Diabetics Data Analysis

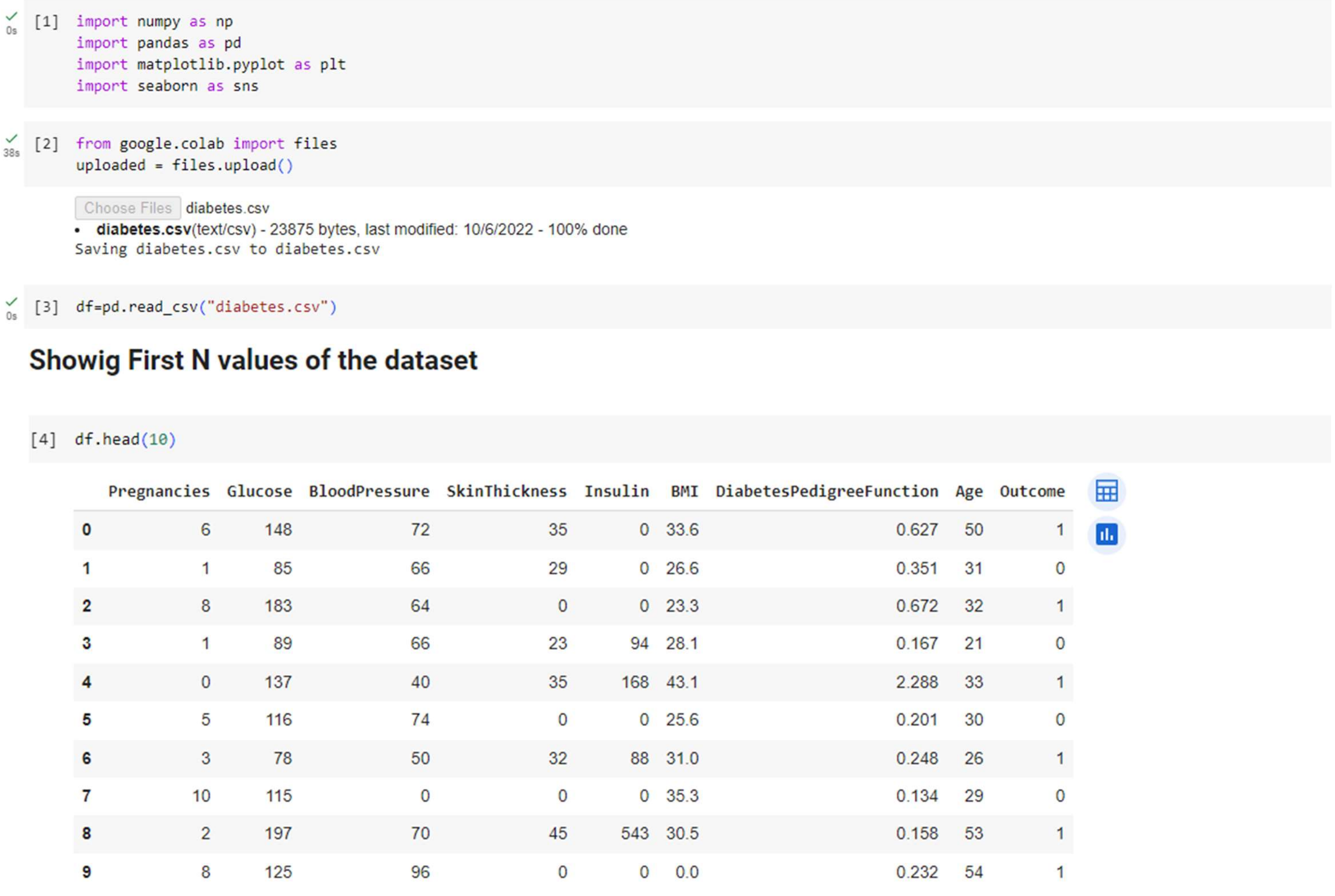
Project Purpose

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

Data View

Pregnancies: Number of times pregnant
Glucose: The plasma glucose concentration in the oral glucose tolerance test after two hours
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: This function calculates the likelihood of having diabetes based on the lineage of a descendant
Age: Age (years)

Outcome: Class variable (have the disease (1) or not (0))



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

```
[2] from google.colab import files
    uploaded = files.upload()
```

diabetes.csv

- **diabetes.csv**(text/csv) - 23875 bytes, last modified: 10/6/2022 - 100% done

```
Saving diabetes.csv to diabetes.csv
```

```
[3] df=pd.read_csv("diabetes.csv")
```

Showig First N values of the dataset

```
[4] 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
9	8	125	96	0	0	0.0	0.232	54	1

```
[6] 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
max	17.000000	199.000000	122.000000	99.000000	846.000000	67.100000	2.420000	81.000000	1.000000

```
[7] 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
```

