DEPARTMENT OF
COMPUTER SCIENCE & ENGINEERING

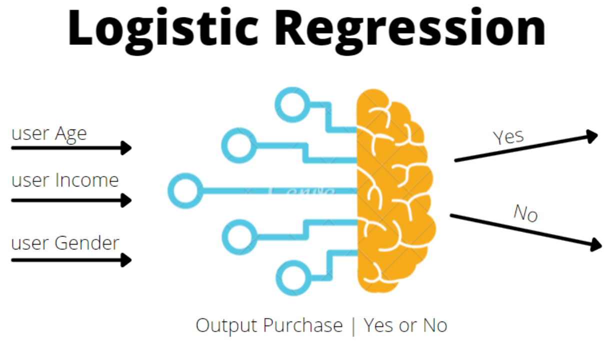
CHANDIGARH UNIVERSITY

Discover. Learn. Empower.

Experiment No. 4

Experiment Title: Support Vector Machine(SVM)

Student Name: YANA SRIVASTAVA **UID:** 20BCS2279
Branch: CSE **Section/Group:** 20BCS-WM-906/B
Semester: 5th **Date of Performance:** 14/10/22
Subject Name: Machine Learning Lab **Subject Code:** 21CSP-317



1. Aim/Overview of the practical:

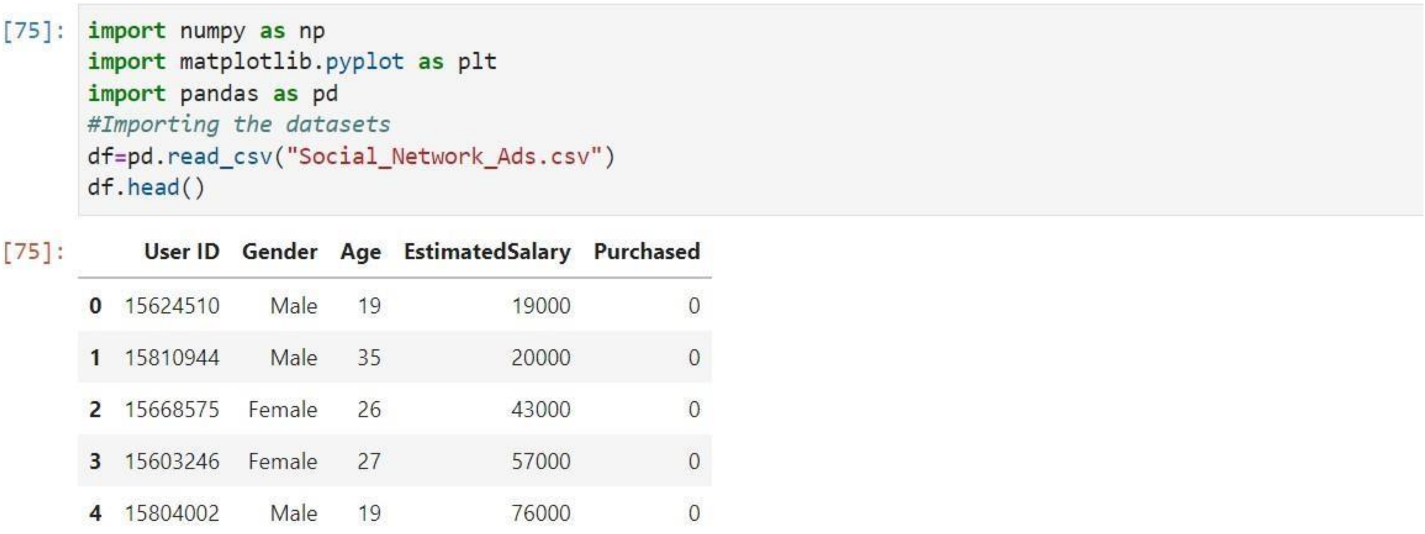
Implement Support Vector Machine on any data set and analyze the accuracy with Logistic regression.

