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Signature Processing in Handwritten Bank Cheque Images

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Abstract--Signature is the most important feature of a bank cheque. Basically signature verification is a scheme to verify a cheque for its authentication. The data base consist of several bank's cheque. The present paper focuses on different steps including browsing a bank cheque, pre-processing, feature extraction, recognition. Preprocessing stage includes image resizing, noise elimination, thinning etc. On the other hand feature extraction is done on the basis of gray level co-occurrence matrix . Feature extraction stage includes contrast, homogeneity, energy, entropy, variance, sum average etc. The recognition is done in two phases i.e training phase and testing phase. The classification is done on the basis of template matching.

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I. INTRODUCTION

Signature verification is one of the most important field in research for authentication of a person's identity. A signature by an authorized person is considered to be a seal of approval and remains the most preferred means of authentication. The main difficult task for computer is to recognize human signature. Handwritten signatures are accepted as a means of a person's identification in all govt., legal and commercial transaction [1]. There are two types of verification system i.e. off line or on line. In on line system, the signatures are scanned and fixed to the form and on other hand off line system is a system that has handwritten signatures or we can say that the signatures are written traditionally on paper. The signature is the primary identity of a person on a bank's cheque, without signature the cheque is invalid. . The big issues arising these days are with off line signatures. Off line signatures have two different approaches writer dependent and writer independent. The off line signatures have very low conflict percentage. Signature basically depends upon behavioral aspects of a person. As signatures are composed of special character as they are not readable [3]. The signature verification is done on the basis of identity calm of a person. Firstly identity calm take the signatures from database then apply the method of preprocessing, feature extraction, similarity computation, Score Normalization and lastly provides the output as signature is accepted or rejected by using decision threshold[3].

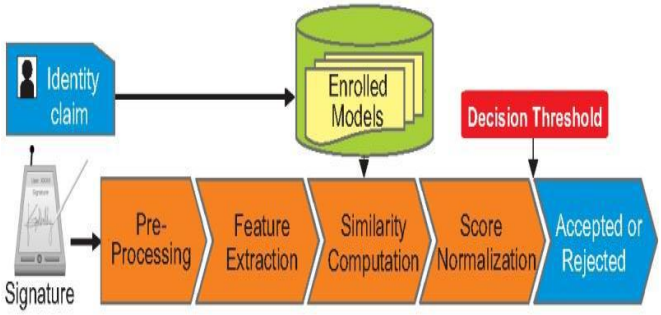

Fig.1: Signature Verification

A. FORGERY

It refers to the duplicacy of signatures and different types of forgery. There are three types of forgery Random Forgery, Skilled Forgery and Simple Forgery.

1. **Random Forgery:** It is the type of signature in which the person doesn't know identity.
2. **Simple Forgery:** It is the type of signature in which a person knows its shape but done without practicing the signature.
3. **Skilled Forgery:** It is the type of forgery which is a kind of genuine signatures.

B Signature verification Process

Signature verification process is done through the steps are given below:

1. Financial documents are scanned and images are stored as JPEG.
2. A primary key is assigned to an image as unique identification.
3. The systems are defined with the signature area scanned document.
4. It is executed the internal processed system determine the two kinds of rate i.e matching rate and token rate.

II. LITERATURE SURVEY

Rua Enrique et al [1] described about the online verification system. In it the system was based on generative models. In generative models different systems like hidden Markov Model and verification universal background model are used. In it, they have done verification on basis of scores as verification scores can be obtained from likelihood ratio and different distance measures. In it, MYCT-100 data base was used for verification. They have also calculated the vertibi path. Several parameters are considered in it i.e. coordinate information, pressure, angle and pressure stage. The most important aspect i.e. fusion of different verification is also investigated in it. They have shown the generality.

