

Project Development Phase

Sprint-1

Date	3 November 2022
Team ID	PNT2022TMID39478
Project Name	A Novel Method for Handwritten Digit Recognition System

Handwritten Digit Recognition.ipynb

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Importing Necessary Libraries

```
[1] import numpy
import tensorflow
from tensorflow.keras.datasets import mnist
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 keras.optimizers import Adam
from keras.utils import np_utils
```

Load Data

10.png archive (1).zip Handwritten_Dig...ipynb

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Dataset Link:

https://drive.google.com/file/d/1rH45JOMn2Gqme4ymXGQD8qtpFEgT2LL2/view?usp=share_link

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[1] from keras.utils import np_utils

{x}

Load Data

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[2] (x_train, y_train), (x_test, y_test)=mnist.load_data()

<>

10

[3] print(x_train.shape)#shope is used for give the dimension values #60000-rows 28x28-pixels paint

(60000, 28, 28)

(10000, 28, 28)

(60000, 28, 28)

(10000, 28, 28)

...

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Understanding the data

```
[4] x_train[0]
```

```
[ 0,  0,  0,  0,  0,  0,  0,  0,  0,  0, 80, 156, 107, 253, 253,
 205, 11,  0, 43, 154,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,
  0,  0,
  0,  0,  0,  0,  0,  0,  0,  0,  0, 14,  1, 154, 253,
 90,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,
  0,  0,
  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0, 139, 253,
190,  2,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,
  0,  0,
  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0, 11, 190,
253, 70,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,
  0,  0,
  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0, 35,
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,  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,  0,  0,
  0, 45, 186, 253, 253, 150, 27,  0,  0,  0,  0,  0,  0,  0,
  0,  0,
  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,
  0,  0, 16, 93, 252, 253, 187,  0,  0,  0,  0,  0,  0,  0,
  0,  0,
  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,
  0,  0,  0,  0, 249, 253, 249, 64,  0,  0,  0,  0,  0,
  0,  0]
```

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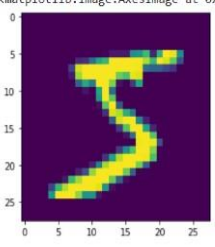
```
[4] 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0,
    [ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
      0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
      0, 0], dtype=uint8)
```

```
[5] y_train[0]
```

```
5
```

```
[6] import matplotlib.pyplot as plt #used for data visualization
     plt.imshow(x_train[0]) #ploting the index=0 image
```

<matplotlib.image.AxesImage at 0x7fc68af2c950>



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Reshaping Dataset

[7]

```
#Reshaping to format which CNN expects (batch, height, width, channels)
x_train=x_train.reshape(60000, 28, 28, 1).astype('float32')
X_test= X_test.reshape(10000, 28, 28, 1).astype('float32')
```

One-Hot Encoding

[8]

```
#one hot encode
number_of_classes = 10 #storing the no. classes in a variable
y_train= np_utils.to_categorical(y_train, number_of_classes) #converts the output in binary format
y_test= np_utils.to_categorical(y_test, number_of_classes)
```

[9]

```
y_train[0]

array([0., 0., 0., 0., 0., 1., 0., 0., 0., 0.], dtype=float32)
```

Creating the Model

[10]

```
#create model
model=Sequential()
#adding model Layer
```

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