**Deep Learning**:

Deep Learning is a **group of techniques** based on **Neural Networks** that can **learn complex patterns** **directly from the data.**

**Why this called deep learning? What is deep about it?** So, the deepness comes from the number of things that we stack on top of each other. Deep Learning is a layer of neurons, stacked one after each other. And learning comes from machine learning. Deep Learning is a part of machine learning, its one technique of machine learning and that’s where learning comes from.

**Neural Network**:

Neural Network based on **neurons**. How they work is that they **take some inputs and do some calculations on the neurons and pass output to next layer and next layer, next layer**. At the end they have an **output and abundance of neurons** come up and create a neural network. Once we give enough training examples, it is able to learn the patterns. And how it happens is, it gives examples and comes with an output and compare the output with the actual output, the real-world value versus the prediction and this error is calculated and this error is used or the difference between the real data and what we predicted is used to correct the neural network and at the end we have a network that can actually predict accurately.

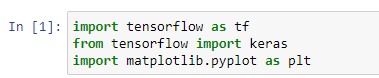
**Keras**:

It is basically a wrapper around the TensorFlow library. TensorFlow is an advanced **API** or library where we would need to do more things hands-on or decide things manually. Whereas Keras is kind of like a higher level one where we don’t need to go into the details of things, we can just complete or like build a neural network and just like one or two lines of code. Whereas in TensorFlow we might need to do it maybe 10 lines of code. So, it’s kind of like a **simplified version of TensorFlow** and we will build simple neural network.

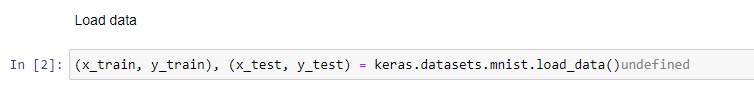
**MNIST** **Dataset**:

This dataset contains a collection of 70,000 and 28 \* 28 images of handwritten digits from 0 to 9. The dataset is already divided into training (60,000) and testing (10,000) sets in grayscale.

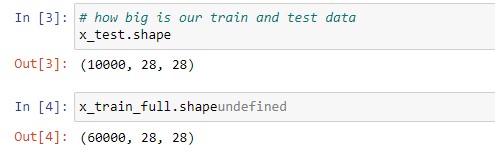
Now, **import all the relevant libraries** such as TensorFlow from Keras and matplotlib.



Load data from keras:



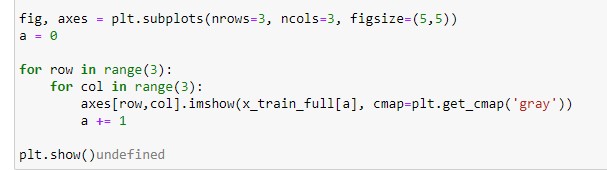
Now, testing the training and testing data’s shape.



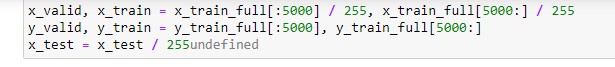
Testing one instance.

After testing the once instance of training data now we have to create an image to look-up.

Here, we are showing the nine images which is easy task for humans by we have to build a neural network that machine detect to get the actual number.



Normalization:



Check validation of one instance:

Here, we have to expect all the values lies between 0 to 1.