Justino E et al [2] described about the off line verification system. In this introduction to new graphometric based features are based on curve defined in it. The basic idea is to simulate the shape of signature by using the curves and features of different curves are defined in it. Two types of

representation are present i.e. genuine sample or input image is presented. The input image is presented in two different ways one is graphometric representation and other is dissimilarity representation. In it they have used the universal classifier when new users can be added without retaining the classifier.

Oliveria S et al [3] described about the off line verification system. In it, they have worked on writer dependent approach. The writer dependent approach is used to reduce the pattern recognition problem to the class problem. They have used the SVM classifiers. The data base of 100 writers is used with ROC classifier or combine classifier i.e. based on independent approach. They also check the acceptable level of rejection or acceptance rate as this will considerably reduce the rejection rate.

Velez J et al [4] described about off line signature approach. They have developed the fuzzy shape memories snake. They have made a fuzzy shape framework. They worked on several parameters i.e. shape, size, adjustment and similarity etc. This model is designed only to know the ability to remember its initial shape during the adjustment to an image. They have worked with two methods i.e. heuristic crisp method and other is based on energy definition. They considered two important facts one is training set and other is testing signature for reducing the number of iterations at the time of execution. They have also used the fuzzy sets to work with it.

Ordonez A et al [5] described about the off line verification system robustness. They have used the several databases i.e. CORPUS, MYCT and GDPS. They have used data bases for cheque invoices. They worked on grey level features. Different texture measures were proposed in it i.e. histogram of local binary pattern or local direction and local derivative patterns etc. Different types of classifiers are evaluated in it such as nearest neighbour , SVM and LderivP patterns etc. Two types of forgeries are defined in it i.e. random forgery and simulated forgery.

Impevado D et al[6], studied about the signature verification and system security. They surveyed about the different kind of features and functions. They have gone through several parameters. Mainly they use global and local features. The global features include position, speed etc. They have number of pen up and downs and on the other hand the local parameters are two types one is component based and other is pixel oriented. They have gone through the verification techniques which can be classified into three categories i.e. Template matching, Statistical and Structural. In template matching we perform the different techniques like Euclidean distance. They have worked on two different categories offline and online.

III. METHODOLOGY

Methodology is the systematic, theoretical analysis of the methods applied to a field of study, or the theoretical analysis of the body of methods and principles associated with a branch of knowledge. Several steps are included in it that is as follows:

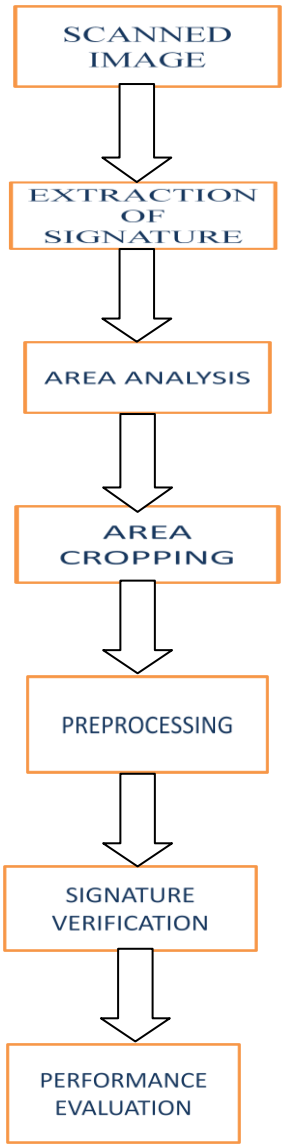

Fig 2: Methodology

A. Scanned image

The first step is to scan the cheque from which signature is extracted and apply some preprocessing techniques to remove the noise. The system uses a prior knowledge about the document to determine the approximate area of intrest.

B. Extraction of signature

This is the important module in the entire system. To perform this procedure the text images should be pre processed. Subsequently the signature segmentation is achieved by phasing out noise and other extraneous features.. This method can be used to locate a box in cheque.

C. Area analysis

The area is created to move horizontally from left to right. The area is analyzed by the approximation or width with certain number of pixels. The density of pixel within the current area is calculated.

