CS 203.4762	PPML Lab	Spring 2020
	Part 1	
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1 Summary

In this Part we implement python deep learning project to build a handwritten digit recognition app using $MNIST$ dataset, convolutional neural network(CNN).
What is CNN? is an artificial neural network that specializes in picking out or detect patterns and make sense of them. Thus, CNN has been most useful for image classification.

Motivation: Deep Learning uses different types of neural network architectures one of them is image classification, in this part we want to classificate digits images, to get this we have some steps.

- Import And Load Dataset.
- Preprocess the data.
- Train and Evaluate the Model.
- Make Predictions.

2 Digit Recognition

In this section we present the main phases of the program, for a given images of grayscale using the next steps we can get an digit recognition.

2.1 Import And Load Dataset

we can easily import the dataset through keras.using mnist load data method returns the training data, its labels along with the testing data and its labels.

2.2 Preprocess the data

we need to reshape the images to have dimensions.then We need to normalize inputs from 0–255 to 0–1 as to change the values of numeric columns in the dataset to a common scale, without distorting differences in the ranges of value. This involves first converting the data type from unsigned integers to floats, then dividing the pixel values by the maximum value.

2.3 Train and Evaluate

We will evaluate the model using five-fold cross-validation.so we get the better Learning rate and better validation can be achieved by increasing the train and test data respectively. In our case, value of k is 5. Thus, each test set will be 0.2 of the training dataset.

2.4 Make Predictions

We need to reshape the image to $[1, 28, 28, 1]$.and run the saved model after training.

3 Results

The accuracy of the neural network was 0.9973.