of a research work for developing an automatic person identification system using hand written biometric. The developed automatic person identification system mainly used toolboxes provided by MATLAB environment. . In order to train and test the developed automatic person identification system, an in-house hand written database is created, which contains hand signatures of different persons . The collected hand data have gone through pre-processing steps such as producing a digitized version of the signatures using a scanner, converting input images type to a standard binary images type, cropping, normalizing images size, and reshaping in order to produce a ready-to-use hand signatures database for training and testing the automatic person identification system. Global features such as signature height, image area, pure width, and pure height are then selected to be used in the system. For features training and classification, the support vector machine(SVM) is used.

Keywords—SVM,handwritingrecognition,offline,online,static

I. Introduction

Automatic person identification is one of the major concerns in this area of automation. However, this is not a new problem and our society has adopted several different ways to authenticate the identity of a person such as signature and possessing a document. With the advent of electronic communication media (Internet), the interactions are becoming more and more automatic and thus the problem of identity theft has became even more severe.

The traditional modes of person authentication systems such as Possessions and Knowledge are not able to solve this problem. Possessions include physical possessions such as keys, passports, and smart cards. Knowledge is a piece of information that is memorized, such as a password and is supposed to be kept a secret. Knowledge and possession based methods are more focused on "what you know" or "what you possess" rather than "who you are". Due to inability of knowledge and possession based authentication methods to handle the security concerns, biometrics research have gained significant momentum in the last decade as the security concerns are increasing due to increasing automation of every field. Biometrics refers to authentication of a person using a physiological and behavioral trait of the individual that distinguish him from others. Biometric authentication has various advantages over knowledge and possession based identification methods including ease of use and non repudiation.

The paper consist of five sections. section 1 includes the introduction of the handwriting recognition. section 2 includes the various approaches are carried out by different research papers. section 3 includes methodology of the handwriting recognition system. section 4 includes handwriting recognition results. Finally section 5 ends with the conclusion.

II. Related Work

Naoya Wada [1] proposed signature identification using HMM and performed experiments using large signature database obtained from 170 persons in 50 days. The result clarified the relationship among identification rate, training depth, and robustness against changes of signatures with time. Although 90% of identification is obtained with 4 days training.

A.A.M. Abushariah [2] The developed automatic person identification system mainly used toolboxes provided by MATLAB environment.. In order to train and test the developed automatic person identification system, an in-house hand signatures database is created, which contains hand signatures of 100 persons (50 males and 50 females) each of which is repeated 30 times.

Hifzan Ahmed [3] proposed Discrete Radon Transform (DRT) technique for feature extraction of static signature recognition to identify forgeries. Median filter has been introduced for noise cancellation of handwritten signature.

This paper describes static signature verification techniques where signature samples of each person was collected and cropped by automatic cropping system.

In this paper Parashuram Bannigidad [4] proposed a new novel approach for restoration of degraded Kannada handwritten paper inscription (hastaprati) using the combination of special local and global binarization techniques, by eliminating of non-uniformly illuminated background. The performance evaluation is done by calculating the values of MSE and PSNR.

In this paper Susana M [5] a novel Handwritten Character Identification methodology that performs the recognition of the students identification numbers handwritten in classroom maps has been proposed. In classification, three different approaches are used: Support Vector Machine, Convolutional Neural Networks and an hybrid approach that use the CNN extracted features as inputs for a Support Vector Machine. The hybrid approach has the advantage of avoiding the feature extraction step.

III. METHODOLOGY

Handwriting recognition: Handwriting recognition is a process to extract the style invariant. features to eliminate variations added due to different handwriting styles. The major goal of handwriting recognition is to extract the underlying text, automatically. This will enable us to use many automatic systems that are controlled using handwritten query. The handwriting recognition systems look for style invariant features, so that the variations added due to different handwriting styles can be eliminated. Thus, handwriting recognition require eliminations of variations due to different writers.

