Reshav Saroa

Assignment 19

Predict whether the person is having diabetes or not

1.Logistic Regression

2. Decision Tree

3. Random Forest

4. Adaptive Boosting

5. Gradient Boosting

Compare the results and tell which algorithm is good for predicting the person is diabetic or not

1.Logistic Regression

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

In [2]:
```
db=pd.read_csv("diabetes - diabetes.csv")
```

In [3]:
```
db.head()
```

Out[3]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction
0	6.0	148.0	72.0	35.0	0.0	33.6	0.627
1	1.0	85.0	66.0	29.0	0.0	26.6	0.351
2	8.0	183.0	64.0	0.0	0.0	23.3	0.672
3	1.0	89.0	66.0	23.0	94.0	28.1	0.167
4	0.0	137.0	40.0	35.0	168.0	43.1	2.288

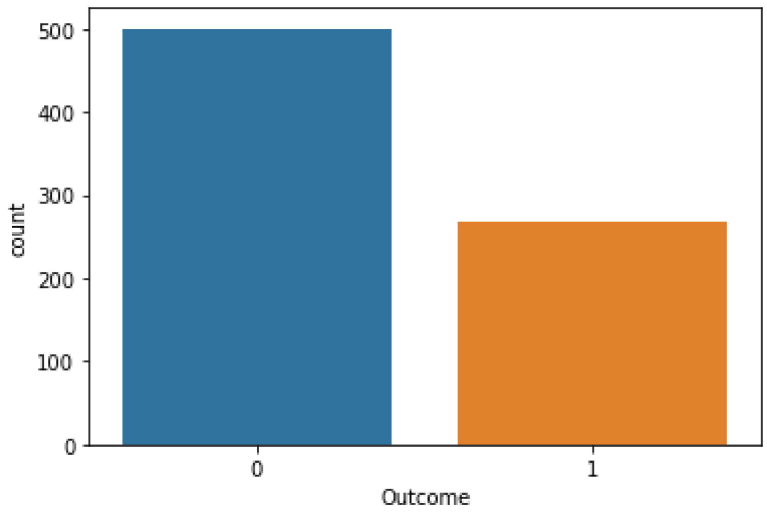
In [4]:
```
db.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 768 entries, 0 to 767
Data columns (total 9 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   Pregnancies               767 non-null    float64
 1   Glucose                   759 non-null    float64
 2   BloodPressure             741 non-null    float64
 3   SkinThickness             747 non-null    float64
 4   Insulin                   732 non-null    float64
 5   BMI                       746 non-null    float64
 6   DiabetesPedigreeFunction  752 non-null    float64
 7   Age                       762 non-null    float64
 8   Outcome                   768 non-null    int64  
dtypes: float64(8), int64(1)
memory usage: 54.1 KB
```

In [5]:
```
sns.countplot(db['Outcome'],label='abs_values')
```

```
C:\Users\keerti chouhan\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[5]: <AxesSubplot:xlabel='Outcome', ylabel='count'>



In [6]:
```
db.describe()
```

Out[6]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	Diabetes
count	767.000000	759.000000	741.000000	747.000000	732.000000	746.000000	
mean	3.844850	121.001318	69.026991	20.416332	78.285519	32.013673	
std	3.371772	32.071511	19.378222	15.976672	113.071200	7.896529	
min	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	1.000000	99.000000	62.000000	0.000000	0.000000	27.325000	
50%	3.000000	117.000000	72.000000	23.000000	22.500000	32.050000	
75%	6.000000	141.000000	80.000000	32.000000	126.250000	36.600000	
max	17.000000	199.000000	122.000000	99.000000	846.000000	67.100000	

In [7]:
```
db.isna().sum()
```

Out[7]:
```
Pregnancies                 1
Glucose                     9
BloodPressure              27
SkinThickness              21
Insulin                    36
BMI                        22
DiabetesPedigreeFunction   16
Age                         6
Outcome                     0
dtype: int64
```

In [8]:
```
db['Pregnancies'].fillna(db['Pregnancies'].mean(),inplace=True)
db['Glucose'].fillna(db['Glucose'].mean(),inplace=True)
db['BloodPressure'].fillna(db['BloodPressure'].mean(),inplace=True)
db['SkinThickness'].fillna(db['SkinThickness'].mean(),inplace=True)
db['Insulin'].fillna(db['Insulin'].mean(),inplace=True)
db['BMI'].fillna(db['BMI'].mean(),inplace=True)
db['DiabetesPedigreeFunction'].fillna(db['DiabetesPedigreeFunction'].mean(),in
db['Age'].fillna(db['Age'].mean(),inplace=True)
```

In [9]:
```
db.isna().sum()
```

Out[9]:
```
Pregnancies                 0
Glucose                     0
BloodPressure               0
SkinThickness               0
Insulin                     0
BMI                         0
DiabetesPedigreeFunction    0
Age                         0
Outcome                     0
dtype: int64
```

In [10]:
```
db.columns
```

Out[10]:
```
Index(['Pregnancies', 'Glucose', 'BloodPressure', 'SkinThickness', 'Insulin',
       'BMI', 'DiabetesPedigreeFunction', 'Age', 'Outcome'],
      dtype='object')
```

In [11]:
```
x=db[['Pregnancies', 'Glucose', 'BloodPressure', 'SkinThickness', 'Insulin',
       'BMI', 'DiabetesPedigreeFunction', 'Age']]
y=db['Outcome']
```

In [12]:
```
from sklearn.model_selection import train_test_split
```

In [13]:
```
x_train,x_test,y_train,y_test= train_test_split(x,y,test_size=0.2,random_state
```

In [14]:
```
from sklearn.linear_model import LogisticRegression
```

In [15]:
```
model= LogisticRegression()
```

In [53]:
```
model.fit(x_train,y_train)
```

