```
from google.colab import drive

drive.mount('/content/gdrive')
```

```
     Mounted at /content/gdrive
```

```
cd /content/gdrive/My Drive/k means clustering
```

```
     /content/gdrive/My Drive/k means clustering
```

```
ls
```

```
     'case study 1(1).pdf'       gender_classification_v7.csv   README.md
     'case study 1.pdf'          k-means-clustering.ipynb
     'Copy of driver-data.csv'   LICENSE
```

```
import pandas as pd,numpy as np,matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression as LR
from sklearn.neighbors import KNeighborsClassifier as KNC
from sklearn.svm import SVC
from sklearn.naive_bayes import GaussianNB as GNB
from sklearn.tree import DecisionTreeClassifier as DTC
from sklearn.ensemble import RandomForestClassifier as RFC
import seaborn as s
from sklearn.metrics import accuracy_score
```

Importing the Dataset -

```
#loading the dataset
data=pd.read_csv("gender_classification_v7.csv")
```

```
data.head()   #print first five rows
```

	long_hair	forehead_width_cm	forehead_height_cm	nose_wide	nose_long	lips_thin	di
0	1	11.8	6.1	1	0	1	
1	0	14.0	5.4	0	0	1	
2	0	11.8	6.3	1	1	1	
3	0	14.4	6.1	0	1	1	
4	1	13.5	5.9	0	0	0	

```
data.tail()    #print last five rows
```

	long_hair	forehead_width_cm	forehead_height_cm	nose_wide	nose_long	lips_thin
4996	1	13.6	5.1	0	0	0
4997	1	11.9	5.4	0	0	0
4998	1	12.9	5.7	0	0	0
4999	1	13.2	6.2	0	0	0
5000	1	15.4	5.4	1	1	1

EDA

```
#statistical measure of the data
data.describe()
```

	long_hair	forehead_width_cm	forehead_height_cm	nose_wide	nose_long	lips_thin	distance_nose_to_lip_long
count	5001.000000	5001.000000	5001.000000	5001.000000	5001.000000	5001.000000	5001.000000
mean	0.869626	13.181484	5.946311	0.493901	0.507898	0.493101	0.498900
std	0.336748	1.107128	0.541268	0.500013	0.499988	0.500002	0.500049
min	0.000000	11.400000	5.100000	0.000000	0.000000	0.000000	0.000000
25%	1.000000	12.200000	5.500000	0.000000	0.000000	0.000000	0.000000
50%	1.000000	13.100000	5.900000	0.000000	1.000000	0.000000	0.000000

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5001 entries, 0 to 5000
Data columns (total 8 columns):
 #   Column                     Non-Null Count  Dtype  
---  ------                     --------------  -----  
 0   long_hair                  5001 non-null   int64  
 1   forehead_width_cm          5001 non-null   float64
 2   forehead_height_cm         5001 non-null   float64
 3   nose_wide                  5001 non-null   int64  
 4   nose_long                  5001 non-null   int64  
 5   lips_thin                  5001 non-null   int64  
 6   distance_nose_to_lip_long  5001 non-null   int64  
 7   gender                     5001 non-null   object 
dtypes: float64(2), int64(5), object(1)
memory usage: 312.7+ KB
```

```
print(np.shape(data))
```

```
(5001, 8)
```

> The above analysis tells us that the dataset has 14 columns ans 303 columns and the data types are "int64" and "float64"

```
print(data.columns) #prints name of the columns
```

```
Index(['long_hair', 'forehead_width_cm', 'forehead_height_cm', 'nose_wide',
       'nose_long', 'lips_thin', 'distance_nose_to_lip_long', 'gender'],
      dtype='object')
```

```
print(data.isnull().any())  # checking for any null value in the data set
```

```
long_hair                    False
forehead_width_cm            False
forehead_height_cm           False
nose_wide                    False
nose_long                    False
lips_thin                    False
distance_nose_to_lip_long    False
gender                       False
dtype: bool
```