Handwriting identification: Writer identification is a process to identify the writer of the documents. In writer identification systems, features are extracted that can discriminate between different writers i.e., features based on the style of the writer. In short, writer identification requires enhancement of the variations due to style

Handwriting has received much attention from the time human-beings started writing. The ease and individuality of handwriting made it to expand as a major communication medium. With the advent of easy to use and fast electronic communication and storage mediums, the focus starts shifting from handwriting. However, still handwriting is one of the major modes of expression and data storage, for example, there are specific situations such as classrooms, one to-one discussions, meeting, etc. where handwriting is still the major medium for note taking. At the same time, with the advent of electronic handwriting devices such as PDA, Tablet PC, research interests in the field of automatic

handwriting analysis have gain significant increase in the last two decades. Researchers are always attracted by non-intrusive nature of handwriting data entry methods as compared to keyboards and speech. At the same time, keyboards can not be used for data entry in all languages that can be done easily using handwriting. This makes automatic handwriting recognition even more popular.
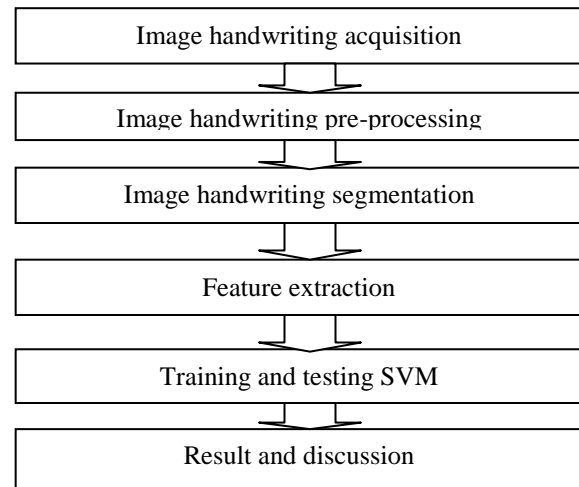
Fig 1: The steps performed by the handwriting recognition

Support vector machine:
The principle aim of the SVM algorithm is to transform a nonlinear dividing objective into a linear transformation using a function called SVM's kernel function. In this study, we used the Gaussian kernel function for transformation. By using a kernel function, the nonlinear samples can be transformed into a high-dimensional future space where the separation of nonlinear samples or data might become possible, making the classification convenient.

SVM Classification using various Kernels SVMs were developed to solve the classification problem, but recently it is extended using predictive analysis to the solve the linear and non-linear regression problems. The kernel is effectively a similarity measure, to choose kernel one need prior knowledge of invariance's. By using Radial Basis Function obtains a default kernel for SVM classification.

The SVM is a machine learning algorithm that solves classification problems as linear function, which runs in a polynomial time by implementing automatic complexity control to over fitting. It also uses a supple representation of the class boundaries and has a single global minimum. With little tuning SVM solves different problems and gives a better performance.

ALGORITHMS

1. Start

2. Scan the textual image.

3. Convert color image into gray image and then binary image.

4. Do pre-processing like noise removal, skew correction etc.
5. Load the DATABASE.
6. Do segmentation by separating lines from textual image.

7. Boundary approach or Thresholding: It is the most commonly used segmentation method.

8. In the thresholding method the gray image is converted to binary image. After thresholding the image has segmented into two values 0 and 1.

9. Edge approach: In edge-based segmentation method , the detected edges in an image are assumed to represent object boundaries and used to identify these objects .

10. The segmented samples are given to the input of support vector machine (SVM) classifier.

11. Support vector machine classifier will recognize the handwriting samples from the trained database.

12. Finally the support vector machine will identified the person based on their handwriting samples.

APPLICATIONS
1. Low security access control systems.
2. Automatic forensic document examination.
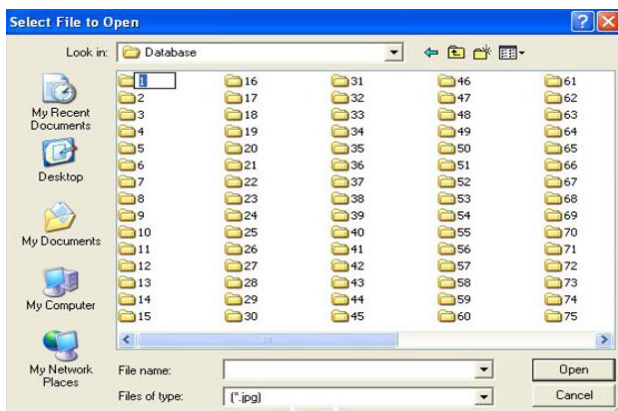3. Banking sectors.