To find number of unique values

```
[8] df.nunique()
```

```
Pregnancies                  17
Glucose                     136
BloodPressure                47
SkinThickness                51
Insulin                     186
BMI                         248
DiabetesPedigreeFunction    517
Age                          52
Outcome                       2
dtype: int64
```

```
[9] df["Outcome"].value_counts()*100/len(df)
```

```
0    65.104167
1    34.895833
Name: Outcome, dtype: float64
```

Finding no. of values that are zero

```
[10] (df[df.columns]==0).sum()
```

```
Pregnancies                 111
Glucose                       5
BloodPressure                35
SkinThickness               227
Insulin                     374
BMI                          11
DiabetesPedigreeFunction      0
Age                           0
Outcome                     500
dtype: int64
```

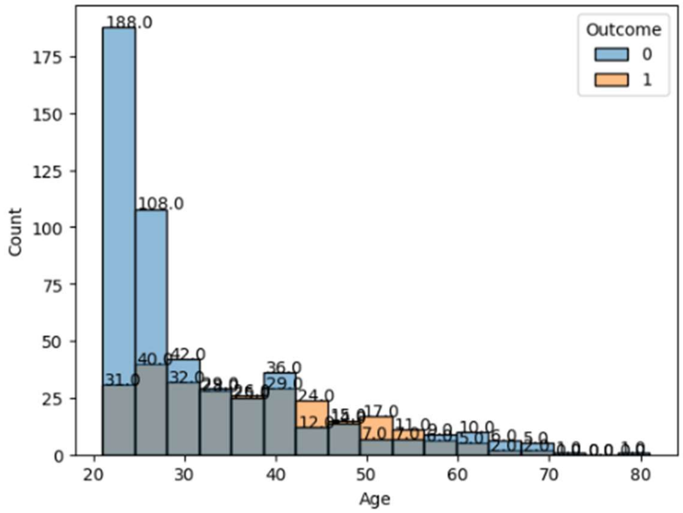
replace all 0's with median

```
[11] for i in ["Glucose","BloodPressure","Insulin","BMI"]:
       df[i].replace(to_replace = 0, value = df[i].median(), inplace=True)
```

```
[12] (df[df.columns]==0).sum()
```

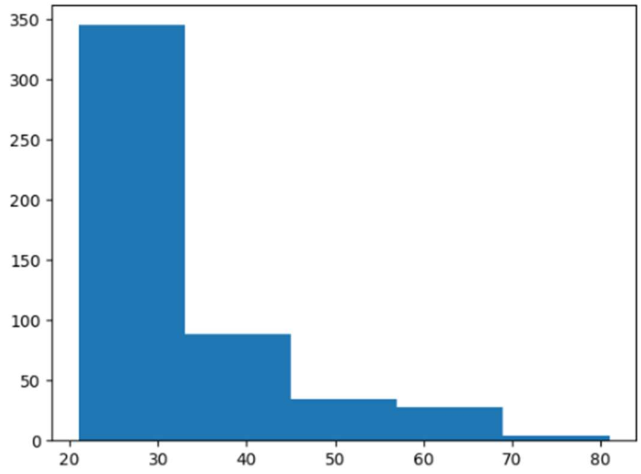
```
Pregnancies                 111
Glucose                       0
BloodPressure                 0
SkinThickness               227
Insulin                       0
BMI                           0
DiabetesPedigreeFunction      0
Age                           0
Outcome                     500
dtype: int64
```

```
ax=sns.histplot(x=df.Age,data=df,hue=df.Outcome)
for p in ax.patches:
  ax.annotate('{:.1f}'.format(p.get_height()), (p.get_x()+0.25, p.get_height()+0.01))
```