```
C:\Users\keerti chouhan\anaconda3\lib\site-packages\sklearn\linear_model\_log
istic.py:814: ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html (https://sciki
t-learn.org/stable/modules/preprocessing.html)
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regres
sion (https://scikit-learn.org/stable/modules/linear_model.html#logistic-regr
ession)
  n_iter_i = _check_optimize_result(
```

Out[53]:
```
LogisticRegression()
```

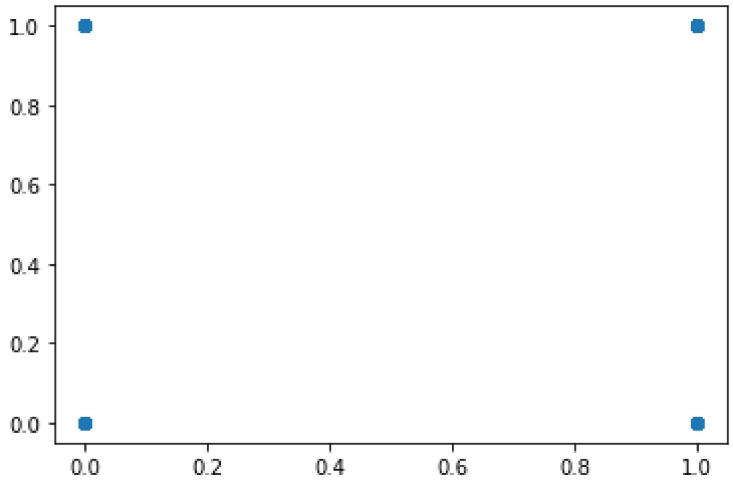
In [17]:
```
predictions=model.predict(x_test)
```

In [18]:
```
predictions
```

Out[18]:
```
array([1, 0, 0, 0, 0, 1, 1, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0, 1, 1, 1, 1, 0,
       0, 0, 0, 0, 0, 0, 1, 1, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1, 1, 1,
       0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0, 0, 1, 0, 1, 0, 1, 0, 0, 0, 1, 1,
       0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 0, 1,
       1, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 1, 1, 0, 0, 0, 0, 0, 1, 1, 0,
       0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0, 0],
      dtype=int64)
```

In [19]:
```
plt.scatter(y_test,predictions)
```

Out[19]:
```
<matplotlib.collections.PathCollection at 0x23351dd0850>
```



In [20]:
```
from sklearn.metrics import confusion_matrix
from sklearn.metrics import classification_report
```

In [21]:
```
print(classification_report(y_test,predictions))
```

```
              precision    recall  f1-score   support

           0       0.81      0.87      0.84       100
           1       0.72      0.61      0.66        54

    accuracy                           0.78       154
   macro avg       0.76      0.74      0.75       154
weighted avg       0.77      0.78      0.77       154
```

In [22]:
```
print(confusion_matrix(y_test,predictions))
```