2. Steps of Experiment:

- Import all the required library.
- Import the dataset which you want to implement.
- Split data into x and y and perform some task.
- Split data into training set and testing set.

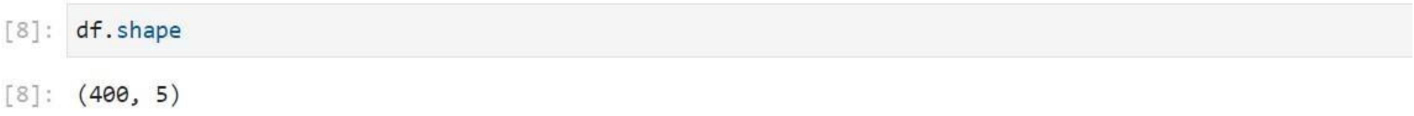
- Feature Scaling
- Predict The test set result
- Check the accuracy score by using different kernel
- Plot the train data
- Plot the test data
- Predicting the test set result
- Plot data points
- Create the hyperplane
- Plot the hyperplane

3. Source Code/Result/Output:



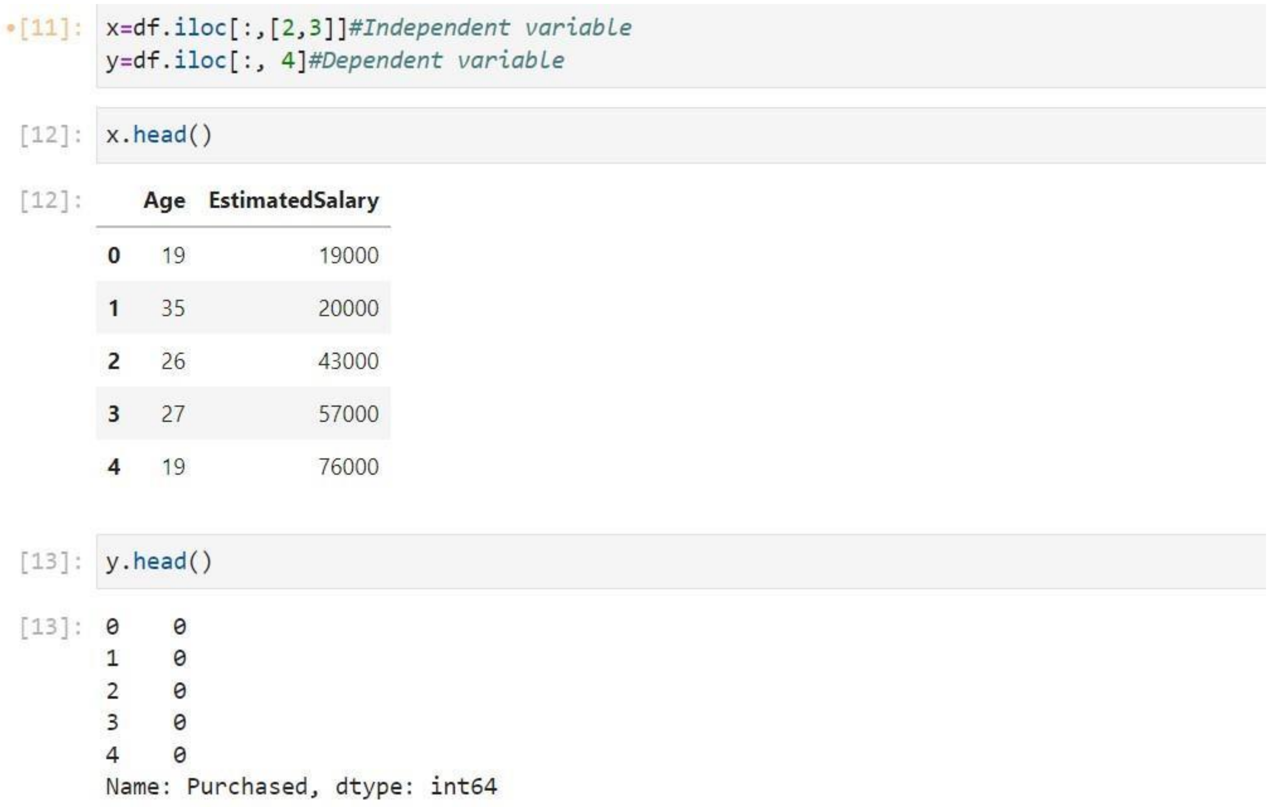
```
[75]: import numpy as np
      import matplotlib.pyplot as plt
      import pandas as pd
      #Importing the datasets
      df=pd.read_csv("Social_Network_Ads.csv")
      df.head()
```

```
[75]:      User ID  Gender  Age  EstimatedSalary  Purchased
      0   15624510    Male   19            19000          0
      1   15810944    Male   35            20000          0
      2   15668575  Female   26            43000          0
      3   15603246  Female   27            57000          0
      4   15804002    Male   19            76000          0
```



```
[8]: df.shape
```

```
[8]: (400, 5)
```

