A NOVEL METHOD FOR HANDWRITTEN DIGIT RECOGNITION SYSTEM

ABSTRACT:

Humans with the help of their brains can recognize the things that they see. Computers make use of neural networks, to recognize what they see through the User Interface (UI). Handwritten Digit Recognition System involves the analysis and interpretation of handwritten digits from an image by a system. Handwritten digit Recognition has a wide area of study and research due to its enormous applications like automatic bank cheque processing, billing and automatic postal service. The heart of the problem lies within the ability to develop an efficient algorithm that can recognize handwritten digits and which is submitted by users by the way of a scanner, tablet, and other digital devices. Handwriting processing has advanced due to a mix of factors such as improved recognition rates and the usage of complicated systems.

IMPROVED HANDWRITTEN DIGIT RECOGNITION USING CONVOLUTIONAL NEURAL NETWORKS(CNN)

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Customized features and a vast quantity of past knowledge have been used in traditional handwriting recognition systems. It is difficult to train an optical character recognition (OCR) system based on these conditions. Deep learning approaches have enabled significant performance in the field of handwriting recognition research in recent years. Nonetheless, the increasing increase in the amount of handwritten data, along with the availability of vast computing capacity, necessitates improvements in recognition accuracy and warrants additional exploration. Convolutional neural networks (CNNs) are extremely excellent in perceiving the structure of handwritten characters/words in ways that aid in the automatic extraction of distinguishing features. The proposed work

aims to investigate several design alternatives for CNN-based handwritten digit recognition, such as the number of layers, stride size, receptive field, kernel size, padding, and dilution. We intend to assess the effectiveness of several SGD optimization techniques in enhancing the performance of handwritten digit recognition. Using ensemble architecture improves the recognition accuracy of a network. In this case, we want to obtain equal accuracy by employing a pure CNN design without ensemble architecture, because ensemble structures increase computational overhead and testing complexity. As a result, a CNN design is developed in order to obtain higher accuracy than ensemble systems while reducing operational complexity and expense. Furthermore, we demonstrate an appropriate combination of learning parameters in the design of a CNN that leads us to a new absolute record in categorising MNIST handwritten digits. We conducted extensive trials and achieved 99.87% recognition accuracy for an MNIST dataset.

NOVEL DEEP NEURAL NETWORK MODEL FOR HANDWRITTEN DIGIT CLASSIFICATION AND RECOGNITION

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An artificial neural network has one hidden layer between the input and output layers, whereas a deep neural network has numerous hidden layers with input and output layers. Deep neural networks use several hidden layers to increase model performance compared to the accuracy of machine learning models. We've used the proposed deep neural network technique to classify and identify data from the ARDIS and USPS datasets. The suggested model consists of six layers with Softmax and Relu activation functions. After model implementation, accuracy for ARDIS samples reached 98.70% testing and 99.76% training, which is greater than the accuracy from prior research. Additionally, using the USPS samples dataset, 98.22% training accuracy and 93.01% testing accuracy was attained. When compared to earlier methodologies, the data show that deep neural networks perform incredibly well.

HANDWRITTEN CHARACTER RECOGNITION USING NEURAL NETWORKS AND TENSORFLOW

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The offline handwritten character recognition in this study will be carried out using Tensorflow and a convolutional neural network. a process known as using SoftMax Regression, one may assign probabilities to one of the many characters in the handwritten text that offers the range of values from 0 to 1, summed to 1. The objective is to create a model that is extremely accurate and that has a minimum level of complexity. It was determined that strategies for feature extraction like diagonal and direction are significantly better at producing high accuracy. The feed-forward model in neural networks is the back-propagation algorithm that was primarily used to classify the characters, recognise them, and receive training continually. In addition to these, normalizing along with feature extraction, the results were better and more effective. Character recognition is the outcome of accuracy. The paper will describe the best approach to get more than 90% accuracy in the field of Handwritten Character Recognition (HCR).

PROBLEM DEFINITION:

Handwriting recognition is one of the compelling research works going on because every individual in this world has their own style of writing. In many places, the computer has the responsibility to identify and understand handwritten digits or characters automatically. Because of the progress in the field of science and technology, everything is being digitalized to reduce human effort. Hence, there comes a need for handwritten digit recognition in many real-time applications. 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. A 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 (User Interface).