Diabetes Prediction Using SVM Model

importing required libraries

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
df = pd.read_csv("diabetes.csv")
df.head()
```

Out[2]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
0	6	148	72	35	0	33.6	0.627	50	1
1	1	85	66	29	0	26.6	0.351	31	0
2	8	183	64	0	0	23.3	0.672	32	1
3	1	89	66	23	94	28.1	0.167	21	0
4	0	137	40	35	168	43.1	2.288	33	1

In [3]:
```
df.shape
```

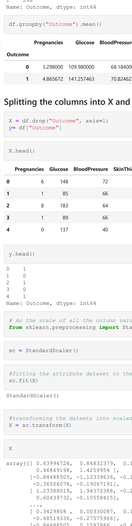
Out[3]:
```
(768, 9)
```

In [4]:
```
df.describe()
```

Out[4]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
count	768.000000	768.000000	768.000000	768.000000	768.000000	768.000000	768.000000	768.000000	768.000000
mean	3.845052	120.894531	69.105469	20.536458	79.799479	31.992578	0.471876	33.240885	0.348958
std	3.369578	31.972618	19.355807	15.952218	115.244002	7.884160	0.331329	11.760232	0.476951
min	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.078000	21.000000	0.000000
25%	1.000000	99.000000	62.000000	0.000000	0.000000	27.300000	0.243750	24.000000	0.000000
50%	3.000000	117.000000	72.000000	23.000000	30.500000	32.000000	0.372500	29.000000	0.000000
75%	6.000000	140.250000	80.000000	32.000000	127.250000	36.600000	0.626250	41.000000	1.000000
max	17.000000	199.000000	122.000000	99.000000	846.000000	67.100000	2.420000	81.000000	1.000000

In [41]:
```
# Testing for the correlation between the dataset features.
sns.heatmap(data=df.corr(),cmap="YlGnBu", annot=True)
plt.show()
```



EDA PERFORMANCE

In [5]:
```
df.isna().sum()
```

Out[5]:
```
Pregnancies                 0
Glucose                     0
BloodPressure               0
SkinThickness               0
Insulin                     0
BMI                         0
DiabetesPedigreeFunction    0
Age                         0
Outcome                     0
dtype: int64
```

In [6]:
```
df["Outcome"].value_counts()
```

Out[6]:
```
0    500
1    268
Name: Outcome, dtype: int64
```

In [7]:
```
df.groupby("Outcome").mean()
```

Out[7]:

Outcome	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age
0	3.298000	109.980000	68.184000	19.664000	68.792000	30.304200	0.429734	31.190000
1	4.865672	141.257463	70.824627	22.164179	100.335821	35.142537	0.550500	37.067164

Splitting the columns into X and Y Variables for the model building process.

In [8]:
```
X = df.drop("Outcome", axis=1)
y= df["Outcome"]
```

In [9]:
```
X.head()
```

Out[9]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age
0	6	148	72	35	0	33.6	0.627	50
1	1	85	66	29	0	26.6	0.351	31
2	8	183	64	0	0	23.3	0.672	32
3	1	89	66	23	94	28.1	0.167	21
4	0	137	40	35	168	43.1	2.288	33

In [10]:
```
y.head()
```

Out[10]:
```
0    1
1    0
2    1
3    0
4    1
Name: Outcome, dtype: int64
```

In [11]:
```
# As the scale of all the column values are not in same scale. So we need to Standardize the values to one sca
from sklearn.preprocessing import StandardScaler
```

In [12]:
```
sc = StandardScaler()
```

In [13]:
```
#fitting the attribute dataset to the scaling library.
sc.fit(X)
```

Out[13]:
```
StandardScaler()
```

In [14]:
```
#transforming the datasets into scaled arrays
X = sc.transform(X)
```

In [15]:
```
X
```

Out[15]:
```
array([[ 0.63994726,  0.84832379,  0.14964075, ...,  0.20401277,
         0.46849198,  1.4259954 ],
       [-0.84488505, -1.12339636, -0.16054575, ..., -0.68442195,
        -0.36506078, -0.19067191],
       [ 1.23388019,  1.94372388, -0.26394125, ..., -1.10325546,
         0.60439732, -0.10558415],
       ...,
       [ 0.3429808 ,  0.00330087,  0.14964075, ..., -0.73518964,
        -0.68519336, -0.27575966],
       [-0.84488505,  0.1597866 , -0.47073225, ..., -0.24020459,
        -0.37110101,  1.17073215],
       [-0.84488505,  0.4778032 ,  0.04624525, ..., -0.20212881,
        -0.47378505, -0.87137393]])
```

In [16]:
```
y
```

Out[16]:
```
0      1
1      0
2      1
3      0
4      1
      ..
763    0
764    0
765    0
766    1
767    0
Name: Outcome, Length: 768, dtype: int64
```

Splitting the dataset into Training and Testing Dataset

In [17]:
```
from sklearn.model_selection import train_test_split
```

In [18]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=101)
```

