Handwritten Digit Recognition Using Deep Learning

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Abstract

This article shows how to utilize a Deep learning algorithm to detect hand written digits using an MNSIT dataset, it is a well known dataset. We can download it from Keras with a simple API call. This research examines the application of existing Deep learning algorithms on datasets and attempts to construct this prediction engine for real-world use by users.

Introduction

The handwritten digit recognition is the capability of computer applications to

recognize the human handwritten digits. It is a hard task for the machine because

handwritten digits are not perfect and can be made with many different shapes and sizes. The handwritten digit recognition system is a way to tackle this problem which uses the image of a digit and recognizes the digit present in the model created using Keras TensorFlow library over the MNIST dataset to recognize handwritten digits .

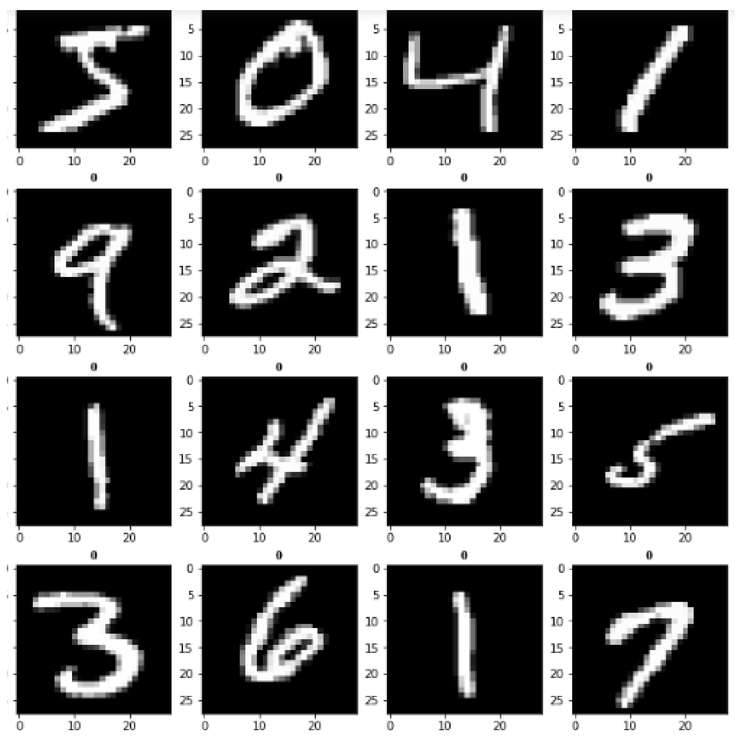
Here in this problem we will train over 60000 images present in the dataset with

Implementing a sequence model.

Objective

Explore the Field of Image Recognition by

examining Convolution Neural Network. We will analyze how adding convolution layers to a network improves accuracy to handwritten digits recognition. Then we will evaluate the Deep Learning model to predict the Input Images.



Model Architecture

Convolutional Layers:

The convolutional layer is the very first layer which convole the Input Image with Filter

of weights to extract features.

Pooling Layer:

Subsamples Convoluted layer by taking the maximum value in a small neighborhood

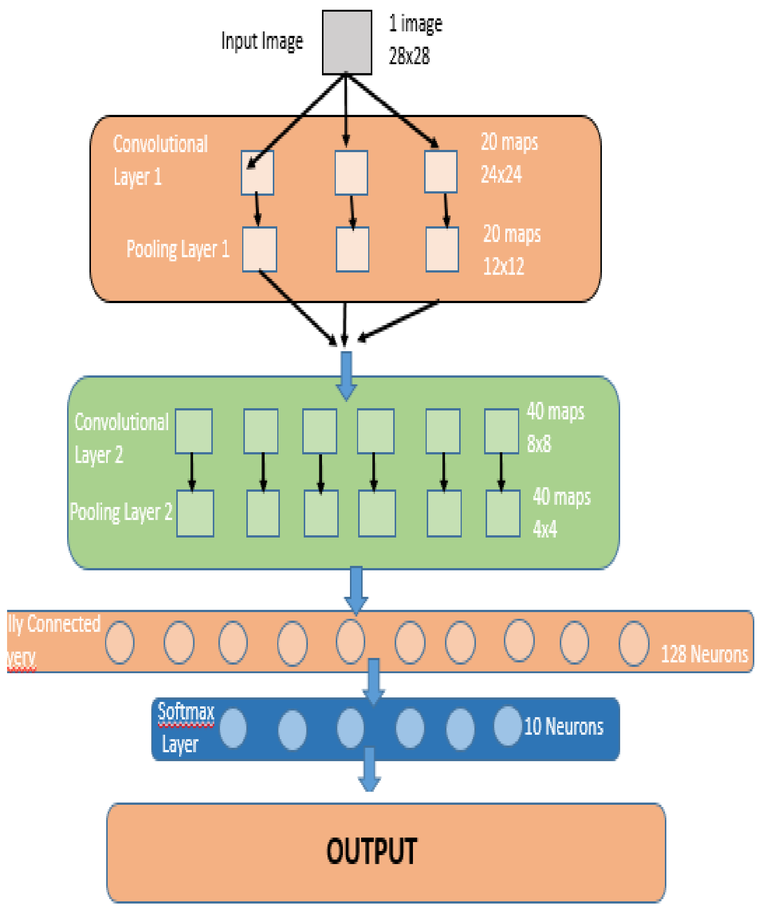
It reduce the amount of the parameters and also helps with the overfitting problem.

