DML MINI PROJECT

AIM: Handwritten digit recognition using mnist dataset

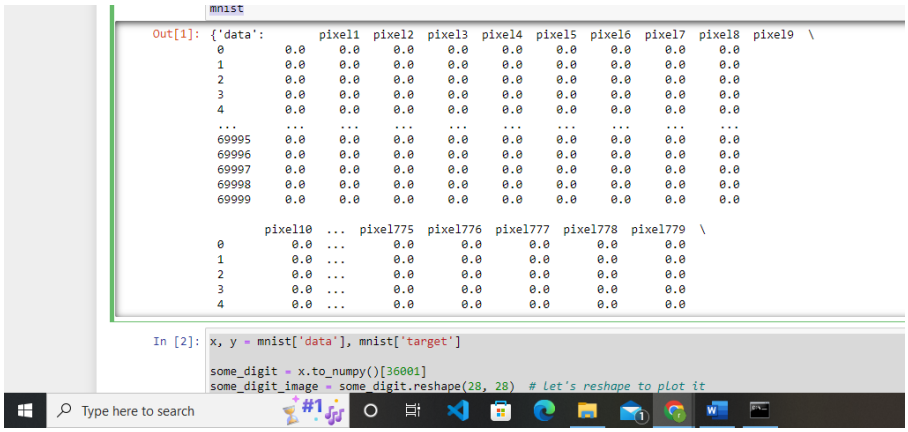
What is MNIST?

1. Set of 70,000 small images of digits handwritten by high school students and employees of the US causes Bureau.
2. All images are labeled with the respective digit they represent.
3. MNIST is the hello world of machine learning. Every time a data scientist or machine learning engineer makes a new algorithm for classification, they would always first check its performance on the MNIST dataset.
4. There are 70,000 images and each image has 28*28 = 784 features.
5. Each image is 28*28 pixels and each feature simply represents one-pixel intensity from 0 to 255. If the intensity is 0, it means that the pixel is white and if it is 255, it means it is black.

CODE:

```
from sklearn.datasets import fetch_openml

import matplotlib

import matplotlib.pyplot as plt

import numpy as np

from sklearn.linear_model import LogisticRegression

from sklearn.model_selection import cross_val_score

mnist = fetch_openml('mnist_784')

mnist
```

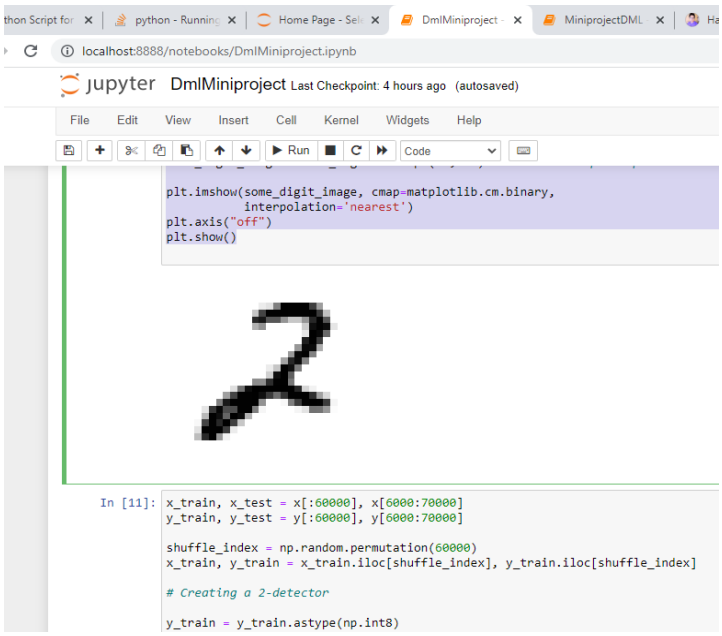
OUTPUT:



CODE:

```
x, y = mnist['data'], mnist['target']
some_digit = x.to_numpy()[36001]
some_digit_image = some_digit.reshape(28, 28)  # let's reshape to plot it
plt.imshow(some_digit_image, cmap=matplotlib.cm.binary,
interpolation='nearest')
plt.axis("off")
plt.show()
```

OUTPUT:



CODE

```
x_train, x_test = x[:60000], x[6000:70000]
y_train, y_test = y[:60000], y[6000:70000]
shuffle_index = np.random.permutation(60000)
x_train, y_train = x_train.iloc[shuffle_index], y_train.iloc[shuffle_index]


# Creating a 2-detector
y_train = y_train.astype(np.int8)
y_test = y_test.astype(np.int8)
y_train_2 = (y_train == 2)
y_test_2 = (y_test == 2)
```

```
clf = LogisticRegression(tol=0.1)

clf.fit(x_train, y_train_2)
```

OUTPUT

```
LogisticRegression(tol=0.1)
```

CODE:

```
a = cross_val_score(clf, x_train, y_train_2, cv=3, scoring="accuracy")
print(a.mean())
```

In [15]:

OUTPUT: