```
#TEAM ID:PNT2022TMID33471
#Importing required Libraries
import numpy#for numerical analysis
import tensorflow#open source ml tool by google
from tensorflow.keras.datasets import mnist #mnist dataset
from tensorflow.keras.models import Sequential# stack for layers
from tensorflow.keras import layers#input,middle and output layers
forcnn structure
from tensorflow.keras.layers import Dense, Flatten#dense and flatten
lavers
from tensorflow.keras.layers import Conv2D#convolutional layers
from tensorflow import keras#library for building neural networks
built on tensorflow
from tensorflow.keras.optimizers import Adam#optimizers
from keras.utils import np utils
#Loading dataset
Dataset is available in tensorflow dataset repository
(x_train,y_train),(x_test,y_test)=mnist.load_data()
Downloading data from https://storage.googleapis.com/tensorflow/tf-
keras-datasets/mnist.npz
automatically data is splitted for train, test -70:30 ratio
print(x train.shape)
print(y_train.shape)
(60000, 28, 28)
(60000,)
Training Dataset has 60000 images & testing has 10000 images
print(x test.shape)
print(y test.shape)
(10000, 28, 28)
(10000,)
Analyze the data
```

x train[3]

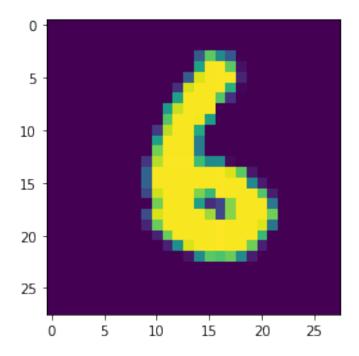
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y_train[36]
6
image in 36th position in training dataset
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image in 36th position in training dataset
import matplotlib.pyplot as plt
plt.imshow(x_train[36])

<matplotlib.image.AxesImage at 0x7fa70fb3b550>



#Reshaping the data

As we are using Deep learning neural network, the input for this network to get trained on should be of higher dimensional. Our dataset is having three-dimensional images so we have to reshape them too higher dimensions

```
#(batch,height,width,channel)
x_train=x_train.reshape(60000,28,28,1).astype('float32')
x_test=x_test.reshape(10000,28,28,1).astype('float32')
```

#Applying one hot encoding

One hot encoding to convert numerical values to classes where 0 to 9 are 10 separate classes if value is 5 class 5 is 1 else 0

```
no_of_classes=10
y_train=np_utils.to_categorical(y_train,no_of_classes)
y_test=np_utils.to_categorical(y_test,no_of_classes)
y_test[3]
array([1., 0., 0., 0., 0., 0., 0., 0., 0., 0.], dtype=float32)
```