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

DATE: **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.

```
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.

```
(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.

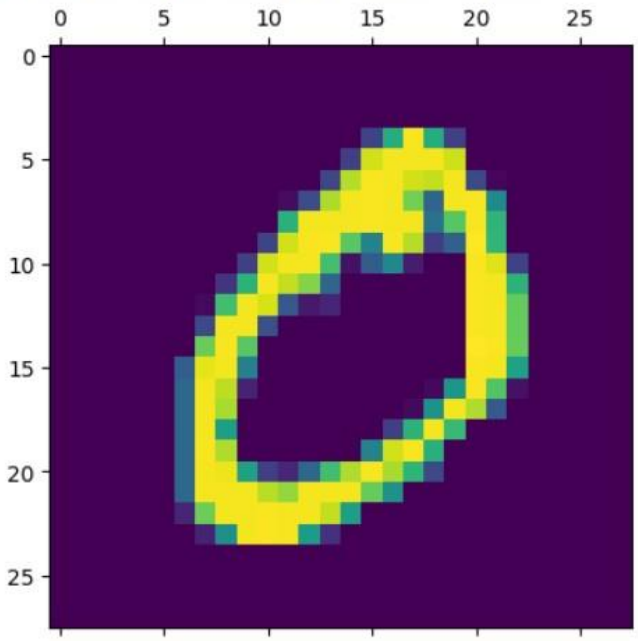
```
print(f"Training set:{X_train.shape}")

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

```
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

```
#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)
```

```
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]
```

RESULT:

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