Recognition of Handwritten Script by Using Neural Network

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Abstract - India is a multi script and multilingual country where a varity of different scripts is used in writing documents. It is important to know a script used in writing. Script recognitions have many important applications like automatic transcription of multilingual documents, searching document image, script sorting. Proposed work emphasis on the "block level technique" which is conquered with manual which compromises Training, Calculating Error and Modifying Weights. A problem where script recognition recognizes the encountered with a 20x 20 matrix is time-consuming training compression and script of the given document in a mixture of various script documents. Feature extraction technique is an important step in Script recognition. In this project, we have used combined approach of Discrete Cosine Transform (DCT) and discrete wavelets Transform (DWT) for feature extraction and neural network(feedforward back propagation) classifier for classification and recognition purpose.

Keywords:- Multi-script documents, Handwritten scripts, Discrete cosine Transform, Discrete wavelets transform, neural network

I. INTRODUCTION

Today, many researchers have been done to recognize multi script recognition. But the problem of interchanging data between human beings and computing machines is a challenging one. Even today, many algorithms have been proposed by many researchers so-that these multi script (Hindi, English, Urdu) can be easily recognize. But the efficiency of these algorithms is not Satisfactory.
Mainly, users do Handwritten Multi Script Recognition for interpretation of data, which describes handwritten drawing. Handwritten Multi Script recognition can be differentiated into two categories i.e. Online Handwritten Script recognition and Offline Handwritten Script recognition. On-line handwritten Script recognition deals with automatic conversion of Multi Scripts, which are written on a special digitizer, tablet PC where a sensor picks up the pen-tip movements as well as pen-up/pen-down switching. Off-line handwritten Multi Script recognition deals with dataset. The main objective of handwritten Multi Script recognition (HMSR) is to recognize the Multi Scripts in desirable format from image format so that they can be easily edited.

II. OBJECTIVE

On the basis of character recognition algorithms, one question to be answered is: which algorithm is the best choice for a given application? This question leads the thesis to characterize the available algorithms so that the most efficient methods can be sorted out for different applications. An experimental approach needs to be developed to compare and evaluate the performance of different invariants of shape- based script. An image with 1280×800 pixels will certainly take much longer time to compute than a 32×32 image. The investigations of the reconstruction of the region-based multi-script image are a major motivation for the work. Using neural networks, recognition of handwritten multi script is a good idea. However, in the practicalimage acquisition systems and conditions, shape distortion is common processes in HMSR system because of different people handwriting have different shape of characters. The observed character image is being representing only a degraded version of the originalcharacterimage. Recognition of Multi script that are of various shapes is a goal of recent research. Gurumukhi characters using neural networks having Back propagation algorithms are recognized.

III. DEVELOPMENT

The problem defines in the acquisition process of an HMSR system can be justified by training of neural networks in reconstruction of multi-language characters. First of all, the system by offline handwritten different shapes of different script is taught. On the basis of this image model database, character sets are matched and classify the reconstructed image. The HMSR system is developing as follows-

IV. OFFLINE HANDWRITTEN IMAGE SAMPLES

These are the original image drawn by user by free handwriting that stores in a file databases. This file database makes an image model library in which different types ofbinary images drawn by different users using different styles of handwriting are stored.

V. DESCRIPTION

This work has been carried out to implement multi-input multi layered Neural Network (parallel distributed system) for the purpose of recognition of Multi script, which is trained using back propagation, for the final use of this trained network to recognize the patterns trained for, and classify these under different, distinct output classes which the network was trained to group them under.

This problem is divided into two phases-

1) Reading a windows image format

2) Development of Artificial Neural Network model

Second phase is further divided into two sub-phases:

a) Training phase of neural network
b) Testing phase of neural network.