```
data= data.replace(['Male','Female'],[1, 0])
```

```
data.head()
```

	long_hair	forehead_width_cm	forehead_height_cm	nose_wide	nose_long	lips_thin	distance_nose_to_lip_long	gender
0	1	11.8	6.1	1	0	1	1	1
1	0	14.0	5.4	0	0	1	0	0
2	0	11.8	6.3	1	1	1	1	1
3	0	14.4	6.1	0	1	1	1	1
4	1	13.5	5.9	0	0	0	0	0

> result shows there are no null values

```
#checking on the target variable
data["gender"].value_counts()
```

```
0    2501
1    2500
Name: gender, dtype: int64
```

```
X=data.drop(["gender"],axis=1)
X
```

	long_hair	forehead_width_cm	forehead_height_cm	nose_wide	nose_long	lips_thin	distance_nose_to_lip_long
0	1	11.8	6.1	1	0	1	1
1	0	14.0	5.4	0	0	1	0
2	0	11.8	6.3	1	1	1	1
3	0	14.4	6.1	0	1	1	1
4	1	13.5	5.9	0	0	0	0
...	...	...	...	...	...	...	...
4996	1	13.6	5.1	0	0	0	0
4997	1	11.9	5.4	0	0	0	0
4998	1	12.9	5.7	0	0	0	0
4999	1	13.2	6.2	0	0	0	0
5000	1	15.4	5.4	1	1	1	1

5001 rows × 7 columns

```
y=data.gender
y
```

```
0       1
1       0
2       1
3       1
4       0
       ..
4996    0
4997    0
4998    0
4999    0
5000    1
Name: gender, Length: 5001, dtype: int64
```

Splitting data into train_set and test_set

```
x_train,x_test,y_train,y_test=train_test_split(X,y,test_size=0.2,random_state=0)
```

```
#checking the splitted value

print(x_test.shape,x_train.shape,y_test.shape,y_train.shape)
```

```
(1001, 7) (4000, 7) (1001,) (4000,)
```

performing some model and training the data set

Logistic Regression

```
#choosing a model currently logistic regression

log=LR()
log.fit(x_train,y_train)   #training a model   x_train.T to transpose
```

```
print("Test accuracy of training data using Logistic regression: {}".format(log.score(x_train,y_train)*100))
print("Test accuracy of test data usning Logistic regression: {}".format(log.score(x_test,y_test)*100))
```

```
Test accuracy of training data using Logistic regression: 96.925
Test accuracy of test data usning Logistic regression: 96.5034965034965
```

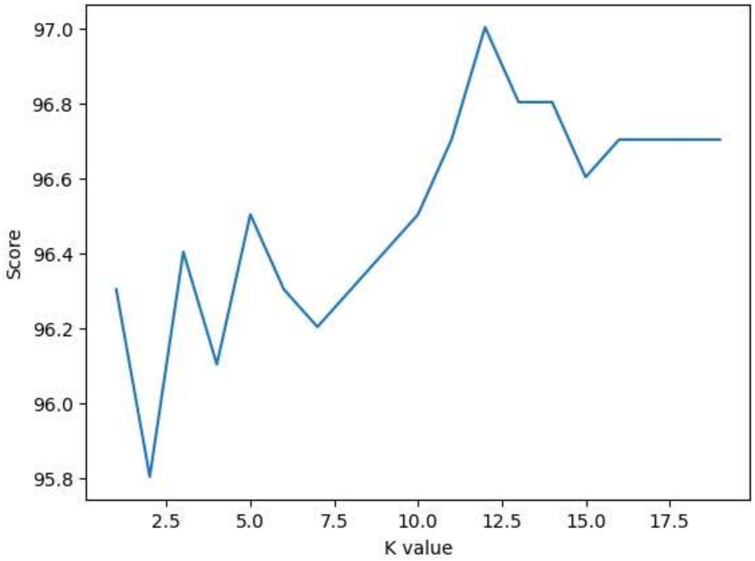
K nearest neighbour

