Handwritten Digit Recognition

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INTRODUCTION

- Scientists believe that most intelligent device is the Human Brain.
- There is no computer which can beat the level of efficiency of human brain.These inefficiencies of the computer has lead to evolution of Artificial Neural Network”.
- They differ from conventional systems in the sense that rather than being programmed these system learn to recognize pattern.

Objective

‘Digits’ are a part of our everyday life, be it License plate on our cars or bike, the price of a product, speed limit on a road, or details associated with a bank account. In the case of a text which is unclear, it is easier to guess the digits in comparison to the alphabets

Machine Learning and Deep Learning are reducing human efforts in almost every field. Moreover, a solution achieved using ML and DL can power various applications at the same time, thereby reducing human effort and increasing the flexibility to use the solution. One such solution is a handwritten digit recognition system that can be used in postal mail sorting, bank check processing, form data entry, etc.

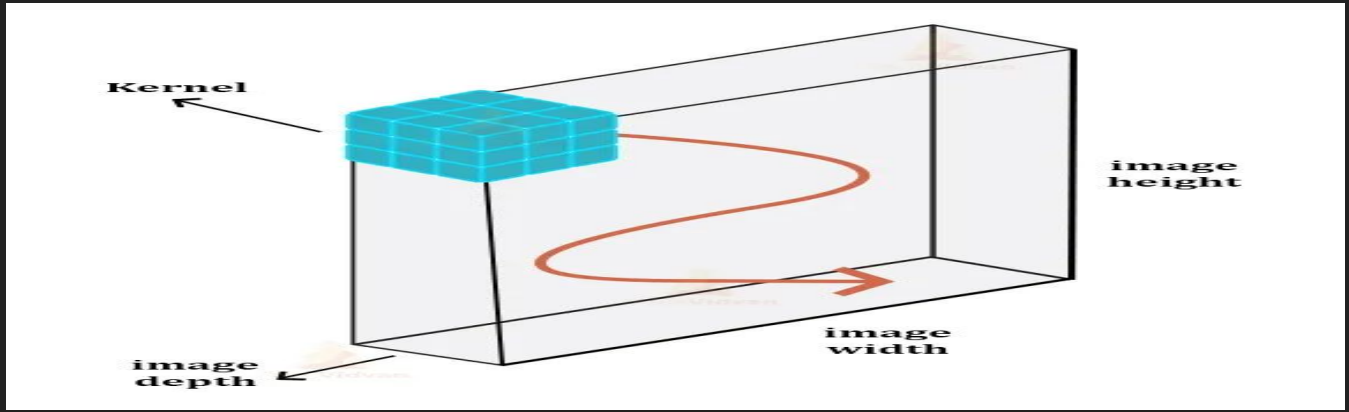
Problem Statement

The goal of this project is to create a model that will be able to recognize and determine the handwritten digits from its image by using the concepts of Convolution Neural Network.

Why CNN

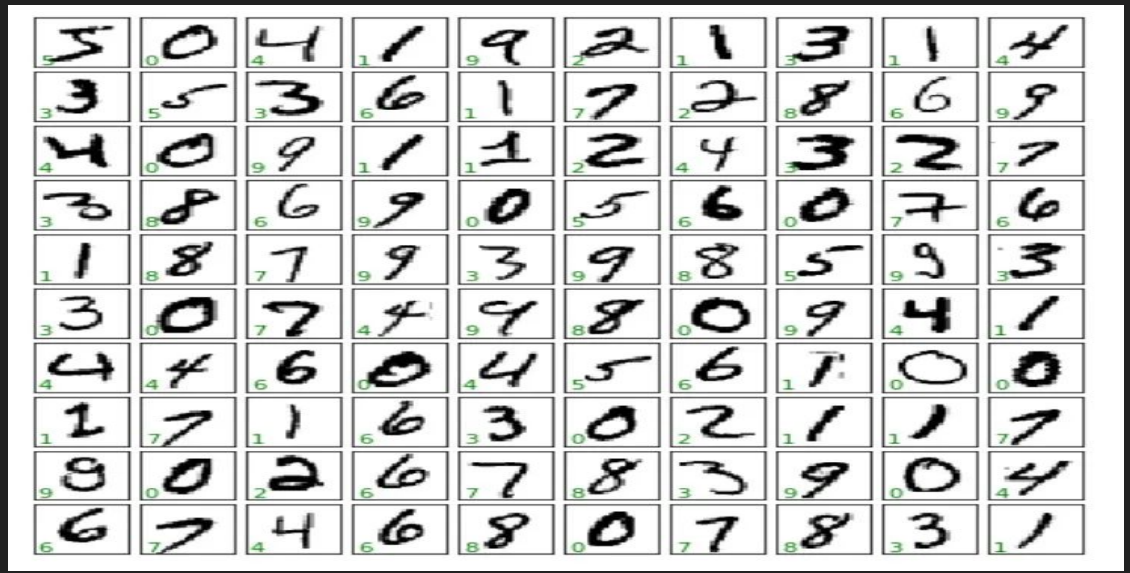
A Convolutional Neural Network or CNN is a Deep Learning Algorithm which is very effective in handling image classification tasks. It is able to capture the Temporal and Spatial dependencies in an image with the help of filters or kernels.

The kernel is just like a small window sliding over the large window in order to extract the spatial features and in the end, we get feature maps.



Mnist dataset

We are going to use the famous MNIST dataset for training our CNN model. The MNIST dataset was compiled with images of digits from various scanned documents and then normalized in size. Each image is of a dimension, 28×28 i.e total 784 pixel values.



Module wise breakdown

- ## Training the Model (Train.py)

  We utilize the MNIST dataset to train our CNN model and then save the model in the current working directory.

- ## Digit Recognition(RecognizeDigit.py)

  We load the saved model and use appropriate functions to capture video via webcam and pass it as an input to our model. Our model produces a prediction which is displayed to the user.

Conclusion

The handwritten digit recognition using convolutional neural network has proved to be of a fairly good efficiency.

It works better than any other algorithm including artificial neura network.

Output

```
469/469 [==============================] - 7
Epoch 29/30
469/469 [==============================] - 7
Epoch 30/30
469/469 [==============================] - 7
Test loss: 0.38438373804092410
Test accuracy: 0.89620000123977660
```