VI. PROPOSED WORK

As defined in previous, the problem of recognition of script can be solved using neural networks. We are use to DCT and DWT for feature extraction and neural

network by using (feed forward back propagation) for classification. A scheme is proposed to recognize script from image. Recognition of script is done in following steps:-

a) Scan the documents
b) Image segmentation(crop the image)
c) Preprocessing
d) Feature extraction

1) DCT:- A Discrete Cosine Transform (DCT) expresses a sequence of finitely many data points in terms of a sum of cosine functions oscillating at different frequencies. The discrete cosine transforms (DCT) and wavelet transform are purely technical. DCT stand for an image as a Sum of sinusoids of varying magnitudes and Frequencies.

2) DWT:- Wavelets are special functions which, in a form analogous to sines and cosines in Fourier analysis, are used as basal functions for representing signals. For 2-D images, applying DWT corresponds to processing the image by 2-D filters in each dimension.

VII. DATA COLLECTION AND PREPROCESSING:-

At present, in India, standard databases of handwritten Indian scripts are not available. Hence, data for training and testing the classification scheme was collected from different sources. Handwritten documents belonging to English, Hindi and urdu scripts are collected from different persons belonging to different professions. The documents are scanned at 300 dpi and stored as gray scale images. A block of image of size 512 x 512 pixels is then extracted manually from different areas of the document image. It should be noted that the handwritten text block may contain two or more lines with different font sizes (large and small) and variable spaces between lines, words and characters. We do not perform any processing to homogenise these parameters. It is ensured that at least 50% of the text block region contains text. These blocks representing a portion of the handwritten document are then binarized so that text represents value 1 and background represents value 0. In proposed system, noise around the boundary is removed using morphological opening. This operation also removes discontinuity at pixel level. A total of 961 handwritten

image blocks are created, 320 blocks for each of the scraps and every script contend 2 different size small (160) and large (160).
1. Binarize the image using Otsu method to yield text representing binary 1 and background binary 0.
2. Remove small objects around the boundary using morphological opening.
3. Apply thinning operation.

VIII. FEATURE EXTRACTION

After the preprocessing of image the next step is feature extraction. It is most difficult task to perform in handwritten script. In fact, the main problem in HMSR system is the

variation on font styles, document noise, photometric effect, document skew and poor image quality. The large variation in shapes makes it difficult to determine the number of features that are convenient prior to model building.for feature extraction use DCT and DWT technique.

IX. COSINE TRANSFORMS:

The DCT and DWT transforms have been extensively used in many digital signal processing applications.

(a) The Dct Transform:

A discrete cosine transform (DCT) expresses a sequence of finitely many data points in terms of a sum of cosine functions oscillating at different frequencies. The discrete cosine transforms (DCT) and wavelet transform are purely technical. DCT stand for an image as a Sum of sinusoids of varying magnitudes and Frequencies.

(b) The Discrete Wavelet Transform (Dwt) Transform:

Wavelets are special functions which, in a form analogous to sines and cosines in Fourier analysis, are used as basal functions for representing signals. For 2-D images, applying DWT corresponds to processing the image by 2-D filters in each dimension.