```
#k nearest neighbour

knn=KNC(n_neighbors=7)
knn.fit(x_train,y_train)

print("Test accuracy of training data using KNN: {}".format(knn.score(x_train,y_train)*100))
print("Test accuracy of test data using KNN regression: {}".format(knn.score(x_test,y_test)*100))
```

```
Test accuracy of training data using KNN: 97.575
Test accuracy of test data using KNN regression: 96.2037962037962
```

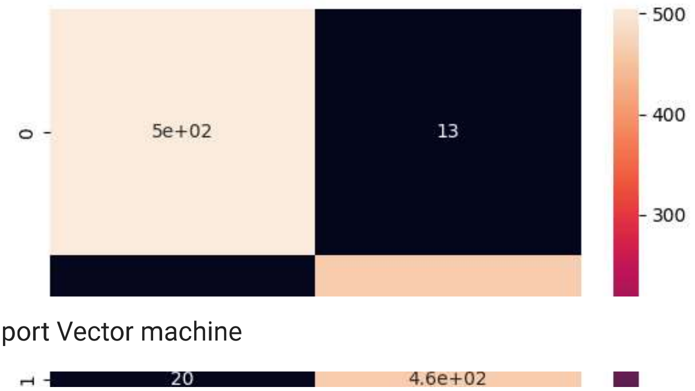
```
# to get the best accuracy
score=[]
for i in range(1,20):
    knn=KNC(n_neighbors=i)
    knn.fit(x_train,y_train)
    prediction=knn.predict(x_test)
    score.append(knn.score(x_test,y_test)*100)
print("the best accuracy is",max(score),"at",score.index(max(score))+1)


plt.plot(range(1,20),score
        )
plt.xlabel("K value")
plt.ylabel("Score")
plt.show()
```

```
the best accuracy is 97.002997002997 at 12
```



```
from sklearn.metrics import confusion_matrix,classification_report
cm=confusion_matrix(y_test,knn_predicting)
s.heatmap(cm,annot=True)
```

```
<Axes: >
```



Support Vector machine

```
# support vector machine algorithm

svm=SVC(random_state=1)
svm.fit(x_train,y_train)
print("Test accuracy of training data using SVM: {}".format(svm.score(x_train,y_train)*100))
print("Test accuracy of test data using SVM regression: {}".format(svm.score(x_test,y_test)*100))
```

```
    Test accuracy of training data using SVM: 97.35000000000001
    Test accuracy of test data using SVM regression: 96.6033966033966
```

Naive Bayes Algorithm

```
#naive bayes algo

nb=GNB()
nb.fit(x_train,y_train)
print("Test accuracy of training data using NB: {}".format(nb.score(x_train,y_train)*100))
print("Test accuracy of test data using NB regression: {}".format(nb.score(x_test,y_test)*100))
```

```
    Test accuracy of training data using NB: 97.275
    Test accuracy of test data using NB regression: 96.8031968031968
```

Decision Tree Algorithm

```
# decision tree algo

dtc=DTC()
dtc.fit(x_train,y_train)
print("Test accuracy of training data using DTC regression: {}".format(dtc.score(x_train,y_train)*100))
print("Test accuracy of test data using DTC regression: {}".format(dtc.score(x_test,y_test)*100))
```