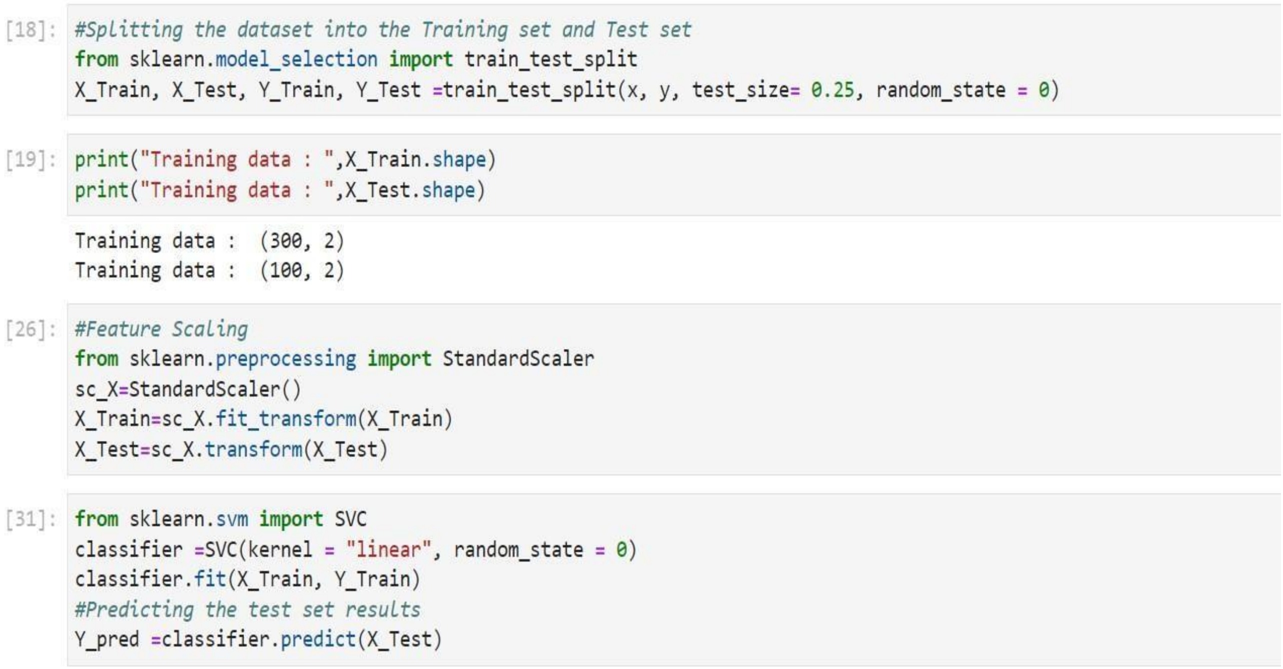


```
•[11]: x=df.iloc[:,[2,3]]#Independent variable
       y=df.iloc[:, 4]#Dependent variable

[12]: x.head()
```

