EXPT NO : 4   **A python program to implement Single Layer**

DATE:13/9/24   **Perceptron**

AIM:

To write a python program to implement Single layer perceptron.

PROCEDURE:

Implementing Single layer perceptron method using the Keras dataset involve the following steps:

Step 1: Import Necessary Libraries

First, import the libraries that are essential for data manipulation, visualization, and model building.

```python
import numpy as np

import pandas as pd

from tensorflow import keras

import matplotlib.pyplot as plt
```

Step 2: Load the Keras Dataset

The Keras dataset can be loaded.

```python
(X_train,y_train),(X_test,y_test)=keras.datasets.mnist.load_data()
```
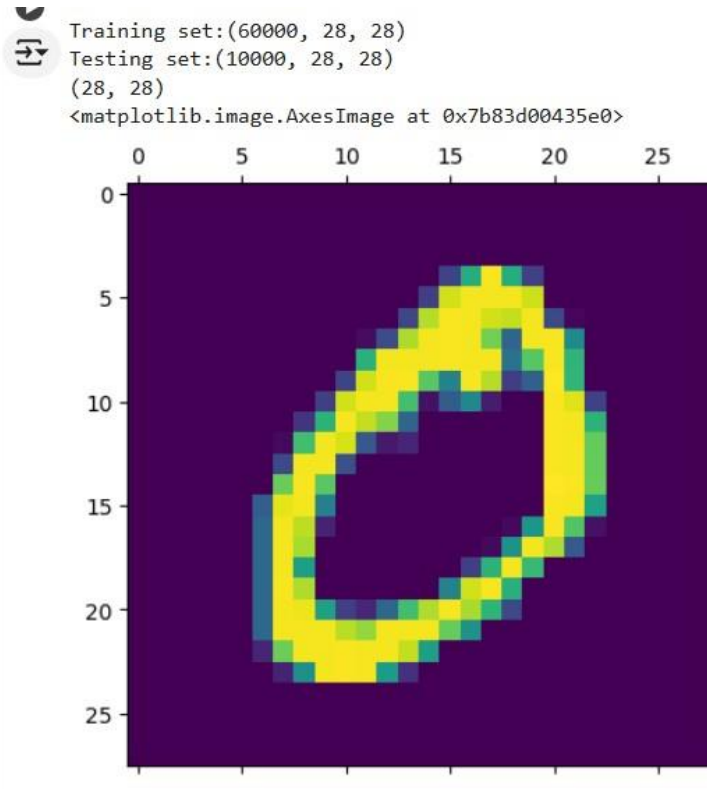
Step 3: Data Preprocessing

Ensure the data is clean and ready for modeling. Since the Iris dataset is clean, minimal preprocessing is needed.

```python
print(f"Training set:{X_train.shape}")

print(f"Testing set:{X_test.shape}")
```


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```
print(X_train[1].shape)
plt.matshow(X_train[1])
```

OUTPUT :

```
Training set:(60000, 28, 28)
Testing set:(10000, 28, 28)
(28, 28)
<matplotlib.image.AxesImage at 0x7b83d00435e0>
```


Step 4 : Train a Model

```python
#Normalizing the dataset

x_train=X_train/255

x_test=X_test/255


#Flatting the dataset in order to compute for model building

x_train_flatten=x_train.reshape(len(x_train),28*28)
```

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```
x_test_flatten=x_test.reshape(len(x_test),28*28)

x_train_flatten.shape
```

Step 5 : Make Predictions

Use the model to make predictions based on the independent variable.

```
model=keras.Sequential([

    keras.layers.Dense(10,input_shape=(784,),

                    activation='sigmoid')

])


model.compile(

    optimizer='adam',

    loss='sparse_categorical_crossentropy',

    metrics=['accuracy'])



model.fit(x_train_flatten,y_train,epochs=5



        )
```

OUTPUT :

```
Epoch 1/5
1875/1875 ─────────────── 3s 1ms/step - accuracy: 0.8180 - loss: 0.7118
Epoch 2/5
1875/1875 ─────────────── 3s 1ms/step - accuracy: 0.9148 - loss: 0.3101
Epoch 3/5
1875/1875 ─────────────── 4s 956us/step - accuracy: 0.9238 - loss: 0.2769
Epoch 4/5
1875/1875 ─────────────── 2s 940us/step - accuracy: 0.9250 - loss: 0.2744
Epoch 5/5
1875/1875 ─────────────── 3s 990us/step - accuracy: 0.9239 - loss: 0.2706
<keras.src.callbacks.history.History at 0x7b83d00c6a70>
```

Step 6 : Evaluate the Model

Evaluate the model performance.

```
model.evaluate(x_test_flatten,y_test)
```

OUTPUT :

```
313/313 ─────────────── 0s 1ms/step - accuracy: 0.9138 - loss: 0.3021
[0.26686596870422363, 0.9257000088691711]
```

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RESULT:

This step-by-step process will help us to implement Single Layer Perceptron models using the Keras dataset and analyze their performance.