

A REVIEW

HANDWRITTEN ENGLISH ALPHABET RECOGNITION

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Abstract— Character recognition is one of the utmost attention holding and extremely intriguing areas of pattern recognition and artificial intelligence. Offline handwritten English character recognition is delicate due to variation in shape, pitch and size of individual characters. Similar variations in handwriting can be handled by better pre-processing and point birth ways. Handwritten character recognition is more delicate process as compared to compartmented or published characters. Neural networks are used in character recognition from last numerous times. The proposed system has been enforced using MATLAB successfully. In this paper, we present a handwritten character recognition system in which first of all original image is converted into greyscale image. After that pre-processing way are applied on that greyscale image. Also individual characters resolve from word using segmentation. Features are uprooted for those characters and multilayer perceptron classifier is used for bracket. At last handwritten character is honored and converted into machine printable form, which will be easier to store and use in future. The result shows that the reverse propagation network provides good recognition delicacy of further than 70 of handwritten English characters.

Keywords: character recognition, pre-processing, feature extraction, neural network, multilayer perceptron.

1. INTRODUCTION

Our life is under the impact of mortal computer interface. The world around us pays further attention to Character Recognition. Every person's handwriting is different. So, feting. Handwritten characters are a veritably complicated task. To save calligraphies and literal documents it's necessary

to convert them into machine editable form. The character recognition process consists of relating, detecting, and feting characters from input images and converting them into original machine editable forms. In Moment's world trend to digitize handwritten documents has surfaced to save the same and apply revision in the future. Character recognition is getting further attention and fashion ability due to its wide range of operations. For a character recognition system, one can use the neural network, top element analysis, support vector machine, retired Markov model (12). The figures of operations are License Plate Recognition System which can be used in parking areas and for largely security demesne, Handwriting Recognition System, Relating Machine Number, and Lattice Number, Text Recognition, Form Processing, Bank Check Processing. Every language has a different shape and wind of different characters and integers (13). Character Recognition can be classified according to two important aspects. One is grounded on the type of textbook that has been used Machine published and Handwritten. Another is grounded on the manner in which the data has been acquired Online and Offline (2). In Handwritten Character Recognition the input is taken as the handwritten character. Operations of HCR are recycling handwritten operation forms, digitizing ancient papers, postal address processing, bank checks processing, hand verification, automatic leg law reading. In Optical Character Recognition the published or compartmented character is taken as input. The OCR is a fashion used to restate printable characters to ASCII characters so that computers can fete it. (11). OCR operations are form data entry, automatic textbook entry, machine reading, automatic form processing, automatic bank. check concurrence, postal correspondence sorting, automatic plate number recognition. As handwriting varies from person to person normal OCR which

fete published textbook is fail to identify handwritten textbooks. Hence the necessity of developing HCR arises. HCR is an advanced OCR program specially designed for handwriting feting.

2. LITERATURE REVIEW

Colorful approaches have been applied in order to negotiate character recognition. In literature [1], S.A. Yadav et al proposed an offline English character recognition model grounded on an artificial neural network, the database of 2600 samples are collected from 100 pens for each character, the flowchart of the system is explained and training is performed using Feed Forward Neural Network Algorithm. In literature [2], G. Katiyar et al presented Offline handwritten character recognition of English rudiments using a three concentrated feed-forward neural network, CEDAR CDROM-1 database is used and evaluation of feed-forward neural network is described by combining four different point birth approaches (box approach, slant distance approach, mean and grade operations). In [3], M.S. Ali et al used Back-Propagation Learning Neural Network Algorithm (BPN) as the ANN and GA, the delicacy of BPN is more compared to GA because BPN works with the same size of images and for faster literacy. In literature [4], R.S. Hussien et al proposed an approach to fete Arabic handwritten characters using an out-line OCR system, Hopfield neural network is also proposed for same. In [5], V.J. Dongre et al present an approach for Devanagari numeric and character recognition, it uses structural and geometric features for point birth, illustration of the recognition process is given in detail, 5137 numeric images and 20305 character images are taken.

