

Understanding the Data (Sprint-1)

TEAM ID:PNT2022TMID05025

#Import all Necessary Libraries

```
import pandas as pd
```

```
import numpy as np
```

```
import matplotlib.pyplot as plt
```

```
from tensorflow.keras.datasets import mnist
```

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

```
array([[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, 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, 0, 0],
```

```
 [0, 0, 0, ..., 0, 0, 0],
```

[illegible]

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0, 0],
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90, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
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0, 0],
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148, 229, 253, 253, 253, 250, 182, 0, 0, 0, 0, 0, 0, 0,
0, 0],
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253, 253, 253, 253, 201, 78, 0, 0, 0, 0, 0, 0, 0, 0,
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0, 0],
[0, 0, 0, 0, 0, 0, 0, 18, 171, 219, 253, 253, 253, 253,
195, 80, 9, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,

```

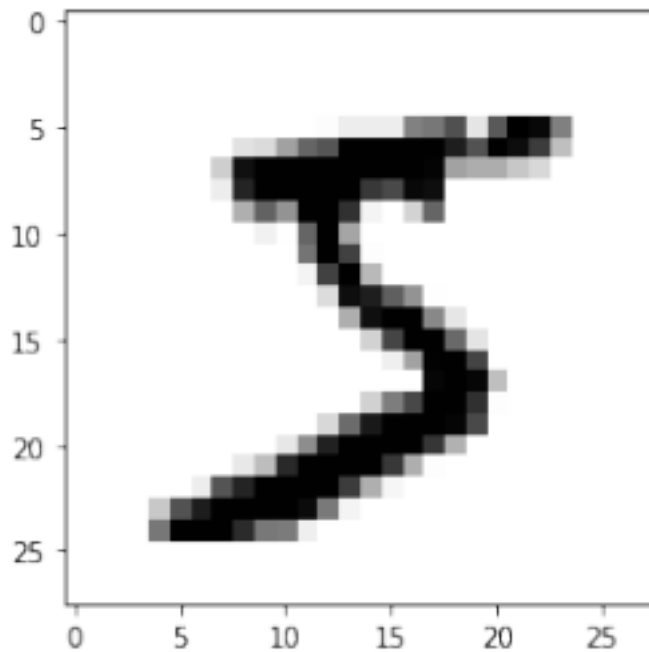
0, 0],
[ 0, 0, 0, 0, 55, 172, 226, 253, 253, 253, 253, 244, 133,
11, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0],
[ 0, 0, 0, 0, 136, 253, 253, 253, 212, 135, 132, 16, 0,
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0, 0],
                                [ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 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, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0]], dtype=uint8)

```

#plot the single image

```
plt.imshow(one_img,cmap='binary')
```

<matplotlib.image.AxesImage at 0x7f36882992d0>



y_train

```
array([5, 0, 4, ..., 5, 6, 8], dtype=uint8)
```

#categories the data

```
from tensorflow.keras.utils import to_categorical
```

```
(60000,)  
y_example = to_categorical(y_train)  
print(y_example,y_example.shape)
```

```
y_example[0]
```

```
to_categorical(y_test,num_classes=10)
```

```
one_img.max(),one_img.min()
```

```
x_train = x_train/255
x_test = x_test/255
```

```
array([[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.],  
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0., 0., 0., 0., 0.],  
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0., 0., 0., 0., 0.],  
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0., 0., 0., 0., 0.],  
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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., 0.01176471, 0.07058824, 0.07058824,  
0.07058824, 0.49411765, 0.53333333, 0.68627451, 0.10196078, 0.65098039, 1.,  
0.96862745, 0.49803922, 0., 0., 0., 0.]])
```

[0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0.19215686, 0.93333333, 0.99215686, 0.99215686,
0.99215686, 0.99215686, 0.99215686, 0.99215686, 0.99215686, 0.99215686, 0.99215686,
0.98431373, 0.36470588, 0.32156863, 0.32156863, 0.21960784, 0.15294118, 0. , 0. , 0. ,
0. , 0.],

[0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0.07058824, 0.85882353, 0.99215686, 0.99215686,
0.99215686, 0.99215686, 0.99215686, 0.77647059, 0.71372549, 0.96862745,
0.94509804, 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0.],

[0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0.31372549, 0.61176471, 0.41960784, 0.99215686,
0.99215686, 0.80392157, 0.04313725, 0. , 0.16862745, 0.60392157, 0. , 0. , 0. , 0. , 0. ,
0. , 0. , 0. , 0. , 0.],

[0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0.05490196, 0.00392157, 0.60392157, 0.99215686,
0.35294118, 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. , 0.54509804, 0.99215686, 0.74509804,
0.00784314, 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. , 0.04313725, 0.74509804, 0.99215686, 0.2745098 , 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. , 0.1372549 , 0.94509804, 0.88235294,
0.62745098, 0.42352941, 0.00392157, 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0.],

[0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0.31764706, 0.94117647, 0.99215686,
0.99215686, 0.46666667, 0.09803922, 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0.],

[0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0.17647059, 0.72941176,
0.99215686, 0.99215686, 0.58823529, 0.10588235, 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0.],

[0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0.0627451 , 0.36470588,
0.98823529, 0.99215686, 0.73333333, 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0.],

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0.71764706, 0.99215686, 0.99215686, 0.81176471, 0.00784314, 0. , 0. , 0. , 0. , 0. , 0. ,
0.],

[0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0.15294118, 0.58039216, 0.89803922,
0.99215686, 0.99215686, 0.99215686, 0.98039216, 0.71372549, 0. , 0. , 0. , 0. , 0. , 0. ,
0. , 0.],

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0.99215686, 0.99215686,

0.99215686, 0.99215686, 0.78823529, 0.30588235, 0. , 0. , 0. , 0. , 0. , 0. , 0. , 0.],

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0.99215686, 0.99215686, 0.99215686, 0.77647059, 0.31764706, 0.00784314, 0. , 0. , 0. ,
0. , 0. , 0. , 0. , 0. , 0.],

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0.99215686, 0.99215686, 0.76470588, 0.31372549, 0.03529412, 0. , 0. , 0. , 0. , 0. , 0. ,
0. , 0. , 0. , 0. , 0.],

[0. , 0. , 0. , 0. , 0. , 0.21568627, 0.6745098 , 0.88627451, 0.99215686, 0.99215686,
0.99215686, 0.99215686, 0.95686275, 0.52156863, 0.04313725, 0. , 0. , 0. , 0. , 0. , 0. ,
0. , 0. , 0. , 0. , 0.],

[0. , 0. , 0. , 0. , 0.53333333, 0.99215686, 0.99215686, 0.99215686, 0.83137255,
0.52941176, 0.51764706, 0.0627451 , 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. , 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. ]])

```

#reshape the scaled data

```
x_train = x_train.reshape(60000,28,28,1)
```

```
x_test = x_test.reshape(10000,28,28,1)
```

```
x_train.shape,x_test.shape
```

```
((60000, 28, 28, 1), (10000, 28, 28, 1))
```