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D. Cropping

It is applied on the defined approximation area in the cheque. Its objective is to locate a rectangular box around an object of interest and remove other objects outside this area. If the signature is the object of interest in the cheque this could be easily done. The crop method works in the four directions namely up, right, bottom and left.

E. Preprocessing

Binarization is one of the most important steps in bank cheque processing. The principal objective is to obtain a transformed image with the enhanced quality. Different types of filters are used in preprocessing to remove different of noise present in image.

F. Signature verification

In this signature are examined as to genuine or forged. It's the last and final step in processing of bank cheque automatically.

IV. WORK DONE

In this work is concluded with the snapshots in different steps as follows:

A. Scanned image

Firstly a bank cheque is taken as a hard copy and scanned it by scanner for the further process.

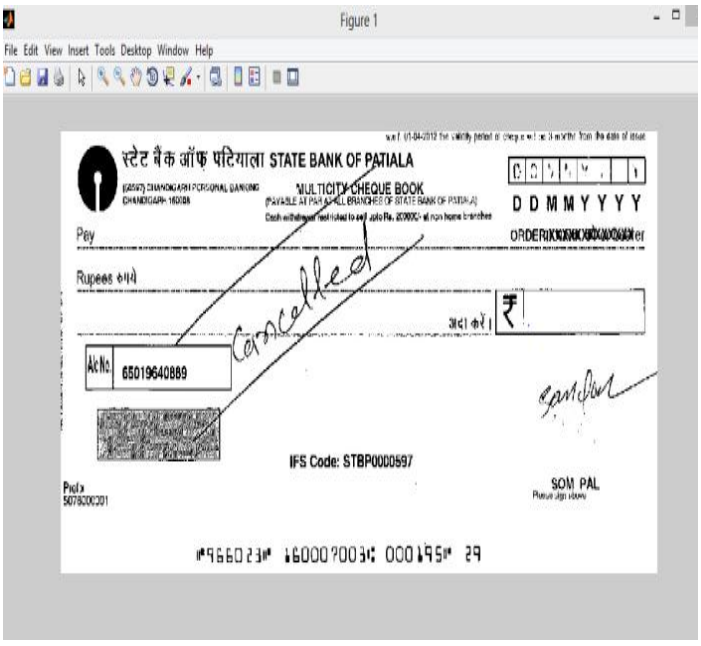

Fig 3:Bank Cheque

B. Extraction of signature

In this step we will perform an action of cropping in the size of 100*300. In it signature part is cropped from cheque. It involves removal of pixels and spaces from an image. It can be done automated or manually.

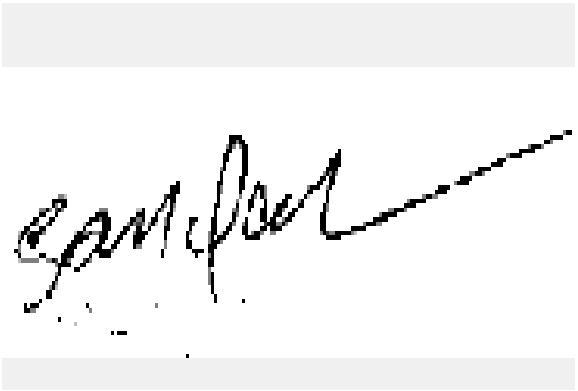

Fig 4:Extraction of Signature

C. Preprocessing

It is the step in which noise is eliminated or blank spaces are removed. The preprocessing includes various steps like noise elimination, image resizing, thinning etc. The snapshot are as follows:-

