A NOVEL METHOD FOR HANDWRITTEN DIGIT RECOGNITION SYSTEM

LITERATURE SURVEY

SURVEY 1 A NOVEL METHOD FOR HANDWRITTEN DIGIT RECOGNITION USING DEEP LEARNING

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Handwritten digit recognition has recently been of very interest among researchers because of the evolution of various Machine Learning, Deep Learning, and Computer Vision algorithms. In this report, We compare the results of some of the most widely used Machine Learning Algorithms like CNN convolution neural networks, and Deep Learning algorithms like multilayer CNN using Keras with Theano and Tensorflow. MNIST is a dataset that is widely used for handwritten digit recognition. The dataset consists of 60,000 training images and 10,000 test images. Artificial neural networks can all most mimic the human brain and are a key ingredient in the image-processing field. For example Convolution Neural networks with backpropagation for image processing.

The applications where these handwritten digit recognition can be used are the Banking sector where it can be used to maintain the security pin numbers, it can be also used for blind people by using sound output. An implementation of Handwritten Digit Recognition using Deep Learning has been implemented in this paper. Additionally, some of the most widely used Machine Learning algorithms i.e. CNN using Tensorflowhave been trained and tested on the same data to draw a comparison as to why we require deep learning methods in critical applications like Handwritten Digit Recognition. In this paper, I have shown that by using Deep Learning techniques, a very high amount of accuracy can be achieved. Using the Convolutional Neural Network with Keras and Theano as the backend, I am able to get an accuracy of 95.72%. Every tool has its own complexity and accuracy. Although we see that the complexity of the code and the process is a bit more as compared to normal Machine Learning algorithms but looking at the accuracy achieved, it can be said that it is worth it. Also, the current implementation is done only using the CPU Thus we settled on classifying a given handwritten digit image as the required digit using three different algorithms and consequently testing its accuracy.

SURVEY 2 HANDWRITTEN CHARACTER RECOGNITION

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Character recognition is fundamental but most challenging in the field of pattern recognition with a large number of useful applications. It has been an intense field of research since the

early days of computer science due to it being a natural way of interacting between computers and humans. More precisely Character recognition is the process of detecting and recognizing characters from the input image and converting it into ASCII or other equivalents machine-editable form [1][2]. The technique by which a computer system can recognize characters and other symbols written by hand in natural handwriting is called a handwriting recognition system. Handwriting recognition is classified into offline handwriting recognition and online handwriting recognition [3]. If handwriting is scanned and then understood by the computer, it is called offline handwriting recognition. In case, the handwriting is recognized while writing through a touchpad using the stylus pen, it is called online handwriting recognition. From the classifier perspective, character recognition systems are classified into two main categories i.e. segmentation-free (global) and segmentation based (analytic). Segmentation free is also known as the holistic approach to recognizing the character without segmenting it into subunits or characters. Each word is represented as a set of global features, e.g. ascender, loops, cusp, etc. Whereas segmentation-based approach [4]; each word/ligature is segmented into subunits either uniform or non-uniform and subunits are considered independently. Handwritten character processing systems are domain and application-specific like it is not possible to design a generic system that can process all kinds of handwritten scripts and language. Lots of work has been done on European languages and Arabic (Urdu) language. Whereas domestic languages like Hindi, Punjabi, Bangla, Tamil, Gujarati, etc. are very less explored due to limited usage. In this paper, section II describes the basic working principle of character recognition followed by a detailed literature survey. Next, in section IV conclusion has is made.