In [19]:
```
X_train
```

Out[19]:
```
array([[-0.54791859, -0.8730192 , -0.26394125, ...,  0.76245745,
         0.61043756, -0.87137393],
       [ 0.04601433,  1.97502103,  0.45598725, ...,  0.63553821,
        -0.6278311 , -0.19067191],
       [-0.54791859,  0.12884845, -0.47073225, ...,  0.22939662,
        -1.15935199, -0.19067191],
       ...,
       [-0.84488505, -0.05929342, -1.29789624, ...,  0.44515934,
        -0.5794892 , -0.70113947],
       [ 0.3429808 , -0.19844823,  0.35643375, ..., -0.10059342,
        -0.38922173,  0.91546899],
       [ 1.53084665,  0.28495758,  0.04624525, ...,  0.28016432,
         0.54339494,  1.00055664]])
```

In [20]:
```
y_train
```

Out[20]:
```
709    1
425    1
135    0
430    1
500    0
      ..
75     0
599    0
575    0
337    1
523    1
Name: Outcome, Length: 614, dtype: int64
```

In [21]:
```
X_test
```

Out[21]:
```
array([[-0.84488505,  0.1597866 , -0.47073225, ..., -0.24020459,
        -0.37110101,  1.17073215],
       [-0.25095213,  2.06891246,  0.04624525, ...,  0.55938666,
        -0.19230140,  0.23476686],
       [ 0.93691372, -0.46615631,  1.18359575, ..., -1.179407  ,
        -0.75339454,  1.2558199 ],
       ...,
       [ 0.63994726,  0.41014376,  0.04624525, ...,  0.43246745,
         0.21178189, -0.36086741],
       [ 1.82781311, -1.65564785,  1.90736425, ...,  0.44515934,
        -0.56438861,  1.17073215],
       [ 1.01567896, -0.65393938,  0.45598725, ...,  0.58477051,
        -0.18083354,  1.08564439]])
```

In [22]:
```
y_test
```

Out[22]:
```
766    1
748    1
42     0
485    1
543    0
      ..
603    1
510    1
171    1
472    0
298    1
Name: Outcome, Length: 154, dtype: int64
```

In [23]:
```
X_train.shape
```

Out[23]:
```
(614, 8)
```

In [24]:
```
X_test.shape
```

Out[24]:
```
(154, 8)
```

In [25]:
```
y_train.shape
```

Out[25]:
```
(614,)
```

In [26]:
```
y_test.shape
```

Out[26]:
```
(154,)
```

Model Building

In [27]:
```
from sklearn import svm
```

In [28]:
```
#attaining a variable to the model
classifier = svm.SVC(kernel='linear')
```

In [29]:
```
#fitting the training dataset into model
classifier.fit(X_train, y_train)
```

Out[29]:
```
SVC(kernel='linear')
```

In [30]:
```
#predicting the output for the training dataset
X_train_pred = classifier.predict(X_train)
```

In [31]:
```
from sklearn.metrics import accuracy_score
```

In [32]:
```
#Calculating how accurate the model is built according to the actual dataset
X_train_accuracy = accuracy_score(X_train_pred, y_train)
```

In [33]:
```
print("The Training model Prediction is :", round(X_train_accuracy *100,2), "%")
```

```
The Training model Prediction is : 77.85 %
```

In [34]:
```
#Now modelling the same with the Test Datastet
X_test_pred = classifier.predict(X_test)
```

In [35]:
```
#Calculating how accurate the model is built according to the actual dataset
X_test_accuracy = accuracy_score(X_test_pred, y_test)
```

In [36]:
```
print("The Testing model Prediction is :", round(X_test_accuracy *100,2), "%")
```

```
The Testing model Prediction is : 77.27 %
```

Manual Prediction

In [37]:
```
input_data = (2,197,70,45,543,30.5,0.158,53)

input_data_as_numpy_array = np.asarray(input_data)

input_data_reshaped = input_data_as_numpy_array.reshape(1,-1)

std_data = sc.transform(input_data_reshaped)

std_data

prediction = classifier.predict(std_data)

print(prediction)

if (prediction ==1):
    print("The person is a Diabetic")
else:
    print("the person is not a Diabetic")
```

```
[1]
The person is a Diabetic
```

Thus the SVM Model for detecting any Diabetic Patient is Ready and accurate.