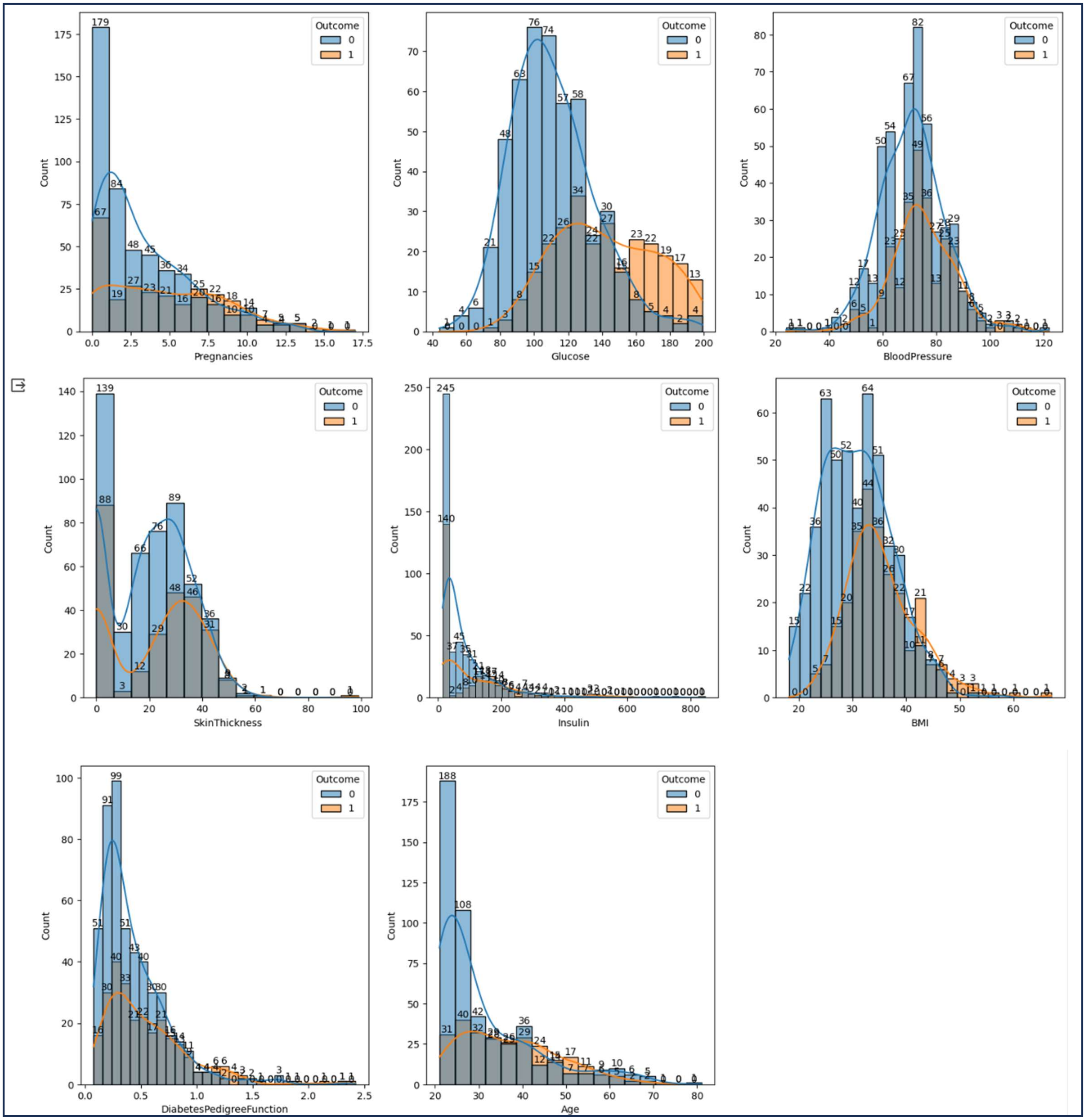
women with diabetes are predominantly in age group of 22 to 35 age bracket. as age increases the frequency of women with diabetes decreases

```
[15] plt.hist(df[df["Outcome"]==0]["Age"],bins=5)
     plt.show()
```

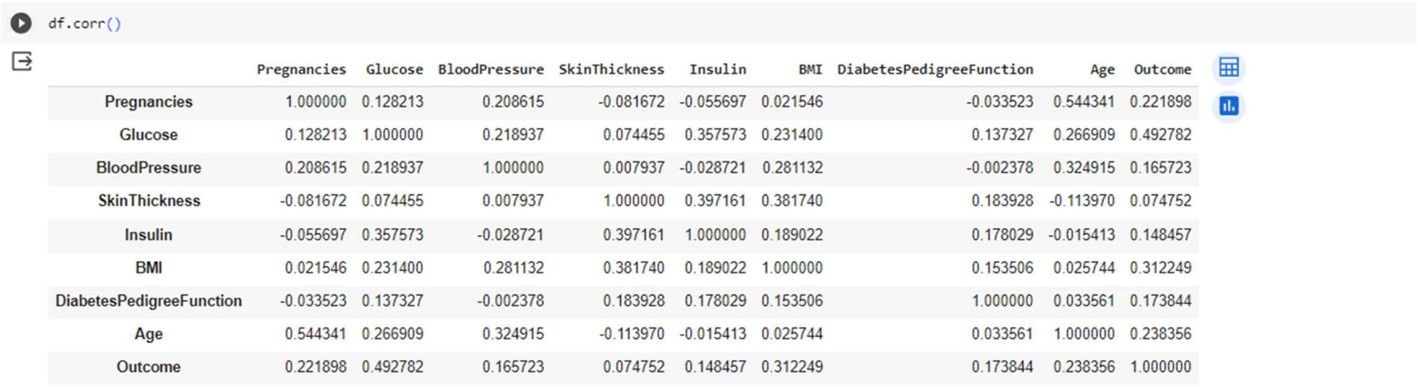


Women without diabetes are predominantly in age group of 22 to 35 age bracket. this is bracket also has highest diabetes risk among women

```
[67] pno=1
     plt.figure(figsize=(18,20))
     for i in df.columns:
         if pno<9:
             plt.subplot(3,3,pno)
             ax=sns.histplot(x=i,data=df,hue=df.Outcome,kde=True)
             plt.xlabel(i)
             pno+=1
             for i in ax.containers:
                   ax.bar_label(i,)
```