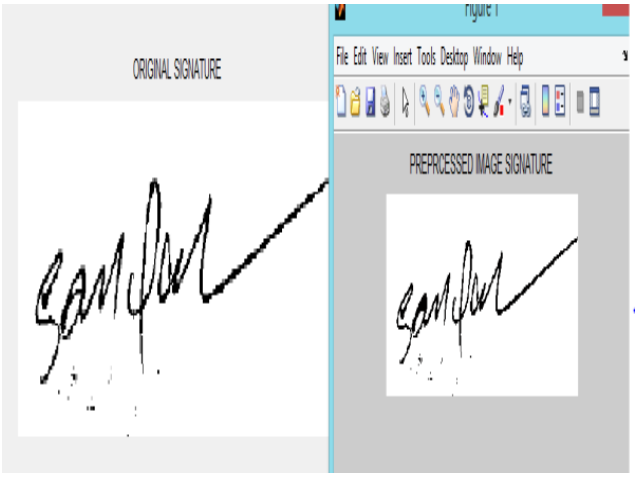

Fig5: Preprocessed image

D. Feature Extraction

Each image has its features which plays an important role in the signature verification. Feature extraction describes different area and shapes. Feature extraction stage in signature verification is the stage which analyses the area by the pixels in it.

Contrast	Homogenity	Energy	Entropy
0.0001	0.0010	0.0004	0.0003
0	0.0001	0	0.0003
0	0	0	0.0008
0.0001	0.0016	0.0005	0.0001
0.0006	0.0009	0.0011	0.0029

Fig6:GLCM features table

E. Recognition

Image recognition is the process of identifying and detecting an object or a feature in a digital image or video. This concept is used in many applications like systems for factory automation, toll booth monitoring, and security surveillance. Intially a dataset of several images is prominent. Recognition is made in two phases - training phase and testing phase .In training phase the gray level co-occurrence matrix is learnt and obtain us the values of different features. In testing phase those images are tested and false acceptance ratio and false rejection ratio is arrived at.

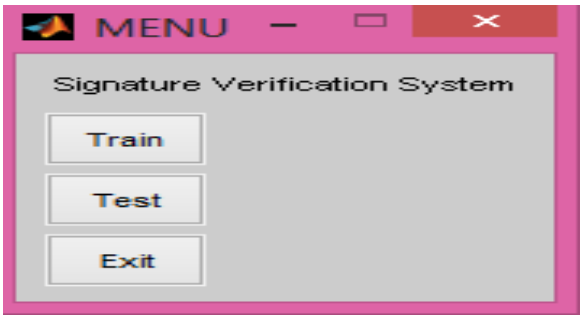

Fig7:Recognition

F. Classification

Classification includes a broad range of decision-theoretic approaches to the identification. All classification algorithms are based on the assumption that the image in question depicts one or more features and that each of these features belongs to one of several distinct and exclusive classes. In this the classification is done on the basis of template matching approach. These are defined in two categories that are given below

Forged signature:

It refers to the duplicacy of signatures. The output figure of forged signatures generated by template matching are shown below:

Fig 8: Forged Signature

Original signature:

It refers to the primitive signature of a person. The output of original signature generated by template matching are shown below:

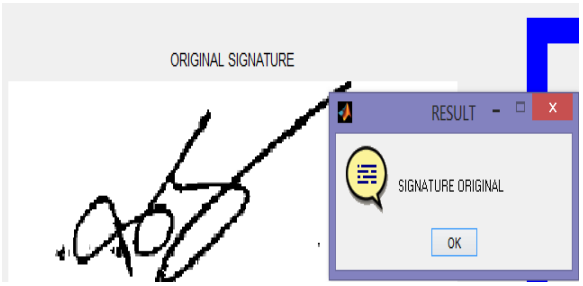

Fig 9: Orignal Signature

V. CONCLUSION

The present paper devised an approach to identify the number of forgeries arriving these days in bank cheques . A number of bank cheques is scanned then preprocessed by using the number of different filters and comparison of their results is done and the best filter is used to eliminate the noise. On other hand , extraction of the number of features based on gray level co-occurrence matrix to recognize the signatures in two phases i.e training phase and testing phase. The classification is done on the basis of template matching approach to know about the number of forgeries present in it.

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