```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
#loading the required libraries
import numpy as np
import pandas as pd
from matplotlib import pyplot as plt
import seaborn as sns
```

About Dataset

Context : This dataset is originally from the National Institute of Diabetes and Digestive and Kidney Diseases. The objective is to predict based on diagnostic measurements whether a patient has diabetes.

Content : Several constraints were placed on the selection of these instances from a larger database. In particular, all patients here are females at least 21 years old of Pima Indian heritage.

- Pregnancies: Number of times pregnant
- Glucose: Plasma glucose concentration a 2 hours in an oral glucose tolerance test
- BloodPressure: Diastolic blood pressure (mm Hg)
- SkinThickness: Triceps skin fold thickness (mm)
- Insulin: 2-Hour serum insulin (mu U/ml)
- BMI: Body mass index (weight in kg/(height in m)^2
- DiabetesPedigreeFunction: Diabetes pedigree function
- Age: Age (years)
- Outcome: Class variable (0 or 1)

Data Loading

```
df=pd.read_csv('/content/drive/MyDrive/Data Analytics Python Projects/Diabetic_analysis/diabetes.csv')
```

```
df.head(10)
```

	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
5	5	116	74	0	0	25.6	0.201	30	0
6	3	78	50	32	88	31.0	0.248	26	1
7	10	115	0	0	0	35.3	0.134	29	0
8	2	197	70	45	543	30.5	0.158	53	1

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 768 entries, 0 to 767
Data columns (total 9 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   Pregnancies               768 non-null    int64  
 1   Glucose                   768 non-null    int64  
 2   BloodPressure             768 non-null    int64  
 3   SkinThickness             768 non-null    int64  
 4   Insulin                   768 non-null    int64  
 5   BMI                       768 non-null    float64
 6   DiabetesPedigreeFunction  768 non-null    float64
 7   Age                       768 non-null    int64  
```

```
 8   Outcome                   768 non-null    int64
dtypes: float64(2), int64(7)
memory usage: 54.1 KB
```

Statistical Measure of Diabetic patients Data

```
df.describe()
```

	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

Total number of zero value as minimum value of all the feature

```
print(df[df["Pregnancies"]==0].shape[0])
print(df[df["Glucose"]==0].shape[0])
print(df[df["BloodPressure"]==0].shape[0])
print(df[df["SkinThickness"]==0].shape[0])
print(df[df["Insulin"]==0].shape[0])
print(df[df["BMI"]==0].shape[0])
print(df[df["DiabetesPedigreeFunction"]==0].shape[0])
print(df[df["Age"]==0].shape[0])
```

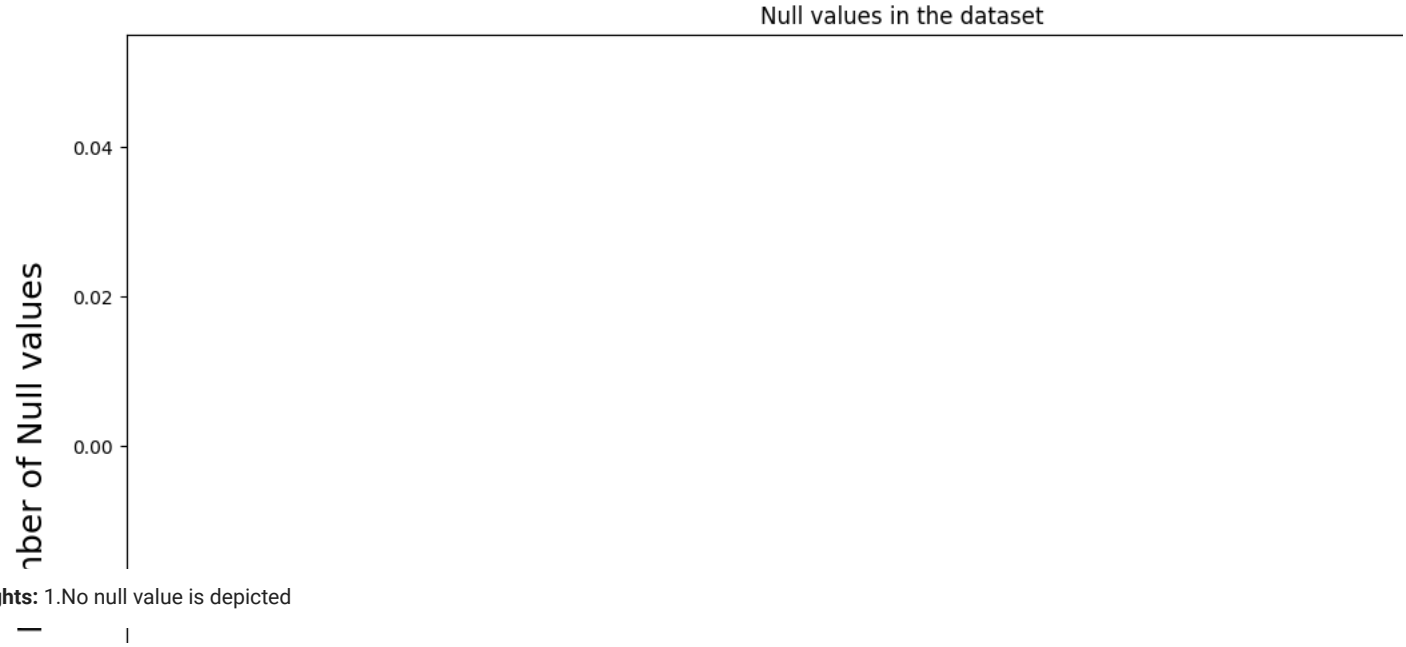
```
111
5
35
227
374
11
0
0
```

Data Analysis

Checking is there any null value or not