IV. RESULTS AND DISCUSSION
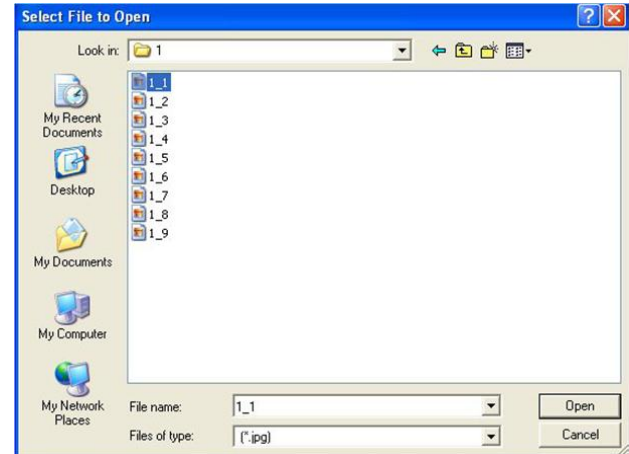

Fig 2: Database for handwriting samples
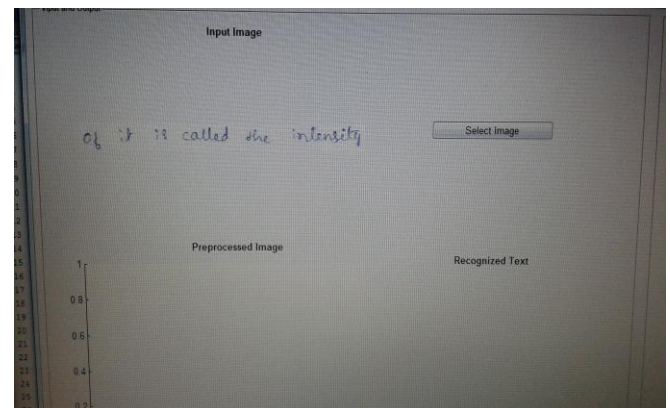

Fig 3: Handwritten instances of 1 user

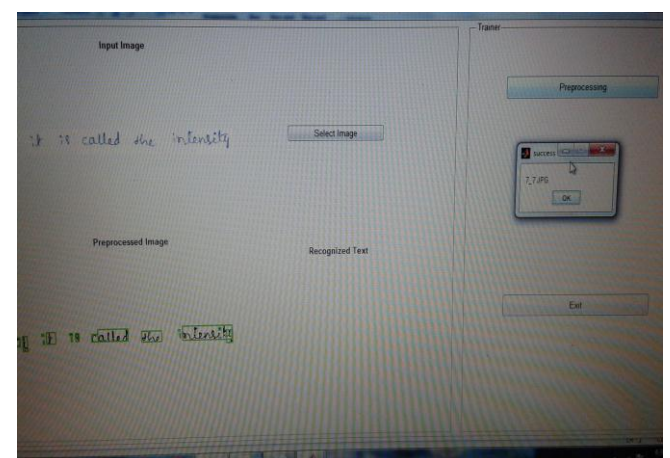**Fig 4: Select the images from the trained database**

Fig 5: Results obtained after execution

Finally the result shows the identification person based on handwriting.

V. CONCLUSION AND FUTURE SCOPE

This project contains support vector machine and artifial neural network two different handwriting recognition approaches. While comparing the various approaches, it is found that support vector machine is more efficient for training as SVM algorithms. While comparing the other techniques affected much with orientation, illumination, size etc of handwriting but has poor discriminative ability.

Support vector machine is more efficient technique to improve the accuracy and robustness of the system for classification as it has superior discriminative ability. So that we can conclude that support vector machine and neural network technique is the best suited for identification of person based on handwriting. In future we can use other high level primitives based on word, line and paragraph.

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