```
    Test accuracy of training data using DTC regression: 99.925
    Test accuracy of test data using DTC regression: 96.00399600399601
```

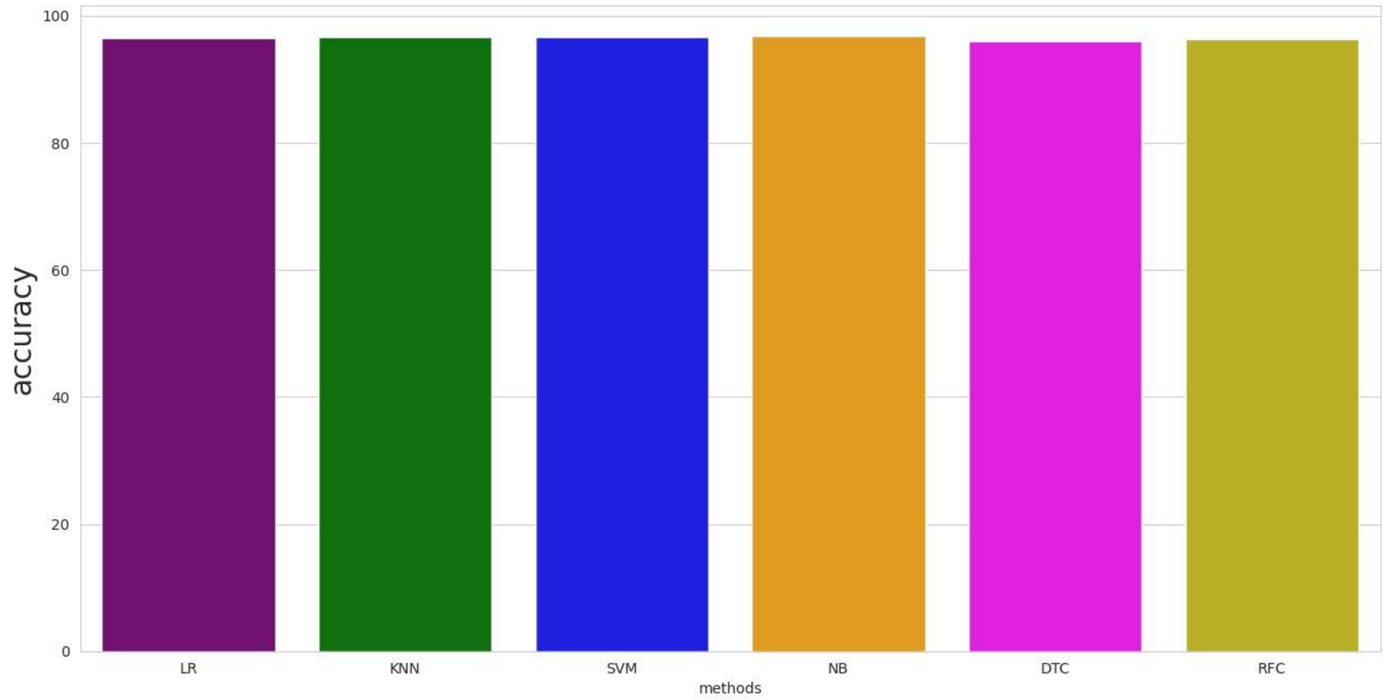
Random Forest algorithm

```
# random forest algorithm

rf=RFC(n_estimators=1000,random_state=1)
rf.fit(x_train,y_train)
print("Test accuracy of training data using RFC regression: {}".format(rf.score(x_train,y_train)*100))
print("Test accuracy of test data using RFC regression: {}".format(rf.score(x_test,y_test)*100))
```

```
    Test accuracy of training data using RFC regression: 99.925
    Test accuracy of test data using RFC regression: 96.30369630369631
```

```
methods=["LR","KNN","SVM","NB","DTC","RFC"]
accuracy=[log.score(x_test,y_test)*100,knn.score(x_test,y_test)*100,svm.score(x_test,y_test)*100,nb.score(x_test,y_test)*100,dtc.score(x_test
colors=["purple","green","blue","orange","magenta","#CFC60E","#0FBBAE"]


s.set_style("whitegrid")
plt.figure(figsize=(16,8))
plt.ylabel("accuracy",size=20)
plt.xlabel("methods")
s.barplot(x=methods,y=accuracy,palette=colors)
```

```
<Axes: xlabel='methods', ylabel='accuracy'>
```



Applying KNN to predict the output

```
knn_predicting=knn.predict(x_test)
print("y true :",y_test[:10].values)
print("y predict :",knn_predicting[:10])
```

```
y true : [0 1 1 0 0 0 0 1 0 0]
y predict : [0 1 1 0 0 0 0 1 0 0]
```