In literature [6], U.R. Babu et al paper presents off-line handwritten number recognition grounded on structural features, KNN as classified used for the bracket, it also uses four different types of structural features videlicet, number of holes, water budgets in four directions, maximum profile distances in four directions, and fill-hole viscosity for the recognition of integers. In literature [7], D. Khanduja et al propose a mongrel approach combining the structural features

of the character and a fine model of wind fitting to pretend the stylish features of a character, Neural Network classifier is used for the bracket. In [8], M.K. Mahto et al collected a Gurmukhi character dataset of 3500 images from 10 pens, proposed a combined vertical and perpendicular protuberance point birth scheme for recognition of Gurmukhi characters. In literature [9], S.R. Patel et al proposed a check paper that gives a deep bracket of different types of character recognition systems and it also shows the frame of the handwritten character recognition system. In literature [10], S.B. Main et al proposed an exploration paper on introductory of Artificial Neural Network which compactly explains neural networks.

The figures of exploration papers that are related to handwritten character recognition for different character sets are reviewed in order to identify approaches to resolve handwritten character recognition problems. Also, different handwriting analyses which are explained in colorful papers have also been studied to get ideas about the handwritten characters & their operations in a forensic lab.[11]

Minhua Li et al. [Minhua Li; Chunheng Wang; Ruwei Dai- 2008] have explained about unconstrained handwritten character recognition which is based on WEDF and MLP neural network. Hailong Liu and Xiaoqing Ding [Hailong Liu; Xiaoqing Ding- 2005] have designed the handwritten character recognition system that uses gradient feature as well as quadratic classifier with multiple discrimination schemes.[12]

Ngo Quoc Tao and Pham Van Hung [Ngo Quoc Tao; Pham Van Hung -2006] have analysed online Continuous Vietnamese Handwritten Character Recognition Based on Microsoft Handwritten Character Recognition Library [13].

The authors Yusuf Perwej & Ashish Chaturvedi [14], explained a system using neural networks to develop a system that will recognize handwritten alphabets, where each of the 26 alphabets is represented by using binary values that are used as input to feature extraction system, whose output is then fed to neural network.

The authors Salma Shofia Rosyda1 and Tito Waluyo Purboyo [15], in their paper titled, "A Review of Various Handwriting

Recognition Methods” presented image recognition methods like Convolution Neural Network, Semi-Incremental Recognition Method, Incremental Recognition Method, Zoning Method, etc. They have also given the comparison between those methods.[16]

Anita Pal and Dayashankar Singh [17], developed handwritten character recognition system for English language with high recognition accuracy and less training time. They applied Boundary Detection Feature Extraction Technique and Multi-Layer Perceptron Neural network for classification and recognition.

The authors Amandeep Kaur, Seema Baghla, Sunil Kumar [18], worked on various techniques for character segmentation of cursive words. Generally, segmentation includes, line segmentation, word segmentation and character segmentation. Character segmentation involves techniques such as explicit segmentation, implicit segmentation and Holistic approach.

Handwritten character recognition Library. K. Gaurav, Bhatia P. K. [19] Et al, deals with the number of pre-processing techniques used in character recognition with different kind of Images including simple handwriting forms based documents as well as complex and colored background documents with varying intensities. Various pre-processing techniques such as skew detection and correction, enhancement techniques for images like binarization, contrast stretching, noise reduction, segmenting images, normalization, different morphological operations like dilation, erosion, filling, etc. are explained. Also, it is concluded that, image processing is not just a single operation [20] but it is a series of operations performed on input images. Although all the mentioned techniques are applied, it is impossible to achieve full accuracy in preprocessing. MLP (Multi-Layer Perceptron) has been used for handwritten English alphabet recognition. For features extraction, boundary tracing and Fourier descriptors are used. Characters are recognized firstly by analyzing their shapes and then comparing their features to classify them.[21] To determine the number of hidden neurons in hidden layer an analysis has been carried out for achieving better performance of back-Propagation network. Recognition accuracy of 94%

along with less training time has been reported for handwritten English character recognition [22].

3. CONCLUSION

This review is proposed to many regional languages throughout world have different writing styles which can be recognized with this system using proper algorithm and strategies. We have learning for recognition of English language characters. It has been found that recognition of English language character becomes difficult due to presence of odd characters or similarity in shapes for multiple characters. Scanned image is pre-processed to get a cleaned image and the characters are isolated into individual characters.

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