X. THE COMBINED DCT-DWT ALGORITHM

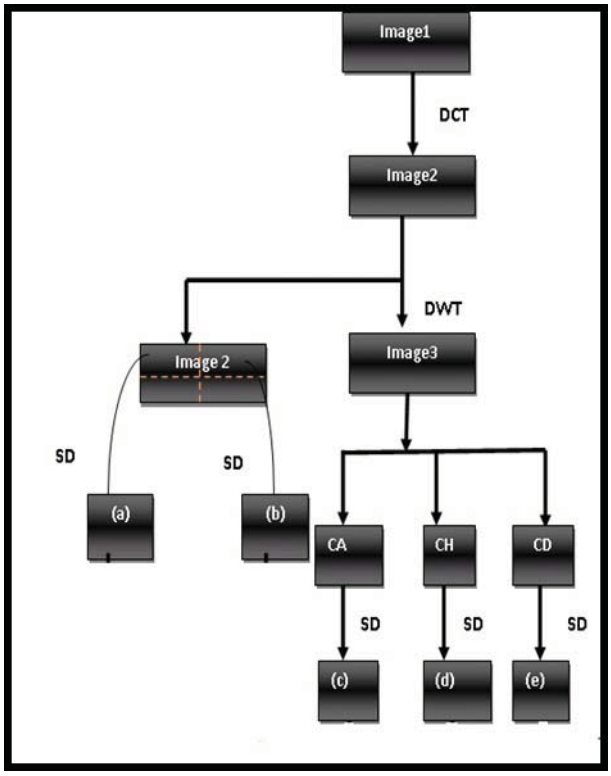

Figure 2.1: The combined DCT and DWT

1. Apply discrete cosine transform (DCT) on the image1.
2. Image2 divide the magnitude (image) of DCT into 4 equal non-overlapping block and extract the local features by computing the Standard Deviation for the first and second block.
3. Perform Wavelet (Daubechies 1) decomposition for the magnitude (image2) of DCT to obtain approximation coefficients (cA), horizontal coefficients (cH), and diagonal coefficients (cD).
4. Extract the local features by computing the Standard Deviation for CA, CH, and CD.

XI. IMAGE DATABASE

The starting point of the project was the creating a database with all these three scripts Hindi, English, Urdu images that would be used for training and testing. The image database can have different formats. Scripts images are handwritten digitized images. For training of neural networks, scripts are written from different handwriting styles and in different fonts. This means that characters on paper have different sizes, different resolutions and sometimes almost completely different angles.Images. These images were converted to grayscale and the background was made uniform.

XII. RESULT

The sets of handwritten scripts are made. The data set was partitioned into two parts. The first one is used for training the system and the second one for testing. For each script, features were computed and stored for training the network. Three network layers, i.e. one input layer, one hidden layer and one output layer are taken.

If number of neurons in the hidden layer is increased, then a problem of allocation of required memory is high, say 0.1, desired results are not occurred. Also, if the value of error tolerance is obtained, so changing the value of error tolerance i.e. say 0.01, high accuracy rate is obtained there have the error is **0%.**

A)In the Back Propagation algo we contain 3 states

1) Performance

2) Training state

3) Regression

The Performance, Training and Regression show the result in graphs respectively.