Fully Connected Layer

Each input is connected to every neuron in the previous layer, creating a function based on the type and location of features.

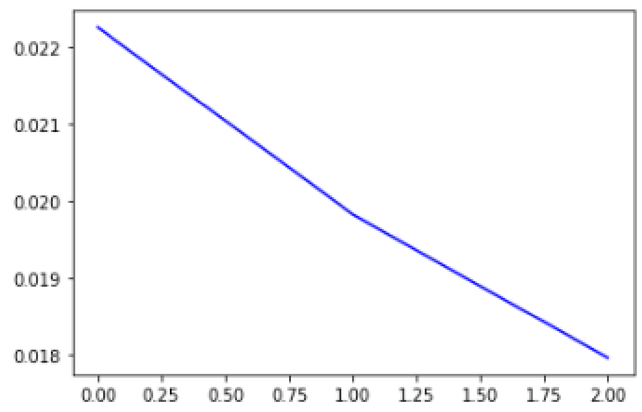
Softmax Layer

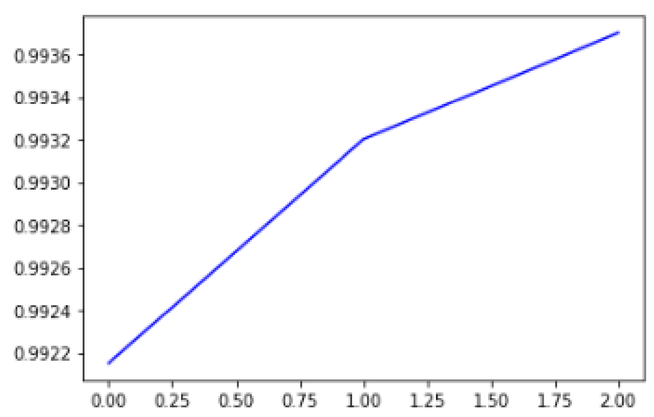
A fully connected layer that normalizes the outputs so that only one output can be high at a time



Result

Here Loss Function and accuracy graph with each epoch



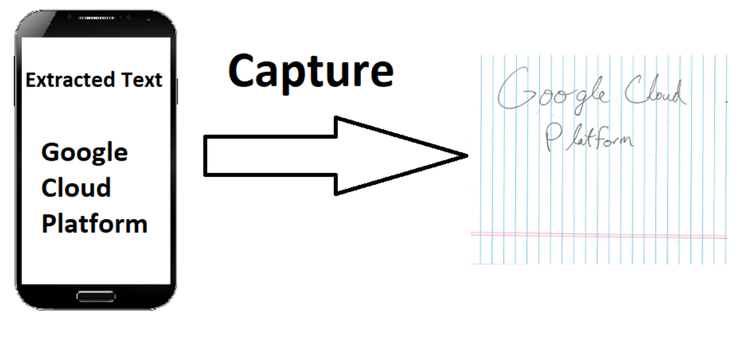


Conclusion

We have successfully built a convolutional neural network to classify handwritten digits with Tensorflow's Keras API. You have achieved accuracy of over 98% and now we can even save this model & create a digit-classifier app!

Real World Application

We can Create a Text Extraction application, where users can use there phone to capture the image and run the model to extract the Text from that image.



References

https://www.kaggle.com/code/ngbolin/mnist-dataset-digit-recognizer/notebook

https://towardsdatascience.com/image-classification-in-10-minutes-with-mnist-dataset-54c35b77a38d

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