

TEAM ID PNT2022TMID14851

```
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
from tensorflow.keras import layers

from tensorflow.keras.layers import Dense,Flatten
from tensorflow.keras.layers import Conv2D
from tensorflow import keras

from tensorflow.keras.optimizers import Adam
from keras.utils import np_utils
```

LOADING DATASET

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```
(x_train,y_train),(x_test,y_test)=mnist.load_data()

print(x_train.shape)
print(y_train.shape)

(60000, 28, 28)
(60000,)

print(x_test.shape)
print(y_test.shape)

(10000, 28, 28)
(10000,)
```

ANALYZE THE DATA

```
x_train[3]
```

```

0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 60, 228, 251, 251, 94, 0, 0, 0, 0, 0, 0,
 0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 155, 253, 253, 189, 0, 0, 0, 0, 0, 0, 0,
 0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 20, 253, 251, 235, 66, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
```

```

32, 205, 253, 251, 126, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
104, 251, 253, 184, 15, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 80,
240, 251, 193, 23, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 32, 253,
253, 253, 159, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 151, 251,
251, 251, 39, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 48, 221, 251,
251, 172, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 234, 251, 251,
196, 12, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 253, 251, 251,
89, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 159, 255, 253, 253,
31, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 48, 228, 253, 247, 140,
8, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 64, 251, 253, 220, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 64, 251, 253, 220, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 24, 193, 253, 220, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0]], dtype=uint8)

```

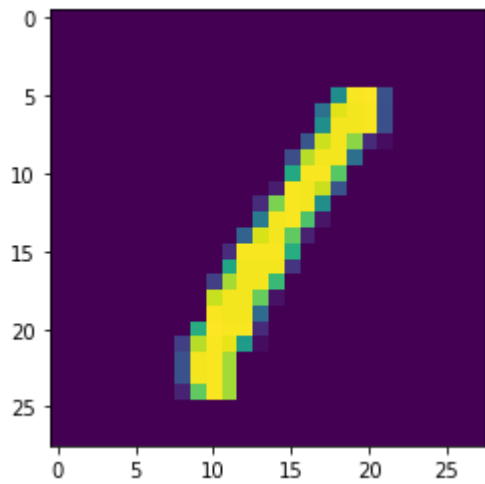
y_train[3]

1

import matplotlib.pyplot as plt

plt.imshow(x_train[3])

<matplotlib.image.AxesImage at 0x7efc73f6e950>



RESHAPING THE DATA.

```
x_train=x_train.reshape(60000,28,28,1).astype('float32')
x_test=x_test.reshape(10000,28,28,1).astype('float32')
```

APPLY ONE HOT ENCODING

```
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)
```

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