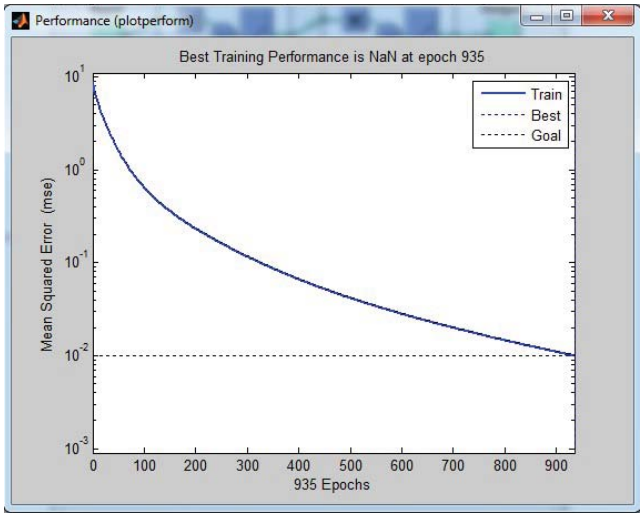

Fig:-performance

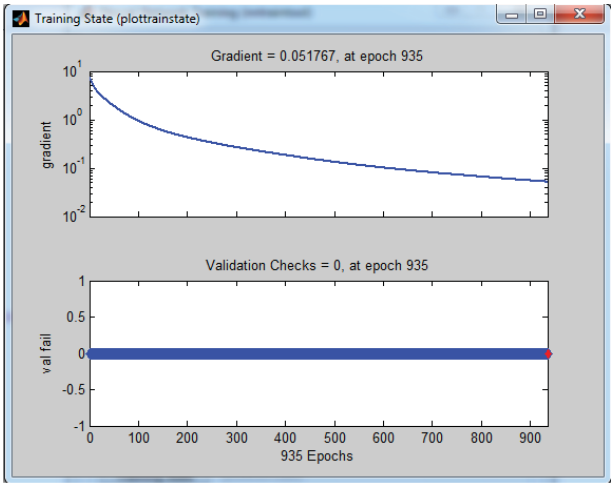

Fig:-training state graph

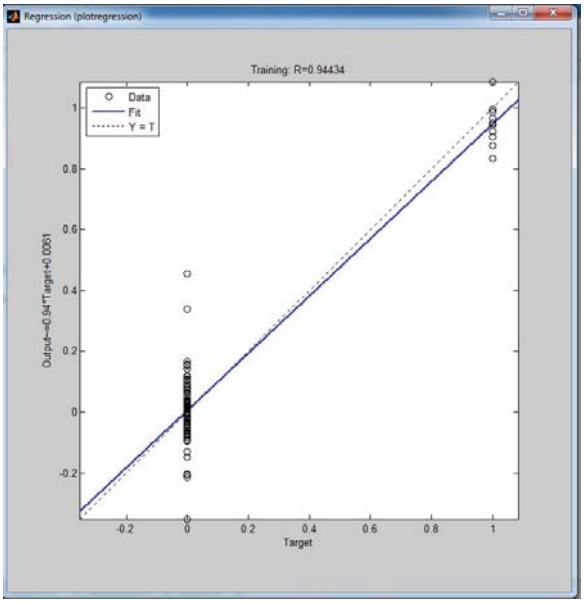

Fig:-regression graph in back propagation algorithm.

2)The Bias learning rule plotted 3 graph which are
a)performance
b)confusion matrix
c)reciver operating characterise

