

A NOVEL METHOD FOR HANDWRITTEN DIGIT RECOGNITION SYSTEM

Team ID: PNT2022TMID21878

Team Leader: Balasubramanian Kalyan

Team Members:

1. Balaji G
2. Ela Barath
3. Gokul Aravind V

Faculty Mentor: K.Sangeetha

Introduction:

Handwriting identification is one of the fascinating scientific projects now underway because everyone in the world has their own writing style. It is the computer's capacity to recognise and understand handwritten figures or characters automatically. Because of advances in science and technology, everything is being digitalized to reduce human effort. As a result, handwritten digit recognition becomes necessary in many real-time applications. The MNIST data collection, which contains 70000 handwritten digits, is commonly utilised for this recognition process. To train these photos and develop a deep learning model, we use artificial neural networks. A web application is constructed in which the user can upload an image of a handwritten digit. The model analyses this image and the detected result is returned on to UI

Literature Survey:

1. Digit Recognition Using Various Machine Learning Algorithms and Models

Handwritten digit recognition is one of the important problems in computer vision these days. There is a great interest in this field because of many potential applications, most importantly where large number of documents must be dealt such as post mail sorting, bank cheque analysis, handwritten form processing etc. So, a system should be designed in such a way that it is capable of reading handwritten digits and provide appropriate results. This paper presents a survey on various neural network approaches to recognize handwritten digits

Advantages: Each hidden layer is made up of a set of neurons, where each neuron is fully connected to all neurons in the previous layer.

Disadvantage: The system not only produces a classification of the digit but also a rich description of the instantiation parameters which can yield information such as the writing style

2. Diagonal based feature extraction for handwritten character recognition system using neural network

An off-line handwritten alphabetical character recognition system using multilayer feed forward neural network is described in the paper. A new method, called, diagonal based feature extraction is introduced for extracting the features of the handwritten alphabets. Fifty data sets, each containing 26 alphabets written by various people, are used for training the neural network and twenty different handwritten alphabets characters are used for testing. The proposed recognition system performs quite well yielding higher levels of recognition accuracy compared to the systems employing the conventional horizontal and vertical methods of feature extraction. This system will be suitable for converting handwritten documents into structural text form and recognizing handwritten names.

Advantages: The main aim of feature extraction phase is to extract that pattern which is most pertinent for classification

Disadvantage: Most importantly, it is not possible to speak to a machine in a natural way due to constraints such as out of vocabulary words.

3. Improving Offline Handwritten Text Recognition with Hybrid HMM/ANN Models

The structural part of the optical models has been modeled with Markov chains, and a Multilayer Perceptron is used to estimate the emission probabilities. This paper also presents new techniques to remove slope and slant from handwritten text and to normalize the size of text images with supervised learning methods. Slope correction and size normalization are achieved by classifying local extrema of text contours with Multilayer Perceptrons. Slant is also removed in a nonuniform way by using Artificial Neural Networks. Experiments have been conducted on offline handwritten text lines from the

IAM database, and the recognition rates achieved, in comparison to the ones reported in the literature, are among the best for the same task.

Advantages: The main aim of feature extraction phase is to extract that pattern which is most pertinent for classification.

Disadvantage: As it is noisy to hear someone sitting next to us and talking to his machine. Moreover, anyone who wants to input confidential data to computer is not willing to do it in public places.

4. Recognition of handwritten similar Chinese characters by self-growing probabilistic decision-based neural networks

The self-growing probabilistic decision-based neural network (SPDNN) is a probabilistic type neural networks, which adopts a hierarchical network structure with nonlinear basis functions and a competitive credit-assignment scheme. Based on the SPDNN model, we constructed a three stage recognition system. The prototype system demonstrates a successful utilisation of SPDNN to similar handwritten Chinese recognition on the public database CCL/HCCRI (5401 characters /spl times/200 samples). Regarding the performance, the experiments on the CCL/HCCRI database demonstrated a 90.12% of recognition accuracy with no rejection and 94.11% of accuracy with 6.7% rejection rates, respectively.

Advantages: The difficult task is there are some handwritten digits that often run together or not fully connected. Numeral 5 is an example. But once these tasks have been carried out, the digits are available as individual items. But the digits are still indifferent sizes.

Disadvantages: Background noise, cross-talk, accented speech and so on

References

[1] Sakshic;, Dr.Kusum gupta ,*"Handwritten digit recognition using various neural network approaches"*, *International Journal of Advanced Research in Computer and Communication Engineering*

[2] J. Pradeep; E. Srinivasan; S. Himavathi, *"Diagonal based feature extraction for handwritten character recognition system using neural network"*

[3] S. España-Boquera; M.J. Castro-Bleda; J. Gorbe-Moya; F. Zamora-Martinez, *"Improving Offline Handwritten Text Recognition with Hybrid HMM/ANN Models"*

[4] Hsin-Chia Fu; Y.Y. Xu, *"Recognition of handwritten similar Chinese characters by self-growing probabilistic decision-based neural networks"*