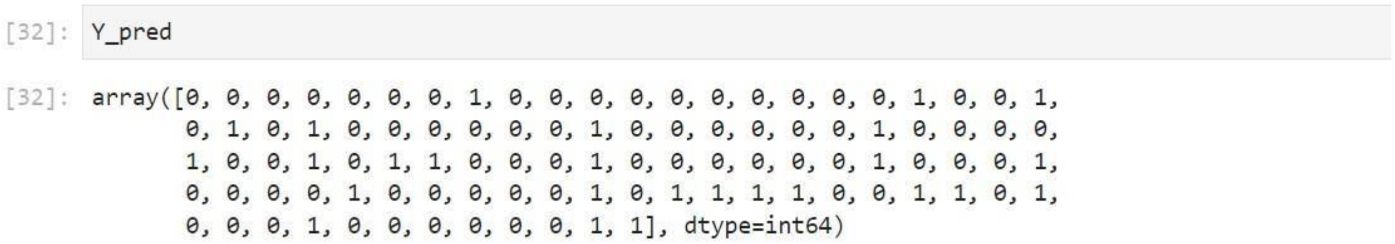
[12]:

	Age	EstimatedSalary
0	19	19000
1	35	20000
2	26	43000
3	27	57000
4	19	76000

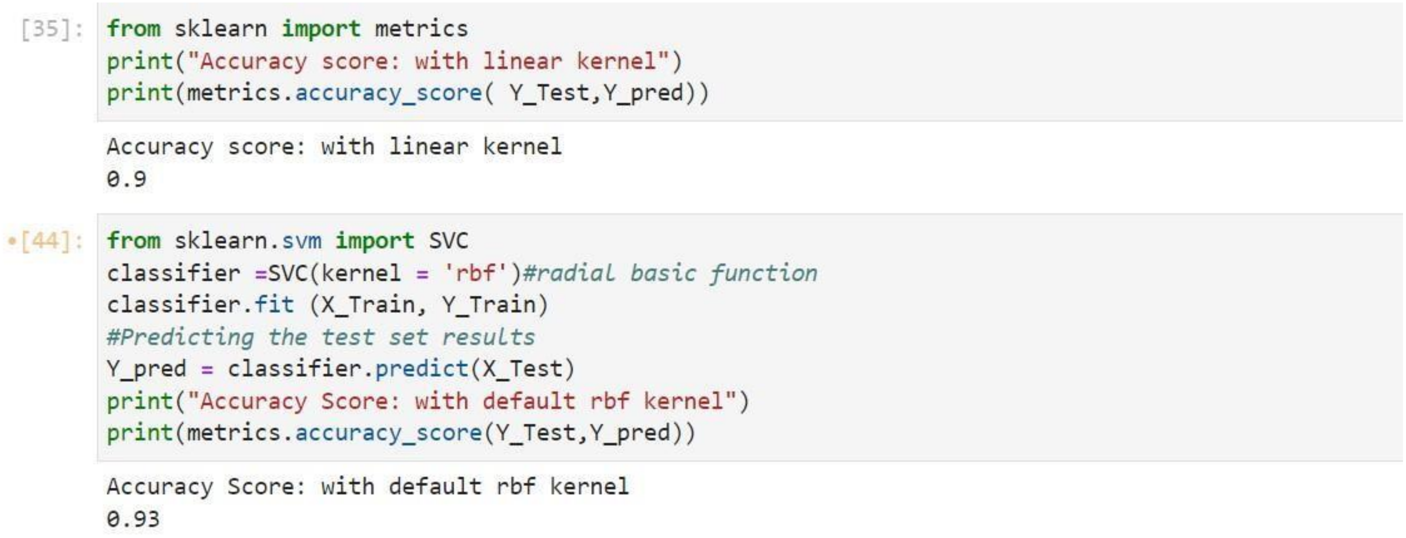
```
[13]: y.head()

[13]: 0    0
      1    0
      2    0
      3    0
      4    0
      Name: Purchased, dtype: int64
```



```
[18]: #Splitting the dataset into the Training set and Test set
      from sklearn.model_selection import train_test_split
      X_Train, X_Test, Y_Train, Y_Test =train_test_split(x, y, test_size= 0.25, random_state = 0)

[19]: print("Training data : ",X_Train.shape)
      print("Training data : ",X_Test.shape)

      Training data :  (300, 2)
      Training data :  (100, 2)

[26]: #Feature Scaling
      from sklearn.preprocessing import StandardScaler
      sc_X=StandardScaler()
      X_Train=sc_X.fit_transform(X_Train)
      X_Test=sc_X.transform(X_Test)

[31]: from sklearn.svm import SVC
      classifier =SVC(kernel = "linear", random_state = 0)
      classifier.fit(X_Train, Y_Train)
      #Predicting the test set results
      Y_pred =classifier.predict(X_Test)
```