```
null_value = df.isnull()
plt.figure(figsize = (15,8))
sns.barplot(data=null_value)
plt.xlabel('Features',fontsize=18)
plt.ylabel('Number of Null values',fontsize=18)
plt.title("Null values in the dataset")
df.isnull().sum()
```

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



Insights: 1.No null value is depicted

Checking Duplicate

```
df.duplicated().sum()
```

```
0
```

Insights: No duplicate

Total number of diabetic and non-diabetic patients

```
df['Outcome'].value_counts().plot(kind = 'bar', color = 'blue')
print(df.Outcome.value_counts())
plt.xlabel('Outcome',fontsize=18)
plt.ylabel('Count',fontsize=18)
```

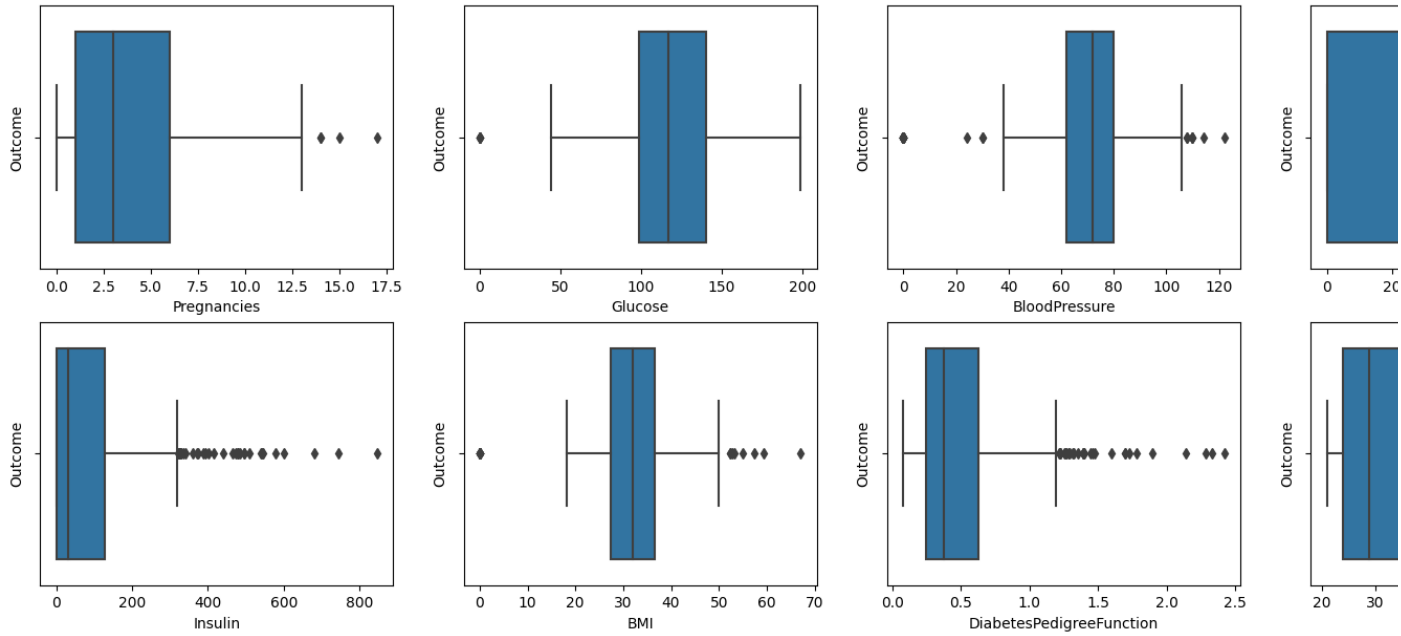
```
0    500
1    268
Name: Outcome, dtype: int64
Text(0, 0.5, 'Count')
```

Insights:

1. 0-> Non-Diabetic Patients(Total 500)
2. 1-> Diabetic Patients(Total 268)

Box plot for checking outliers

