Data Source : https://www.kaggle.com/vikasukani/diabetes-data-set?select=diabetes-dataset.csv

Let's import Library

In [17]:

```
from sklearn.model_selection import train_test_split
import pandas as pd
import numpy as np
import matplotlib.pyplot as  plt
from sklearn.metrics import confusion_matrix
from sklearn.metrics import accuracy_score
from sklearn.metrics import f1_score
import seaborn as sns
from sklearn.neighbors import KNeighborsClassifier
```

Let's read the data

In [2]:

```
data = pd.read_csv('diabetes-dataset.csv')
data.head()
```

Out[2]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
0	2	138	62	35	0	33.6	0.127	47	1
1	0	84	82	31	125	38.2	0.233	23	0
2	0	145	0	0	0	44.2	0.630	31	1
3	0	135	68	42	250	42.3	0.365	24	1
4	1	139	62	41	480	40.7	0.536	21	0

In [3]:

```
data.isnull().sum()
```

Out[3]:

```
Pregnancies                 0
Glucose                     0
BloodPressure               0
SkinThickness               0
Insulin                     0
BMI                         0
DiabetesPedigreeFunction    0
Age                         0
Outcome                     0
dtype: int64
```

In [4]:

```
data.isnull().any()
```

Out[4]:

```
Pregnancies                 False
Glucose                     False
BloodPressure               False
SkinThickness               False
Insulin                     False
BMI                         False
DiabetesPedigreeFunction    False
Age                         False
Outcome                     False
```

```
Outcome                       False
dtype: bool
```

In [5]:

```
data['Outcome'].value_counts()
```

Out[5]:

```
0    1316
1     684
Name: Outcome, dtype: int64
```

0 indicates, human is not having diabetes and 1 indicates,human is having diabetes

Data Cleaning

There are some factors where values are zero, Glucose values,for example,cannot be 0 for a human,Similarly,Blood Pressure, Skin Thickness, Insulin and BMI can not be zero for a human

In [6]:

```
non_zero = ['Glucose','BloodPressure','SkinThickness','Insulin','BMI']
for coloumn in non_zero:
    data[coloumn] = data[coloumn].replace(0,np.NaN)
    mean = int(data[coloumn].mean(skipna = True))
    data[coloumn] = data[coloumn].replace(np.NaN, mean)
    print(data[coloumn])
```

```
0       138.0
1        84.0
2       145.0
3       135.0
4       139.0
        ...
1995     75.0
1996    179.0
1997     85.0
1998    129.0
1999     81.0
Name: Glucose, Length: 2000, dtype: float64
0        62.0
1        82.0
2        72.0
3        68.0
4        62.0
        ...
1995     64.0
1996     72.0
1997     78.0
1998    110.0
1999     72.0
Name: BloodPressure, Length: 2000, dtype: float64
0       35.0
1       31.0
2       29.0
3       42.0
4       41.0
        ...
1995    24.0
1996    42.0
1997    29.0
1998    46.0
1999    15.0
Name: SkinThickness, Length: 2000, dtype: float64
0       153.0
1       125.0
2       153.0
3       250.0
4       480.0
        ...
1995     55.0
```

```
1996    130.0
1997    153.0
1998    130.0
1999     76.0
Name: Insulin, Length: 2000, dtype: float64
0       33.6
1       38.2
2       44.2
3       42.3
4       40.7
        ...
1995    29.7
1996    32.7
1997    31.2
1998    67.1
1999    30.1
Name: BMI, Length: 2000, dtype: float64
```

Observation : We have replaced the zero value with NaN and Nan value mean of cloumn