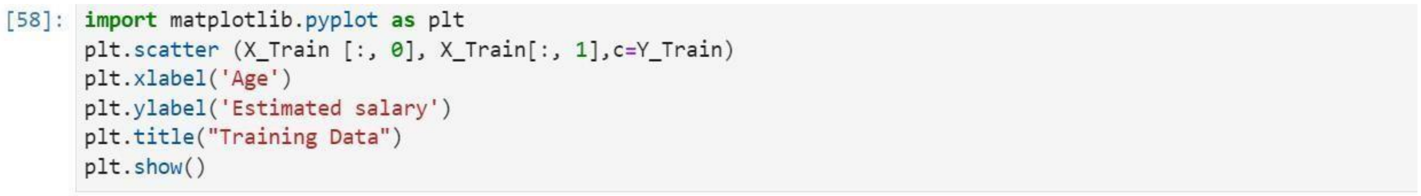


```
[32]: Y_pred

[32]: array([0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1,
             0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0,
             1, 0, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1,
             0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 1, 1, 1, 1, 0, 0, 1, 1, 0, 1,
             0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 1], dtype=int64)
```

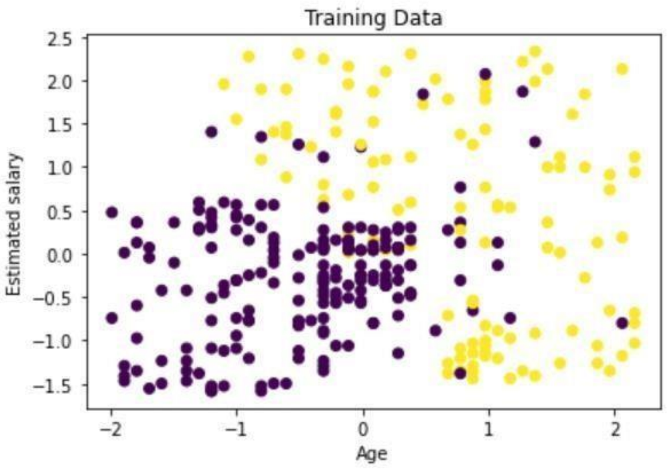


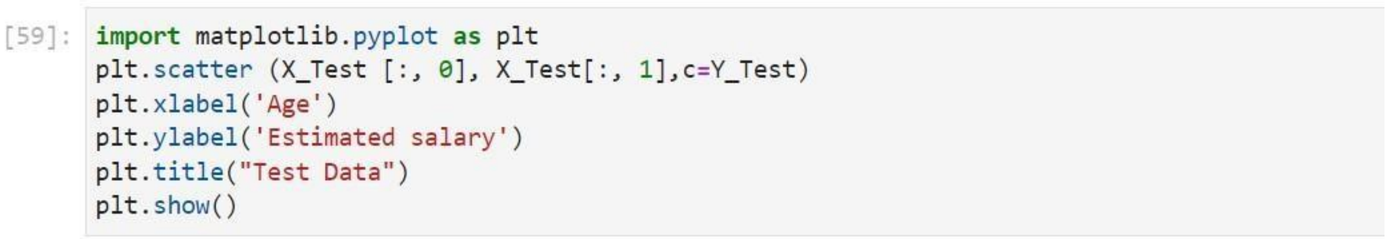
```
[35]: from sklearn import metrics
      print("Accuracy score: with linear kernel")
      print(metrics.accuracy_score( Y_Test,Y_pred))