```
plotnumber=1
featureList=['Pregnancies','Glucose','BloodPressure','SkinThickness','Insulin','BMI','DiabetesPedigreeFunction','Age']
plt.figure(figsize=(20,15),facecolor='white')
for i in featureList:
    if(plotnumber<=8):
        plt.subplot(4,4,plotnumber)
        sns.boxplot(x=i,data=df,hue='Outcome')
        plt.xlabel(i)
        plt.ylabel('Outcome')
        plotnumber+=1
```



Insights: All fetures has outliers

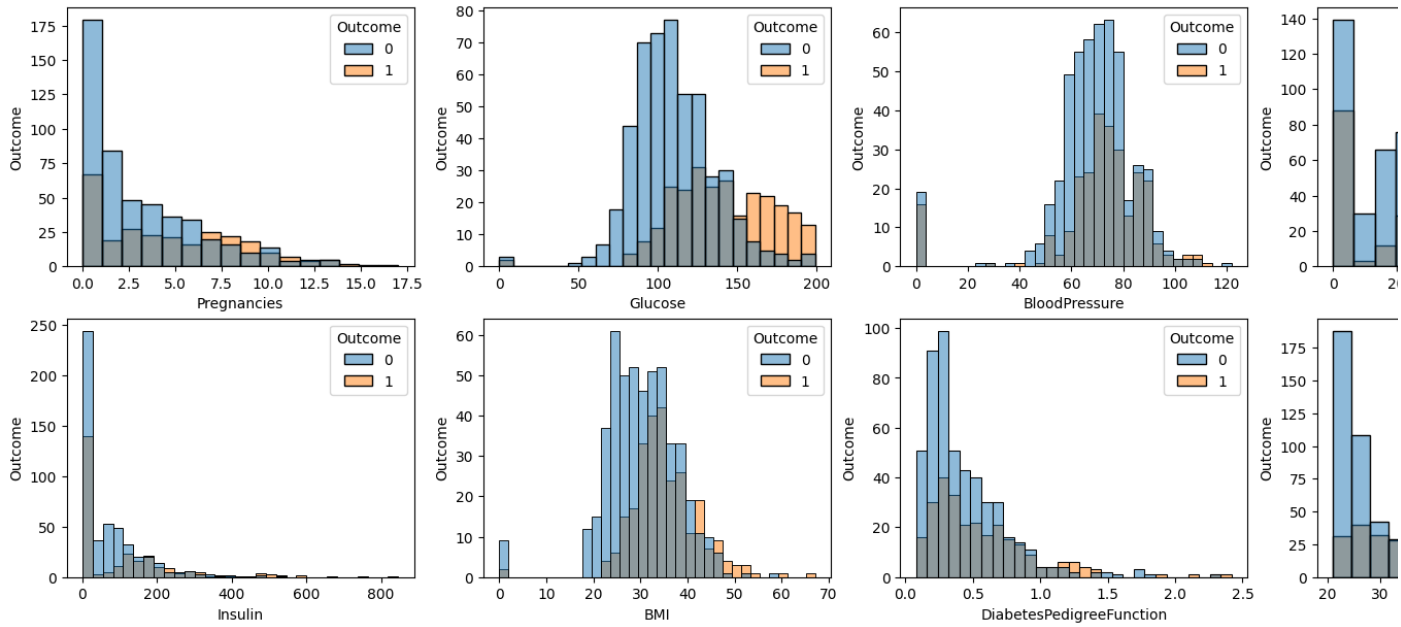
Replacing zeros with the median value