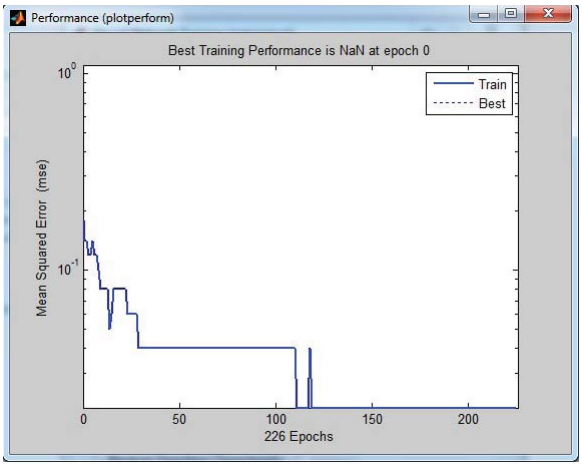

Fig:-performance

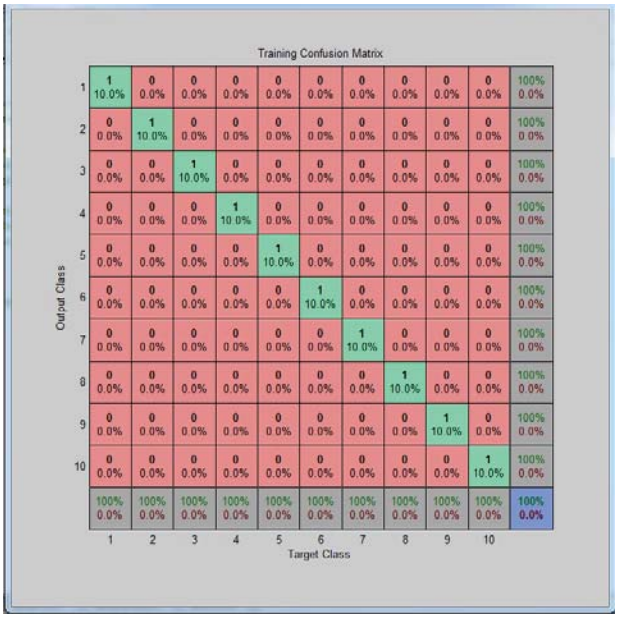

Fig:-confussion matrix

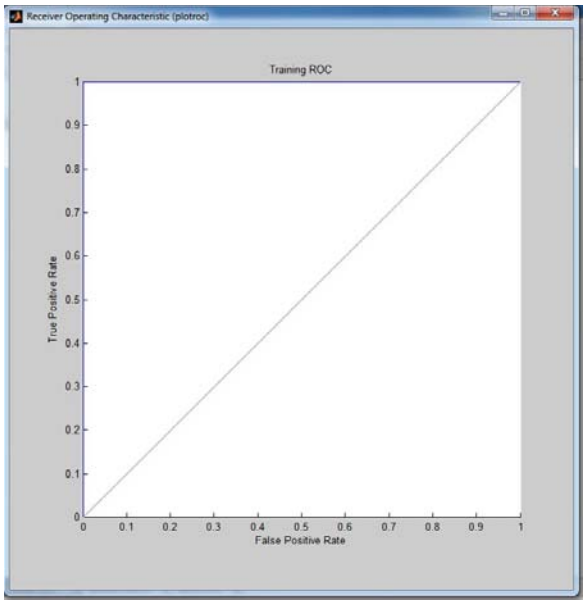

Fig:-reciver operating characterstic matrix

C:-The Back propagation with adaptive learning rate self-organization conation 2 state

1) Performance
2) training state

The graph of performance and training state is:-

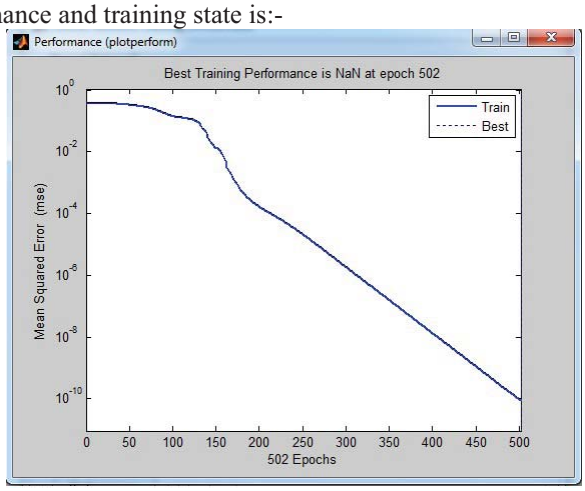

Fig:-performance

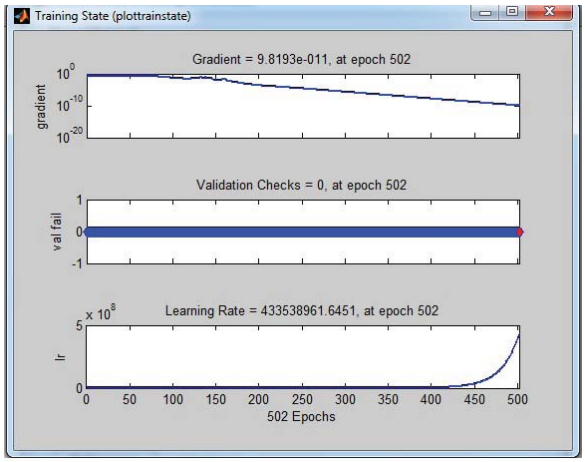

Fig:-training

XIII. CONCLUSION AND FUTURE SCOPE

The discrete cosine transform and discrete wavelettransform (DWT) have been applied successfully in scriptrecognition. In this paper, we have presented a combined DCT, DWT.The discrete cosine transform and disc approach for tri-script identification at block level for then neural network. The proposed method is robust and independent of style of hand writing. Overall, it canbe successfully used for identifying the scripts. The proposed method can be extended to other scripts.

XIV. ACKNOWLEDGEMENT

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