

Offline Handwritten Character Recognition by using Grid approach

Prasad. P. Chaudhari ¹, K.R. Sarode ²

¹ Faculty in Computer Engg.Govt. Polytechnic., India,

² Assistant professor Govt. Engineering , Dept. of Computer Engg., India,

ABSTRACT

One of the most challenging topics is the recognition of handwritten characters. In this paper is concerned with recognition of an offline handwritten character using grid approach. In this technique we extract feature from pattern. Extracted features are train by neural network as classifier of the character in classification stage. The recognition system of experimental results shows that this technique is effective and reliable. The overall procedure results in recognition rate are 96.9%.

Keywords: Handwritten character recognition, multiple feature, neural network, classification.

1. INTRODUCTION

The recognition of optical characters is known to be one of the earliest applications of Artificial Neural Networks, which partially emulate human thinking in the domain of artificial intelligence. The numeral character recognition is most challenging and tantalizing field, because the big research and development effort that has gone into it, has not solved all commercially urgent and intellectually interesting problems. Handwritten numeral character recognition not only it is very challenging problem, but also because it provides a solution for processing large volume of data automatically and large variety of scientific applications. Digital document processing is gaining popularity for application to office and library automation, bank and postal services, publishing houses and communication technology.

The complexity of the problem is greatly increased by noise in data and infinite variability of handwriting as a result of mood of writer and nature of writing. To recognize the handwritten characters is very difficult task. Character recognition has been the subject of intensive research for more than three decades [2]. Many different methods have been explored by large number of scientists to recognized characters. Many statistical and syntactic approaches have been developed for handwritten character recognition by researchers [3,4]. In character recognition a review by V. K. Govindan and Shivprasad explained two main to approaches pattern recognition. They are statistical / decision / theoretic / syntactic / linguistic / grammatical and structural approaches. Each has certain merits and demerits [11]. In syntactic approaches for handwritten character recognition still have problems [7]. The division of two approaches is sometime not clear cut particularly in terms of practical applications.

Artificial neural network has been successfully applied to handwritten digit recognition numerous times, with vary small error margins [5, 9]. This paper proposes a new technique for the recognition of hand-printed characters using neural network. The proposed technique is more efficient for recognition of characters, numerals and also the execution time is very less for recognition the character.

This paper describes the neural network method applied in the classification stage. The paper is organized as follows: In section 2, the basic preprocessing and digitization. procedure of the image In section 3, contains feature extraction are described. Section 4,describes classification technique using neural network. In section 5, we show results of character recognition and draw conclusion in section 6.

The block diagram handwritten character recognition is shown in figure 1

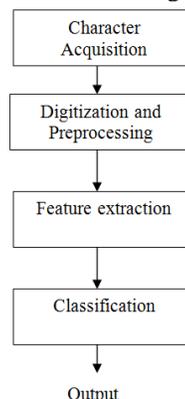


Figure. 1. Block diagram of handwritten character recognition

2. CHARACTER ACQUISITION

The first step in process is to acquire handwritten characters. We used scanner to do this job. Other sensors can be camera, video camera, paintbrush etc. The handwritten samples were specifically collected from different peoples for this study. Each participant was asked to enter a random sequence of character. All character used in this study are disconnected. The first step in this process is to acquire handwritten characters.

3. PREPROCESSING

The goal of preprocessing is to increase the quality of recognition, that means more precisely that character is transformed to such that they are more similar to the class they belongs. In this stage no any recognition process is performing. There is important interaction between preprocessing of character images and feature extraction process. In preprocessing the preliminary step is digitization.

3.1 Digitization

In digitization object is converted into binary form by binarization method. Object is separated from background (1-represent as a region, 0 represent as a no region). This binarized image is put though preprocessing routines that smooth the image and eliminate noise, artificial holes and other artifacts produced by the digitizing process.

4.. FEATURE EXTRACTION

Features extraction plays a vital role in character recognition. The output of preprocessing is given to the feature extraction stage. In this certain features are extracted from numeral character so that we can classify the numeral character.

4.1 Pattern matching .

In this process frame enclosing the normalized image divided in to 7x5 rectangular zones. In each rectangular zone generate pattern of normalized image.

In this, paper we proposed pattern matching based scheme. Pattern of normalized image have 35 zones The unknown character A is segmented into 35 blocks..These features vectors are used in classification stage. The Fig 2 show the character A in 7x5 grid.

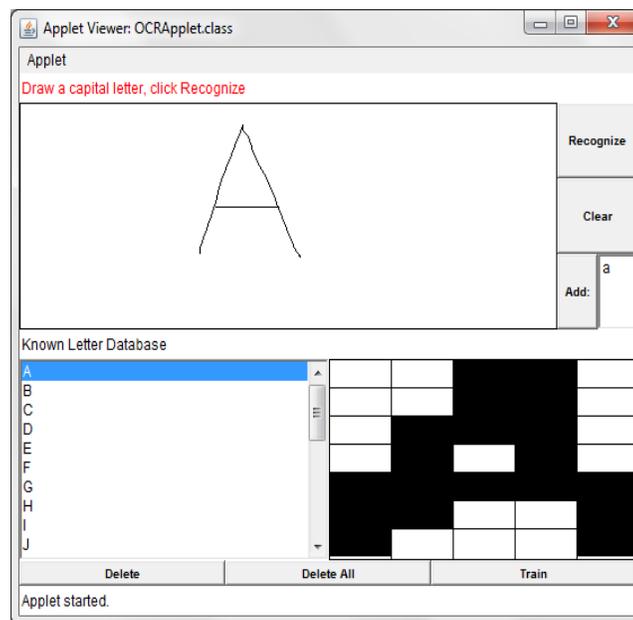


Fig 2. Character A in 7 x 5 grid

5. CLASSIFICATION

Classification is the important stage for numeral character recognition. The extracted features special points are used to identify numeral. Having extracted the features, it is required to store them in some form. Each pattern should uniquely identify a character and each character may represent by several distinct pattern.

A multilayer feed forward network is used for classification stage. Multiple layer networks has layers of processing element and each element makes independent computations on data that it receives and passes the result to another layer. The next layer will in turn make independent computation and pass on results to yet another layer. The neural network

trained with to identify each character. After this, if the pattern of unknown character were presented neural network, it would be able to classify the character based on the identical pattern to which it has been trained. Multilayer feed forward network can be successfully applied to a variety of classification and recognition problems. The architecture was trained with inputs and output neurons. The best result is obtained by multilayer feed forward network.

6. RESULT

The techniques adopted in this paper for recognizing hand-printed characters using Neural Networks combines with grid approach. This approach is efficient for handwritten character recognition. As indicated by the experiments performed, the algorithm results in a 96.9% recognition rate.

The various types of large variability of handwritten character, test samples are taken.. Performance of result is satisfactory .

7.CONCLUSION

In this paper ,box approach is used for recognition of handwritten numeral characters. Multiple features extracted from image. These features were analyzed using neural network. The best recognition rate achieved by our proposed system was 96.9%.

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