```
df['Glucose']=df['Glucose'].replace(0,df['Glucose'].median())
df['BloodPressure']=df['BloodPressure'].replace(0,df['BloodPressure'].
median())
df['SkinThickness']=df['SkinThickness'].replace(0,df['SkinThickness'].
median())
df['Insulin']=df['Insulin'].replace(0,df['Insulin'].median())
df['BMI']=df['BMI'].replace(0,df['BMI'].median())
```

Plotting Histogram for all feature

```
plotnumber=1
featureList=['Pregnancies','Glucose','BloodPressure','SkinThickness','Insulin','BMI','DiabetesPedigreeFunction','Age']
plt.figure(figsize=(20,15),facecolor='white')
```

```
for i in featureList:
    if(plotnumber<=8):
        plt.subplot(4,4,plotnumber)
        sns.histplot(x=i,data=df,hue='Outcome')
        plt.xlabel(i)
        plt.ylabel('Outcome')
        plotnumber+=1
```



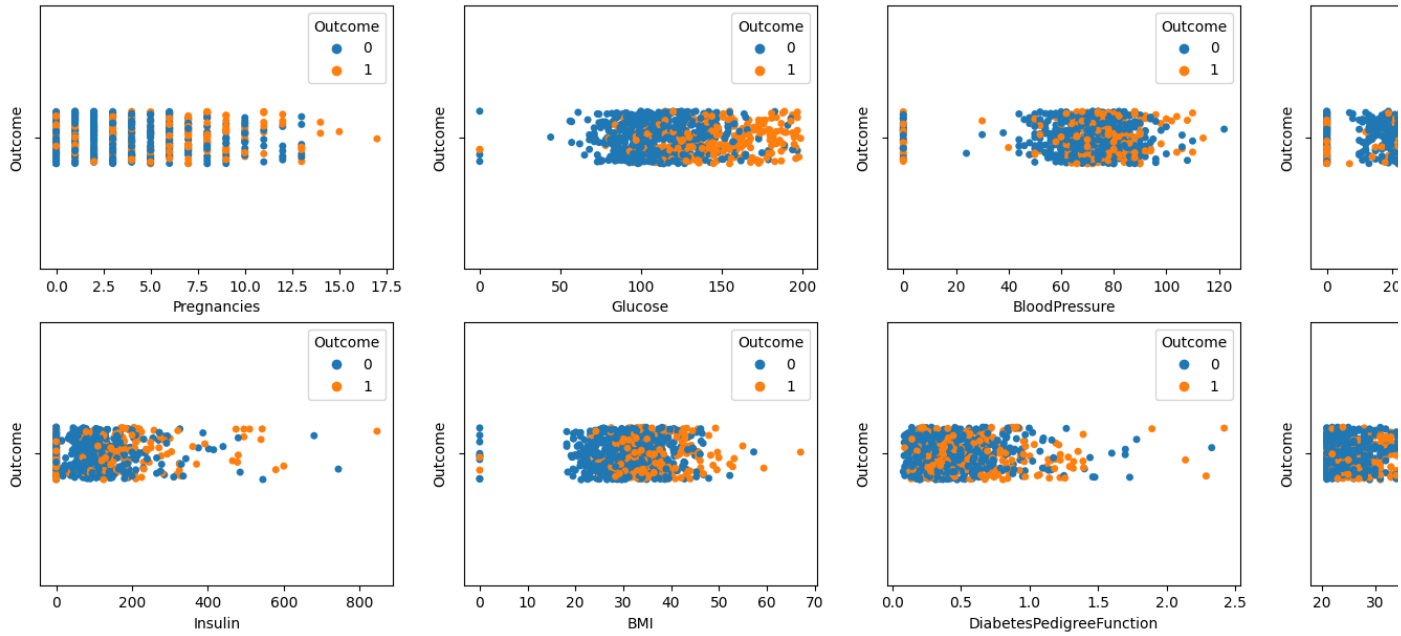
Insights:

1. Between the age groups 40-55 , people having diabetes outnumbers the non diabetic patients
2. Skin thickness in diabetic patients outnumbers non-diabetic patients and is in the range of 43 mm-53 mmc
3. Diabetes Pedigree Function in diabetic patients outnumbers nondiabetic patients in the range 1-1.5
4. BloodPressure in diabetes patients outnumbers non-diabetic patients slightly and is in the range 102-122
5. Glucose level in diabetes patients outnumbers non-diabetic patients largely and is in the range 150-200
6. BMI level in diabetes patients outnumbers non-diabetic patients slightly and is above 43