```
[[87 13]
 [21 33]]
```

Decision Tree

In [23]:
```
from sklearn.tree import DecisionTreeClassifier
```

In [24]:
```
dtree=DecisionTreeClassifier()
```

In [25]:
```
dtree.fit(x_train,y_train)
```

Out[25]:
```
DecisionTreeClassifier()
```

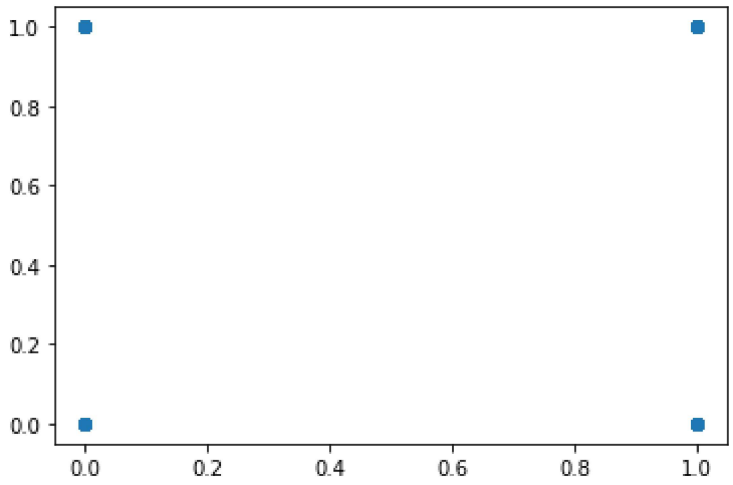
In [26]:
```
pridiction1=dtree.predict(x_test)
```

In [27]:
```
pridiction1
```

Out[27]:
```
array([1, 0, 0, 1, 0, 1, 1, 0, 0, 0, 1, 1, 0, 1, 1, 1, 0, 1, 1, 0, 1, 0,
       0, 1, 1, 0, 0, 1, 1, 0, 0, 1, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0, 1, 1,
       0, 0, 0, 0, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 1, 0,
       0, 0, 0, 1, 0, 1, 1, 0, 0, 0, 0, 1, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0,
       1, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 1, 0, 1, 0, 0, 1, 0, 1, 0, 0, 0,
       1, 1, 0, 0, 1, 0, 1, 0, 0, 1, 1, 0, 1, 1, 0, 0, 1, 0, 0, 0, 1, 0,
       0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 0, 1, 1, 0, 0, 0, 0, 1],
      dtype=int64)
```

In [28]:
```
plt.scatter(y_test,predictions)
```

Out[28]:
```
<matplotlib.collections.PathCollection at 0x23351fb6b50>
```



In [29]:
```
print(classification_report(y_test,pridiction1))
```

```
              precision    recall  f1-score   support

           0       0.80      0.72      0.76       100
           1       0.56      0.67      0.61        54

    accuracy                           0.70       154
   macro avg       0.68      0.69      0.68       154
weighted avg       0.72      0.70      0.71       154
```

In [30]:
```
print(confusion_matrix(y_test,pridiction1))
```

```
[[72 28]
 [18 36]]
```

.Random Forest

In [31]:
```
from sklearn.ensemble import RandomForestClassifier
```

In [32]:
```
rfc=RandomForestClassifier(n_estimators=600)
```

In [33]:
```
rfc.fit(x_train,y_train)
```

Out[33]:
```
RandomForestClassifier(n_estimators=600)
```

In [34]:
```
pridiction2=rfc.predict(x_test)
```

In [35]:
```
pridiction2
```

Out[35]:
```
array([1, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0, 1, 1, 0, 1, 0,
       0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 0, 0, 0, 0, 1, 0, 0, 0, 1, 1, 1, 1,
       0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0, 0, 1, 0, 1, 1, 1, 0, 0, 0, 1, 0,
       1, 0, 0, 0, 1, 0, 1, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1,
       1, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 1, 1, 0, 0, 0, 0, 0, 0, 1, 0,
       0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0, 0],
      dtype=int64)
```

In [36]:
```
from sklearn.metrics import classification_report,confusion_matrix
```

In [37]:
```
print(classification_report(y_test,pridiction2))
```

```
              precision    recall  f1-score   support

           0       0.82      0.88      0.85       100
           1       0.74      0.65      0.69        54

    accuracy                           0.80       154
   macro avg       0.78      0.76      0.77       154
weighted avg       0.80      0.80      0.80       154
```

In [38]:
```
print(confusion_matrix(y_test,pridiction2))
```

```
[[88 12]
 [19 35]]
```

4.Adaptive Boosting

In [39]:
```
from sklearn.ensemble import AdaBoostClassifier
```

In [40]:
```
Ada= AdaBoostClassifier(n_estimators=150)
```

In [41]:
```
Ada.fit(x_train,y_train)
```

Out[41]:
```
AdaBoostClassifier(n_estimators=150)
```

In [42]:
```
pridiction3=Ada.predict(x_test)
```

In [43]:
```
from sklearn.metrics import classification_report,confusion_matrix
```

In [44]:
```
print(classification_report(y_test,pridiction3))
```

```
              precision    recall  f1-score   support

           0       0.75      0.76      0.75       100
           1       0.54      0.52      0.53        54

    accuracy                           0.68       154
   macro avg       0.64      0.64      0.64       154
weighted avg       0.67      0.68      0.67       154
```

In [45]:
```
print(confusion_matrix(y_test,pridiction3))
```

```
[[76 24]
 [26 28]]
```

5Gradient Boosting

In [46]:
```
from sklearn.ensemble import GradientBoostingClassifier
```

In [47]:
```
GD= AdaBoostClassifier(n_estimators=200)
```

In [48]:
```
GD.fit(x_train,y_train)
```

Out[48]:
```
AdaBoostClassifier(n_estimators=200)
```

In [49]:
```
pridiction4=GD.predict(x_test)
```

In [50]:
```
from sklearn.metrics import classification_report,confusion_matrix
```

In [51]:
```
print(classification_report(y_test,pridiction4))
```

```
              precision    recall  f1-score   support

           0       0.75      0.78      0.76       100
           1       0.56      0.52      0.54        54

    accuracy                           0.69       154
   macro avg       0.66      0.65      0.65       154
weighted avg       0.68      0.69      0.69       154
```

In [ ]:
```

```