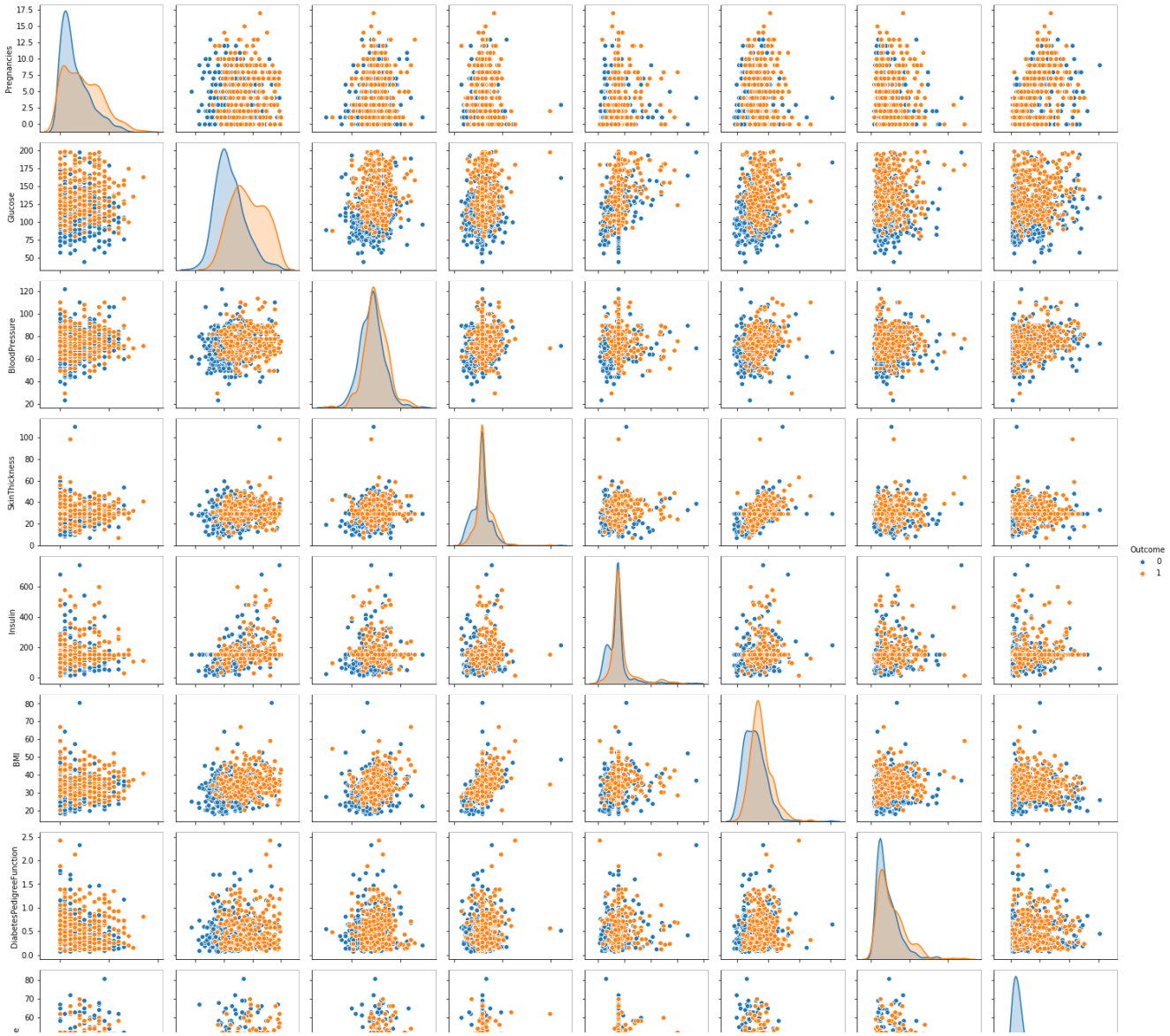
Data Visiualization

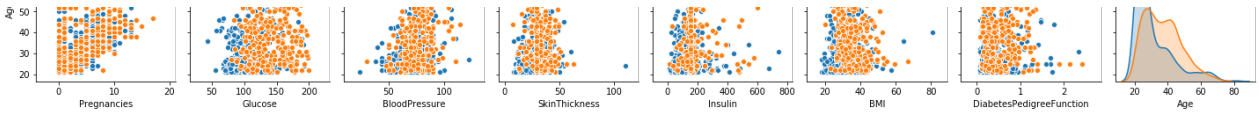
In [7]:

```
sns.pairplot(data,hue='Outcome')
```

Out[7]:

```
<seaborn.axisgrid.PairGrid at 0x2a23c9eb9e8>
```



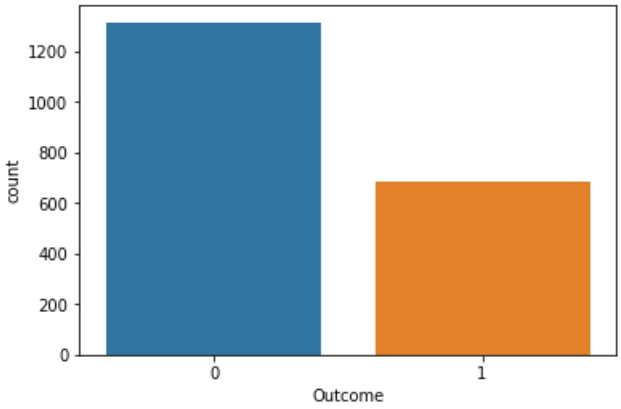


In [8]:

```
sns.countplot(x='Outcome',data= data)
```

Out[8]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x2a23f896cf8>
```



Taining Model

In [18]:

