A Novel Method for Handwritten Digit Recognition System

Domain: Artificial Intelligence

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Paper 1:

Handwritten Digit Recognition using Machine Learning: A Review

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The task for handwritten digit recognition has been troublesome due to various variations in writing styles. Therefore, we have tried to create a base for future research in the area so that the researchers can overcome the existing problems. The existing methods and techniques for handwritten digit recognition were reviewed and understood to analyze the most suitable and best method for digit recognition. A number of 60,000 images were used as training sets of images with pixel size of 28×28. The images/training sets were matched with original image. It was found out after complete analysis and review that classifier ensemble system has the least error rate of just 0.32%. In this paper, reviews of different methods of handwritten digit recognition were observed and analyzed.

Paper 2:

Simplified Neural Network Design for Hand Written Digit Recognition

Muhammad Zubair Asghar, Hussain Ahmad, Shakeel Ahmad, Sheikh Muhammad Saqib, Bashir Ahmad, Muhammad Junaid Asghar

Neural Network is an abstraction of the central nervous system and works as a parallel processing system. Optimization, image processing, Diagnosis and many other applications are made very simple through neural networks, which are difficult and time consuming when conventional

methods are used for their implementation. Neural Network is the simplified version of the human brain. Like the human brain, neural networks also exhibit efficient performance on perceptive tasks like recognition of visual images of objects and handwritten characters etc: Recognition of handwritten digits is one of the oldest applications of ANN. The recognition of digits written in different handwritings and also from scanned text has remained a trouble thus it has received much attention from researchers in the field of artificial neural networks. In this research work a very simple and flexible neural network scheme is proposed and implemented for handwritten digit recognition, which will assist beginners and AI students who want to understand the perceptive capability of neural networks. In the proposed system, a very simple design of artificial neural networks is implemented.

Paper 3:

Character Recognition using Artificial Neural Network

Pranjali Pohankar, Namrata Taralkar, Snehalata Karmare, Smita Kulkarni

A neural network is a machine designed to model the way in which the brain performs a particular task. Character recognition techniques help in recognizing the characters written on paper documents and converting it in digital form. Handwritten character recognition is a very difficult problem due to great variation of writing style, different size and shape of the character. Neural network is a technique used to improve the accuracy and efficiency of the handwritten character recognition system. The error back propagation algorithm is used to train the MLP networks. The main advantage of the back propagation neural network (BPN) method is that it can fairly approximate a large class of functions. The aim of the paper is to use the improved neural network technique to recognize the offline handwritten characters.

Paper 4:

Handwritten Digit Recognition Based on Convolutional Neural Network

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In order to meet the needs of paperless offices and greatly improve work efficiency, it is necessary to research and implement a handwritten digit recognition system. Handwritten digit recognition plays an important role in large-scale data statistics and the financial business, such as industry annual inspection, population census, tax statements and checks, etc. This paper proposes a new type of handwritten digit recognition system based on convolutional neural networks (CNN). In order to improve the recognition performance, the network was trained with a large number of standardized pictures to automatically learn the spatial characteristics of handwritten digits. For model training, according to the loss function, the convolutional neural network continuously updates the network parameters with the data set in MNIST, which contains 60,000 examples. For model tests, the system uses the camera to capture the pictures composed of the images generated by the test data set of MNIST and the samples written by different people, then continuously processes the captured graphics and refreshes the output every 0.5 seconds. With the trained deep learning model, we got a recognition accuracy of 97.3% in the test process. Good performance in this experiment shows that our system can automatically recognize the handwritten digital content appearing in the target area and output the content label in real time.

Paper 5:

Offline handwritten digit recognition using neural network

Sumedha B Hallale, Geeta D Salunke

Optical character recognition is a typical field of application of automatic classification methods. In this paper, we have introduced a whole new idea of recognition of isolated handwritten digits which is known to be a difficult task and still lacks a satisfactory technical solution. The present paper proposes a novel approach for recognition of handwritten digits ie neural network classification. Back propagation neural network is one of the simplest methods for training multilayer neural networks. In this paper, we designed a back propagation neural network and trained it with a set of handwritten digits. The average success rates of recognition of all digits are 91.2%.

Paper 6:

Handwritten Digit Recognition of MNIST dataset using Deep Learning state-of-the-art Artificial Neural Network (ANN) and Convolutional Neural Network (CNN)

Drishti Beohar, Akhtar Rasool

Handwritten digit recognition is an intricate assignment that is vital for developing applications, in computer vision digit recognition is one of the major applications. There has been a copious exploration done in the Handwritten Character Recognition utilizing different deep learning models. Deep learning is rapidly increasing in demand due to its resemblance to the human brain. The two major Deep learning algorithms Artificial Neural Network and Convolutional Neural Network which have been compared in this paper considering their feature extraction and classification stages of recognition. The models were trained using categorical cross-entropy loss and ADAM optimizer on the MNIST dataset. Backpropagation along with Gradient Descent is being used to train the networks along with reLU activations in the network which do automatic

feature extraction. In neural networks, Convolution Neural Network (ConvNets or Convolutional neural networks) is one of the primary classifiers to do image recognition, image classification tasks in Computer Vision.D