```
df.Glucose.value_counts()
```

```
99     17
100    17
111    14
129    14
125    14
       ..
191     1
177     1
44      1
62      1
190     1
Name: Glucose, Length: 136, dtype: int64
```

```
plotnumber=1
featureList=['Pregnancies','Glucose','BloodPressure','SkinThickness','Insulin','BMI','DiabetesPedigreeFunction','Age']
plt.figure(figsize=(20,15),facecolor='white')
for i in featureList:
    if(plotnumber<=8):
        plt.subplot(4,4,plotnumber)
        sns.stripplot(x=i,data=df,hue='Outcome')
        plt.xlabel(i)
        plt.ylabel('Outcome')
        plotnumber+=1
```



Minmax normalization

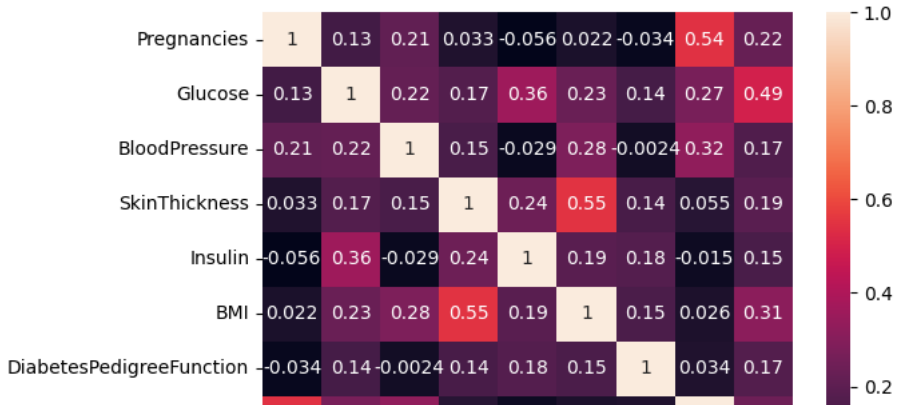
```
from sklearn.preprocessing import MinMaxScaler
temp1=['Glucose','BloodPressure','SkinThickness','Insulin','BMI','DiabetesPedigreeFunction']
scaling=MinMaxScaler()
df.loc[:,temp1]=scaling.fit_transform(df.loc[:,temp1])
```

```
df.corr()
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Out
Pregnancies	1.000000	0.128213	0.208615	0.032568	-0.055697	0.021546	-0.033523	0.544341	0.22
Glucose	0.128213	1.000000	0.218937	0.172143	0.357573	0.231400	0.137327	0.266909	0.49
BloodPressure	0.208615	0.218937	1.000000	0.147809	-0.028721	0.281132	-0.002378	0.324915	0.16
SkinThickness	0.032568	0.172143	0.147809	1.000000	0.238188	0.546951	0.142977	0.054514	0.18
Insulin	-0.055697	0.357573	-0.028721	0.238188	1.000000	0.189022	0.178029	-0.015413	0.14
BMI	0.021546	0.231400	0.281132	0.546951	0.189022	1.000000	0.153506	0.025744	0.31
DiabetesPedigreeFunction	-0.033523	0.137327	-0.002378	0.142977	0.178029	0.153506	1.000000	0.033561	0.17
Age	0.544341	0.266909	0.324915	0.054514	-0.015413	0.025744	0.033561	1.000000	0.23

```
heat=df.corr()
sns.heatmap(heat,annot=True)
```

```
<Axes: >
```



Insights:

1. Age and Pregnancies are positively correlated with 0.54
2. Glucose and outcomes are positively correlated with 0.49
3. Blood pressure, Diabetes Pedigree Function, Insulin and Skin Thickness are not correlated with the outcome

```
sns.pairplot(df)
```

<seaborn.axisgrid.PairGrid at 0x7bb81d64ae60>