      Accuracy score: with linear kernel
      0.9
```

```
•[44]: from sklearn.svm import SVC
       classifier =SVC(kernel = 'rbf')#radial basic function
       classifier.fit (X_Train, Y_Train)
       #Predicting the test set results
       Y_pred = classifier.predict(X_Test)
       print("Accuracy Score: with default rbf kernel")
       print(metrics.accuracy_score(Y_Test,Y_pred))

       Accuracy Score: with default rbf kernel
       0.93
```



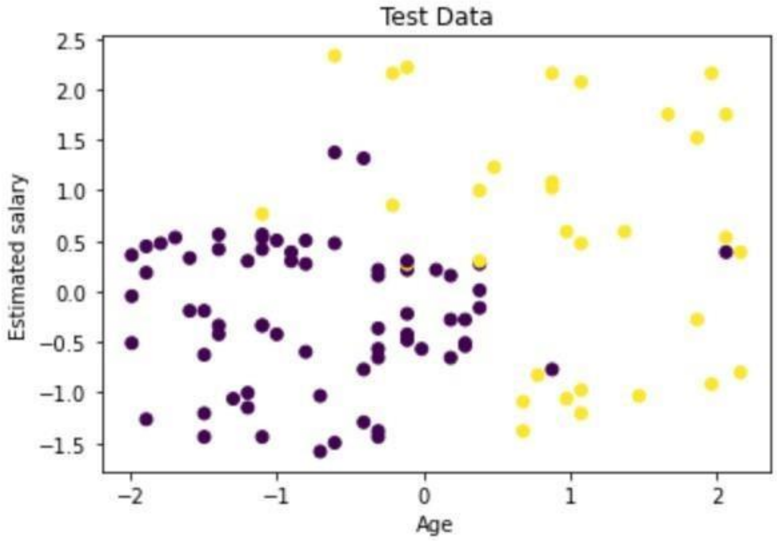
```
[58]: import matplotlib.pyplot as plt
      plt.scatter (X_Train [:, 0], X_Train[:, 1],c=Y_Train)
      plt.xlabel('Age')
      plt.ylabel('Estimated salary')
      plt.title("Training Data")
      plt.show()
```

