Handwritten Text Recognition Using Machine Learning

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Abstract: *The human race has shown a huge interest in machines over the years and has developed and advanced to a very large extent in this domain. Starting from the object identification and classification through pictures to editing for the captured image or video everything can be performed through machines and advanced systems, one such part of this advanced technology is deep learning or machine learning. which comes with its own individual set of modules, algorithms, and techniques. Similar to this domain one such idea which was discovered is handwritten digit recognition. This is one of such areas where development and research occur around the numerical also known as digits, where a number of possibilities, permutations, and combinations are attained to gain accurate results this can also be perceived as the ability of computers to interpret and understand the given input which is through number plates, photographs, documents or can be in a handwritten format and to convert it in digital format as an output through screens.*

Keywords: Machine Learning, handwritten text recognition, MNIST data set, algorithms, Phases

I. INTRODUCTION

This technique of handwritten recognition was around since the 1980s.Recognition is a term that can be associated with the identification of distinguishing a thing or a character or probably an individual from a repetitive pattern of experiences or education likewise digit recognition is also a part of such recognizing technique where recognition or identification of digits from document occurs. Digit recognition technique has a framework that basically consist of a machine working to prepare to interpret the digits which are being displayed, from various sources like handwritten bank checks messages pictures et cetera. Sometimes contents from internet computers tablets machine learning is one such domain which provides a good platform with the help of which human labor can be reduced to a greater extent in recognizing digits manually or in written format. Deep Learning is a machine learning method that trains computers to do what easily falls into place for people: learning through examples. With the utilization of deep learning methods, human attempts can be diminished in perceiving, learning, recognizing, and in a lot more regions. Using deep learning, the computer learns to carry out classification works from pictures or contents from any document. Deep Learning models can accomplish state-of-art accuracy, beyond human level performance. The digit recognition model uses large datasets in order to recognize digits from distinctive sources [1]

II. WHAT IS MACHINE LEARNING

Machine learning is a branch of artificial intelligence along with computer science that features the usage of data along with its own set of algorithms to mimic human thinking and how the neural system works in learning and improving at the given task in turn raising a curacy. The spell is blooming and is very important in the sector of data science as various statistical methods and algorithms are trained to derive various predictions and classification and get important insights uncovered by mining the data in various domains this also subsequently shows that it has a great decision making capacity in various business sectors and applications for increasing the growth metrics along with this deep learning is also one such subfield of machine learning which helps in learning algorithms and to achieve more accurate results there are various data such as supervise data and supervise data from these data sets object recognition is done by Deep machine learning there are various processes carried out in machine learning such as decision process

error function process model optimization process to acquire proper results along with that there are various different methodologies which come with machine learning such as supervise machine learning unsupervised machine learning semi-supervised machine learning reinforcement learning[2].

III. MNIST DATASET

MNIST dataset which stands for modified national Institute of standards and technology it is a dataset that can also be termed as a subset of NIST dataset which further goes down to other two combinations of data sets which are special database one and special database these databases contains various digits written by people at various phases from United States Census Bureau on the other hand MNIST, which has various images digits written different age groups for the variety it uses various models such as support vector machines, Multilayer perceptron and convolution neural network models. These are models that work towards acquiring the highest number of accuracy and also to develop the best suitable model for better results. MNIST contains a total of 70,000 handwritten digit images (60,000 - training set and 10,000 - test set) in 28x28 pixel bounding box and anti-aliased. All these images have corresponding Y values which apprises what the digit is[3].

IV. PHASES

4.1 Source

The input comes from any of the sources such as handwritten documents or sheet images et cetera where the image can be scanned through the camera and sent for the processing

4.2 Pre-processing

In this phase line of operation is performed which would help in getting a better quality of image forgetting the highest percent of accuracy Various processes work in this phase such as noise removal finalization morphological operations et cetera[4].

4.3 Segmentation

In this phase, 2 types of segmentation take place such as implicit segmentation and explicit segmentation wherein in implicit segmentation the digits are recognized without segmenting them Whereas an explicit segmentation the prediction of the word takes place and this is a phase where the algorithm for recognition comes in the picture

4.4 Classification

In this phase, the training and testing problems are done in the previous processes and here the highest probability is of the factors Are selected and classified for grouping[4].

V. CONVILUTION NEURAL NETWORK

As Convolution neural network is a deep feed forward artificial neural network and can also be called a multilayer perceptron which is used in deep learning model and also has a very influential impact in the innovation field related to computer visions as image classification object detection segmentation along with face recognition and implemented through CNN along with keras[5].

5.1 K Nearest Neighbor

K nearest neighbors can also be termed as a nonparametric method or a classifier that is used for classification and grouping, as well as some regression, can also be called as late learning or lazy classification algorithm because of the computations which are gathered at the ride until the very last chance of classification and also it can be called as instance-based learning. Where is that explains the categorical value by getting the majority of the votes from K nearest neighbors where they gave all you can do for which can ultimately lead to the change in the votes.

5.2 Support Vector Machine

Support vector machine comes under the category of supervising and has both classifications, as well as regression problems solving capacity where a general hyperplane is drawn, helps in classifying categories into different sections and by plotting the data points on the two-dimensional basis of the classification process starts from looking at the hyperplane or linear or non-linear plane

5.3 Neural Networks

This can be also termed as the God of them which tries to replicate the human and how are you and brain works which gets them in the era of advanced computational power deep learning can also be associated with neural networks as there are multilayers and each layer is connected and composed of various notes there is not an Act as a perception for taking the inputs to perform various computational programs and then pass the information for the activation function to have a further process for classification.

5.4 Tensor Flow

It can be termed as a free open-source library forgetting data flow and to differentiate programming is across various different ranges perform tasks. Turn off symbolic mathematical functions can be found in this which can be also be used for understanding and learning applications the very best example is neural networks and it can be used for research as well as the production at various platforms such as Google as the tens of lowest developed by Google brain team for the usage of internal matters of Google and it was released on November 2015 under Apache license 2.0.[6].

VI. CONCLUSION

In conclusion machine learning has proved to be a boon in this advanced digital technology and hand it in recognition is one of such products of this advanced technology which would help in recognizing digits and word store various fonts and patterns of writing style and helps in recognizing them through various algorithms and modules with the help of that recognizing digits and creating a database for further research would be helpful.

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