

A NOVEL METHOD FOR HANDWRITTEN DIGIT RECOGNITION SYSTEM

INTRODUCTION

Handwriting recognition is one of the compelling research works going on because every individual in this world has their own style of writing. It is the capability of the computer to identify and understand handwritten digits or characters automatically. Because of the progress in the field of science and technology, everything is being digitized to reduce human effort. Hence, there comes a need for handwritten digit recognition in many real-time applications. The MNIST data set is widely used for this recognition process and it has 70000 handwritten digits. We use Artificial neural networks to train these images and build a deep learning model. Web application is created where the user can upload an image of a handwritten digit. This image is analyzed by the model and the detected result is returned to the UI.

OBJECTIVES

- To utilize the concepts and techniques of the Artificial Neural Network and Convolutional Neural Networks and provide a web application and a novel method for recognizing handwritten digits.
- To solve more complex problems and make humans' jobs easier by implementing handwritten digit recognition system.
- This type of system can be widely used in the world to recognize zip code or postal code for mail sorting and in the Banking Sector too where more handwritten numbers are involved like account number, figure of cash and checks.
- To make it easy for the Postal department and courier services while finding the digits written.
- To help old people who have eye sight issues with handwritten digits.

LITERATURE SURVEY

[1].This project dives into the fundamentals of machine learning victimization associate degree approachable and well-known artificial language, Python. And here we'll be reviewing 2 main components: 1st, we'll be learning regarding the aim of Machine Learning and wherever it applies to the important world. Second, we'll get a general summary of Machine learning topics like supervised learning, model analysis, and Machine Learning algorithms.

[2] Handwritten number recognition is a challenging problem. It is the ability of a computer to receive and interpret intelligible handwriting input from sources such as documents, photographs, touch-screens and other devices. Researchers have been researching in this area in recent years. The main objective of our system is to recognize isolated handwritten digits. Different users have their own handwriting styles. Here the main challenge is to let computer systems understand these different handwriting styles and recognize them. The proposed system deals with such a problem. The system starts by acquiring an image containing handwritten digits, this image is digitized by using techniques like KNN. Numerous recognition techniques are available currently. The idea is to take a large number of handwritten digits, known as training examples and then develop a system which can learn from those training examples. Furthermore, by increasing the number of training examples, the system can learn more on handwritten patterns and improve its accuracy.

[3] In the pattern recognition field, growing interest has been shown in recent years for multiple classifier systems and particularly for bagging, boosting and random sub-spaces. Those methods aim at inducing an ensemble of classifiers by producing diversity at different levels. Following this principle, Breiman introduced in 2001 another family of methods called random forest. Our work aims at studying those methods in a strictly pragmatic approach, in order to provide rules on parameter settings for practitioners. For that purpose we have experimented with the forest-RI algorithm, considered as the random forest reference method, on the MNIST handwritten digits database. In this paper, we describe random forest principles and review some methods proposed in the literature. We present our experimental protocol and results. We finally draw some conclusions on random forest global behavior according to their parameter tuning.

[4] T. Som have discussed fuzzy membership function based approach for HCR. Character images are normalized to 20 X 10 pixels. Average image (fused image) is formed from 10 images of each character. Bounding box around character is determined by using vertical and horizontal projection of character. After cropping image to bounding box, it is resized to 10 X 10 pixels size. After that, thinning is performed and thinned image is placed in one by one row of 100 X 100 canvas. Similarity score of the test image is matched with fusion image and characters are classified.

[5] Renata F. P. Neves has proposed SVM based offline handwritten digit recognition. Authors claim that SVM outperforms the Multilayer perceptron classifier. Experiment is carried out on NIST SD19 standard dataset. Advantage of MLP is that it is able to segment non-linearly separable classes. However, MLP can easily fall into a region of local minimum, where the training will stop assuming it has achieved an optimal point in the error surface. Another hindrance is defining the best network architecture to solve the problem, considering the number

of layers and the number of perceptrons in each hidden layer. Because of these disadvantages, a digit recognizer using the MLP structure may not produce the desired low error rate.

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