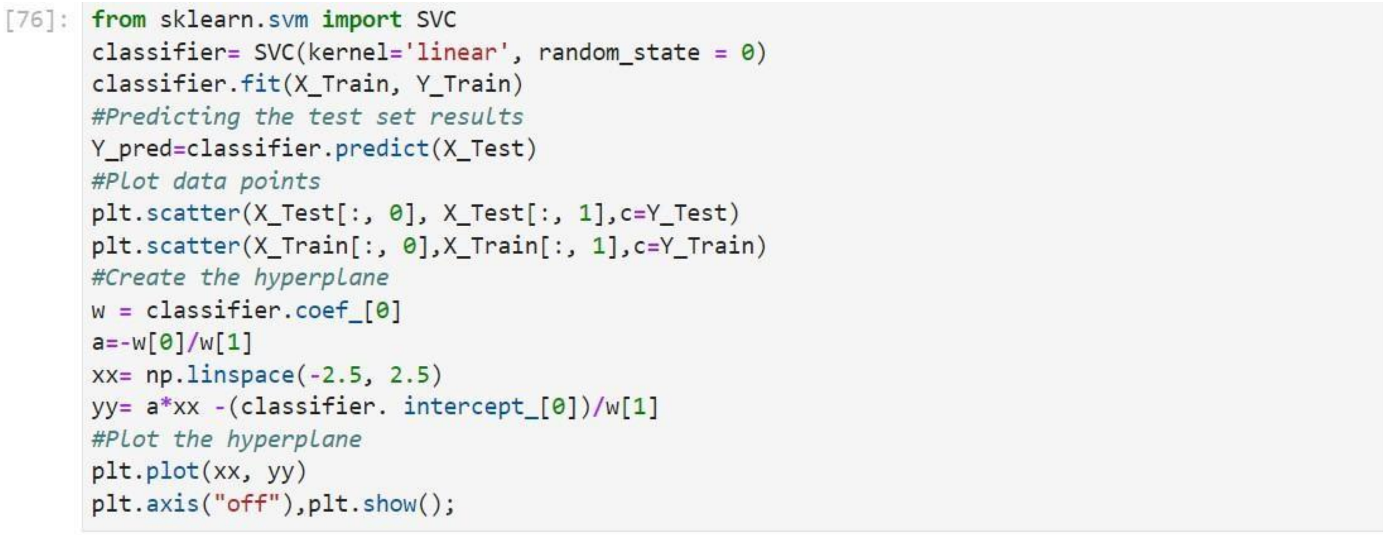




[59]:

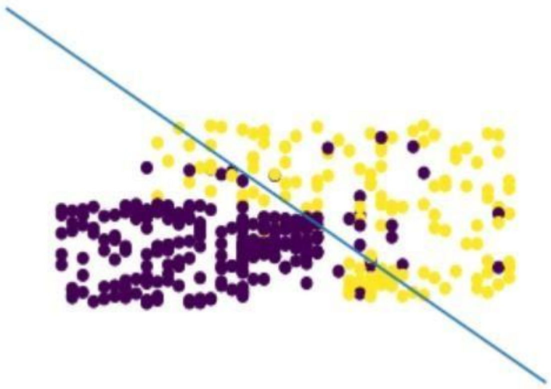
```
import matplotlib.pyplot as plt
plt.scatter (X_Test [:, 0], X_Test[:, 1],c=Y_Test)
plt.xlabel('Age')
plt.ylabel('Estimated salary')
plt.title("Test Data")
plt.show()
```





[76]:

```
from sklearn.svm import SVC
classifier= SVC(kernel='linear', random_state = 0)
classifier.fit(X_Train, Y_Train)
#Predicting the test set results
Y_pred=classifier.predict(X_Test)
#Plot data points
plt.scatter(X_Test[:, 0], X_Test[:, 1],c=Y_Test)
plt.scatter(X_Train[:, 0],X_Train[:, 1],c=Y_Train)
#Create the hyperplane
w = classifier.coef_[0]
a=-w[0]/w[1]
xx= np.linspace(-2.5, 2.5)
yy= a*xx -(classifier. intercept_[0])/w[1]
#Plot the hyperplane
plt.plot(xx, yy)
plt.axis("off"),plt.show();
```



Learning outcomes (What I have learnt):

1. **Learnt to analyze the data.**
2. **Learnt to import various libraries.**
3. **Learnt to read csv files.**
4. **Learnt to implement Logistic Regression.**
5. **Learnt to train and test the data.**
6. **Learnt the concept of SVM (Support Vector Machine).**

Evaluation Grid:

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.	Student Performance (Conduct of experiment) objectives/Outcomes.		12
2.	Viva Voce		10
3.	Submission of Work Sheet (Record)		8
	Total		30