A NOVEL METHOD FOR HANDWRITTEN DIGIT RECOGNITION

LITERATURE SURVEY

PAPER 1: Handwritten digits recognition with Artificial Neural Network

AUTHORS: Islam, Kh Tohidul, et al.

YEAR: 2017

This paper implements an artificial neural network (ANN) which is trained it to recognize handwritten digits from 0 to 9. ANN was employed as a classifier to construct a classification model. It is designed to train the database and evaluate the test performance of the network. The system with a hybrid classifier containing CNN and SVM and achieved 94.40% of classification accuracy while with ANN classification accuracy is 99.60%. There exists a numerous variation in peoples' writing style. In a handwriting recognition system, 100% accuracy cannot be expected in practical applications. One of typical vagueness in handwritten digits classification is the digits interclass and intraclass similarity.

PAPER 2: Handwritten Digit Recognition System based on Convolutional Neural Network

AUTHORS: Jinze Li, Gongbo Sun, Leiye Yi, Yu Sun, Fusen Liang, Qian Cao

YEAR: 2020

This paper proposes an identification system in this paper can be divided into two modules, a data source module and a digital identification module. The data source module includes the provision of original handwritten digits and the feature extraction of handwritten digit pictures. Digit recognition module includes convolutional neural network (CNN) and recognition. It uses the MNIST data set as a training sample. After the training is completed, the handwritten digits in the picture can be recognized through the Softmax regression model. The training and recognition process of this system is completed by LeNet-5 based convolutional neural network repeated convolution operation and pooling operation. The recognition results given by the existing recognition technology often still need manual review, and the accuracy needs to be improved. The design in this article also has the problem of too long recognition time.

PAPER 3: Handwritten Digit Recognition System

AUTHORS: Shubham Mendapara, Krish Pabani, Yash Paneliya

YEAR: 2021

This paper proposes a methodology named Optical character recognition (OCR) which is a part of image processing that leads to excerpting text from images. Recognizing handwritten digits is part of OCR. It then uses CNN to extract the feature maps from the 2D

image. This CNN predicts the mapping of image pixels with near space satisfactorily than having a fully connected layer of neurons. It is preferred to use CNN because it gives high accuracy in image classification, video analysis etc. CNN resembles the behaviour of human brain neurons and hence it is the best algorithm to go with. This paper proposes an effective method yet the lack of input data to be spatially invariant and the need for lots of training the data is the drawback.

PAPER 4: Comparison Study of Handwritten Digit Recognition using Artificial Neural Network and Convolutional Neural Network: A Review

AUTHORS: Sonia Flora, Anju Kakkad

YEAR: 2019

This paper compares the classification accuracy of handwritten digit using artificial neural network and using state of the art deep learning model i.e. convolutional neural network. In the past, the recognition system used classifiers that required the image's features be manually extracted. Although SVM produces pretty excellent recognition results, manually extracting an image's characteristics requires a significant amount of mathematics. However, recognition rates with artificial neural networks and deep neural networks are highly desirable and almost no difficult mathematics are included. On the CPU, CNN's average error is lower than ANN's. However, CNN took longer to train than ANN. But CNN does image categorization more effectively. It can be concluded that when the model is trained with CNN, the recognition accuracy grows accordingly, however if trained on GPU, one can get the best CNN classification results in a timely manner.

PAPER 5: Handwritten Digit Recognition using Machine and Deep Learning Algorithms

AUTHORS: Ritik Dixit, Rishika Kushwah, samay Pashine

YEAR: 2020

This paper deals with providing a comparison of different algorithms based on their accuracy so that the most accurate algorithm with the least chances of errors can be employed. For solving any real-life problem accuracy is the most important factor because the accuracy of any model is paramount and make better decisions. Support vector machines, Multi-layered Perceptron, and Convolutional Neural Networks are compared based on the characteristic charts of each algorithm on common factors such as dataset, the number of epochs, complexity, accuracy, runtime under ideal conditions and the specifications of the device used to execute the program. it has found that SVM has the highest accuracy on training data while on testing dataset CNN accomplishes the utmost accuracy. SVM took the minimum time for execution while CNN accounts for the maximum running time SVM gave an efficient training accuracy with a testing accuracy of above 90 percent. Therefore, this paper concludes that SVM is more effective.

PAPER 6: Handwritten digit recognition using various machine learning algorithms and models

AUTHORS: Patil, Pranit

YEAR: 2020

This paper compares various papers and testing various algorithms gave results – “Lesser the complexity more will be efficiency and accuracy for any digital data sets.” It concludes that by using Convolutional neural network accuracy increase to the 99.89% accuracy most among all. Similarly, Double Q learning algorithm also given high accuracy but in MATLAB dataset only. SVM also given accuracy of 99.36%. CNN produces the most as it used layered architecture which improves the computer vision and follows a hierarchical model which works on making a network and giving fully connected layers so that the neurons get connected to each other.