```
X = data.iloc[:,0:8]
Y = data.iloc[:,8]
x_train,x_test,y_train,y_test = train_test_split(X,Y,test_size=0.2,stratify=Y)
```

In [19]:

```
x_train.head()
```

Out[19]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age
1337	5	130.0	82.0	29.0	153.0	39.1	0.956	37
423	2	115.0	64.0	22.0	153.0	30.8	0.421	21
1665	1	143.0	84.0	23.0	310.0	42.4	1.076	22
1796	9	164.0	78.0	29.0	153.0	32.8	0.148	45
105	1	126.0	56.0	29.0	152.0	28.7	0.801	21

In [20]:

```
x_test.head()
```

Out[20]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age
1980	17	163.0	72.0	41.0	114.0	40.9	0.817	47
197	3	107.0	62.0	13.0	48.0	22.9	0.678	23
1215	1	106.0	76.0	29.0	153.0	37.5	0.197	26
328	2	102.0	86.0	36.0	120.0	45.5	0.127	23
1915	2	142.0	82.0	18.0	64.0	24.7	0.761	21

In [21]:

```
y_train.head()
```

Out[21]:

```
1337    1
423     0
1665    0
1796    1
105     0
Name: Outcome, dtype: int64
```

In [22]:

```
y_test.head()
```

Out[22]:

```
1980    1
197     1
1215    0
328     1
1915    0
Name: Outcome, dtype: int64
```

In [23]:

```
import math
math.sqrt(len(y_test))
```

Out[23]:

```
20.0
```

We will take k values as odd because if it will be even it will create confusion between 2 classes

In [26]:

```
classifier = KNeighborsClassifier(n_neighbors=21,metric = 'euclidean')
classifier.fit(x_train,y_train)
```

Out[26]:

```
KNeighborsClassifier(metric='euclidean', n_neighbors=21)
```

In [28]:

```
y_pred = classifier.predict(x_test)
y_pred
```

Out[28]:

```
array([1, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1, 1, 1, 0, 0, 1, 0, 0, 0, 0, 0, 1,
       1, 0, 0, 1, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 1, 0, 0, 1, 0, 1, 0,
       0, 0, 1, 0, 0, 0, 0, 1, 1, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0,
       0, 0, 0, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 1, 0, 0,
       1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0,
       0, 1, 0, 0, 0, 1, 0, 0, 0, 0, 1, 1, 0, 0, 1, 0, 0, 0, 1, 1, 1, 1,
       0, 1, 0, 1, 0, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 1,
       0, 0, 0, 0, 0, 1, 0, 1, 1, 1, 0, 0, 0, 0, 1, 1, 0, 1, 1, 0, 1, 0,
       0, 1, 0, 1, 0, 0, 1, 0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 1, 0, 1, 0, 1,
       0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 1, 1, 1, 0, 0, 0, 0, 1, 0, 1, 1,
       0, 1, 0, 0, 0, 1, 0, 0, 0, 0, 1, 1, 1, 0, 0, 0, 0, 1, 0, 0, 0, 1,
       0, 0, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0,
       0, 1, 1, 1, 0, 0, 1, 1, 0, 1, 1, 0, 1, 0, 1, 0, 1, 1, 1, 1, 1, 1,
       1, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 1, 0, 0, 0, 0, 1, 1, 0, 0, 0,
       0, 1, 0, 0, 1, 0, 0, 1, 1, 0, 1, 1, 1, 0, 0, 0, 1, 0, 1, 1, 0, 1,
       1, 0, 1, 1, 0, 0, 1, 0, 0, 0, 1, 1, 1, 0, 0, 1, 1, 1, 1, 1, 0, 0,
       0, 1, 1, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0, 0, 1, 0, 1
```

```
0, 1, 1, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0, 0, 1, 0, 1,
0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 1, 0, 0, 1, 0, 0, 0, 0, 1,
1, 0, 0, 0], dtype=int64)
```

Confustion Matrix

In [29]:

```
cm = confusion_matrix(y_test,y_pred)
cm
```

Out[29]:

```
array([[214,  49],
       [ 43,  94]], dtype=int64)
```

In [31]:

```
print("f1 score:",f1_score(y_test,y_pred))
```

```
f1 score: 0.6714285714285714
```

In [32]:

```
print(accuracy_score(y_test,y_pred))
```

```
0.77
```

In [ ]:

```

```