

## PROJECT DEVELOPMENT PHASE - sprint\_1

TEAM ID:PNT2022TMID29320

### #understanding the data (sprint 1)

```
#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]

170,	[	0,	0,	0,	0,	0,	0,	0,	0,	30,	36,	94,	154,
0,		253,	253,	253,	253,	253,	225,	172,	253,	242,	195,	64,	0,
		0,	0],										
253,	[	0,	0,	0,	0,	0,	0,	0,	49,	238,	253,	253,	253,
0,		253,	253,	253,	253,	251,	93,	82,	82,	56,	39,	0,	0,
		0,	0],										
253,	[	0,	0,	0,	0,	0,	0,	0,	18,	219,	253,	253,	253,
0,		253,	198,	182,	247,	241,	0,	0,	0,	0,	0,	0,	0,
		0,	0],										
253,	[	0,	0,	0,	0,	0,	0,	0,	0,	80,	156,	107,	253,
0,		205,	11,	0,	43,	154,	0,	0,	0,	0,	0,	0,	0,
		0,	0],										
253,	[	0,	0,	0,	0,	0,	0,	0,	0,	0,	14,	1,	154,
0,		90,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
		0,	0],										
253,	[	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	139,
0,		190,	2,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
		0,	0],										
190,	[	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	11,
0,		253,	70,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
		0,	0],										
35,	[	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
0,		241,	225,	160,	108,	1,	0,	0,	0,	0,	0,	0,	0,
		0,	0],										
0,	[	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
0,		81,	240,	253,	253,	119,	25,	0,	0,	0,	0,	0,	0,
		0,	0],										
0,	[	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
		0,	45,	186,	253,	253,	150,	27,	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,  0,  0,  0,  0,  0,  0,  0,  0,
0,      0,  0],
0,      [ 0,  0,  0,  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)

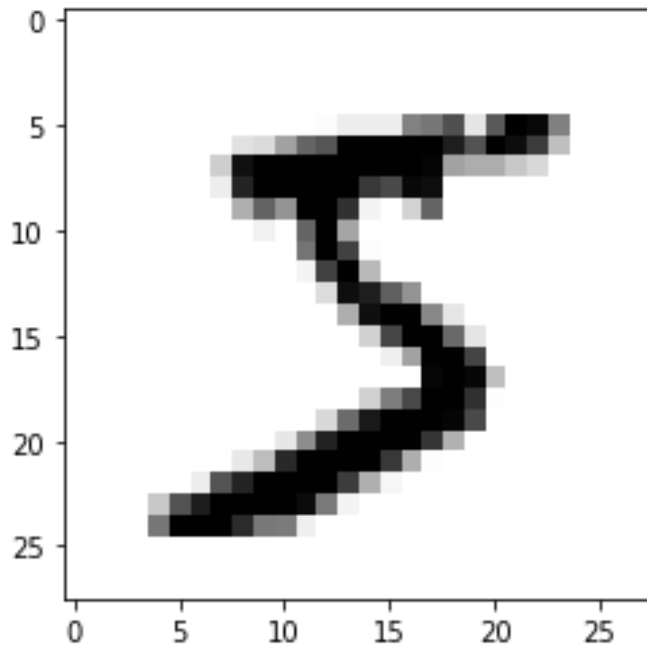
```

```

#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
y_train.shape
(60000,)

```

[illegible]

[0.	, 0.	, 0.	, 0.	, 0.	, 0.
0.	, 0.	, 0.	, 0.	, 0.	, 0.
0.	, 0.	, 0.	, 0.	, 0.	, 0.
0.	, 0.	, 0.	, 0.	, 0.	, 0.
0.	, 0.	, 0.	, 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.	, 0.11764706,	0.14117647,	
0.36862745,	0.60392157,	0.66666667,	0.99215686,	0.99215686,	
0.99215686,	0.99215686,	0.99215686,	0.88235294,	0.6745098	
0.99215686,	0.94901961,	0.76470588,	0.25098039,	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,	0.98431373,	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.	, 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.	, 0.54509804,	0.99215686,	0.74509804,	0.00784314,	
0.	, 0.	, 0.	, 0.	, 0.	
0.	, 0.	, 0.	, 0.	, 0.	
0.	, 0.	, 0.	, 0.		

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[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.      , 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.      ,
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.      ,
0.0627451 , 0.36470588, 0.98823529, 0.99215686, 0.73333333,
0.      , 0.      , 0.      , 0.      , 0.      ,
0.      , 0.      , 0.      , 0.      , ],
[0.      , 0.      , 0.      , 0.      , 0.      ,
0.      , 0.      , 0.      , 0.      , 0.      ,
0.      , 0.      , 0.      , 0.      , 0.      ,
0.      , 0.      , 0.97647059, 0.99215686, 0.97647059,
0.25098039, 0.      , 0.      , 0.      , 0.      ,
0.      , 0.      , 0.      , 0.      , ],
[0.      , 0.      , 0.      , 0.      , 0.      ,
0.      , 0.      , 0.      , 0.      , 0.      ,
0.      , 0.      , 0.      , 0.      , 0.18039216,
0.50980392, 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.      , 0.15294118, 0.58039216, 0.89803922,
0.99215686, 0.99215686, 0.99215686, 0.98039216, 0.71372549,
0.      , 0.      , 0.      , 0.      , 0.      ,
0.      , 0.      , 0.      , 0.      , ],
```



```
[0., 0., 0., 0., 0., 0.,
0., 0., 0., 0., 0., 0.,
0.09411765, 0.44705882, 0.86666667, 0.99215686, 0.99215686,
0.99215686, 0.99215686, 0.78823529, 0.30588235, 0.,
0., 0., 0., 0., 0., 0.,
0., 0., 0., ],
[0., 0., 0., 0., 0., 0.,
0., 0., 0., 0.09019608, 0.25882353,
0.83529412, 0.99215686, 0.99215686, 0.99215686, 0.99215686,
0.77647059, 0.31764706, 0.00784314, 0., 0.,
0., 0., 0., 0., 0., 0.,
0., 0., 0., 0., ],
[0., 0., 0., 0., 0., 0.,
0., 0.07058824, 0.67058824, 0.85882353, 0.99215686,
0.99215686, 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., 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., 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., 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))
```