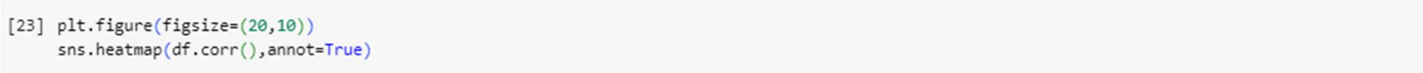


This pridicts that internal factor that are causing diabities are **Insulin**,**BMI**, **Glucose** and external features are **Pregnensies** and **Age**

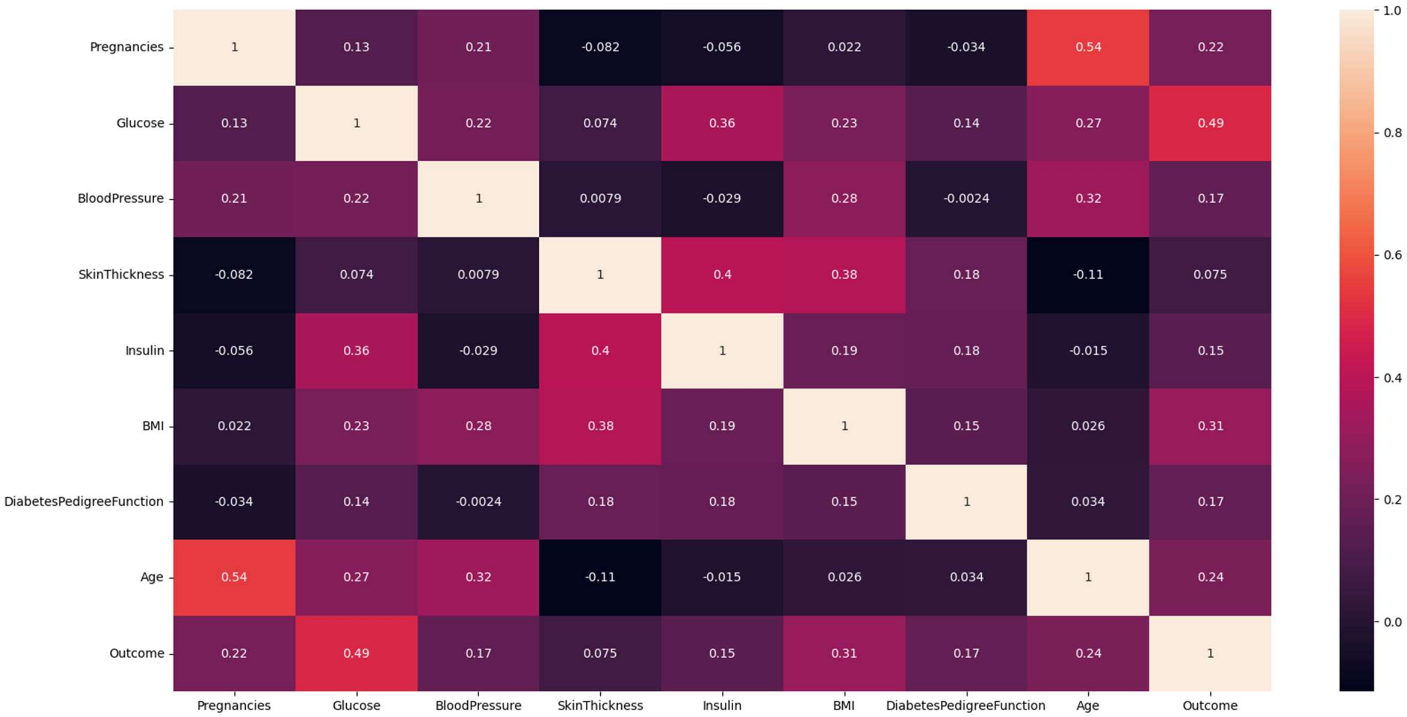


```
df.corr()
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
Pregnancies	1.000000	0.128213	0.208615	-0.081672	-0.055697	0.021546	-0.033523	0.544341	0.221898
Glucose	0.128213	1.000000	0.218937	0.074455	0.357573	0.231400	0.137327	0.266909	0.492782
BloodPressure	0.208615	0.218937	1.000000	0.007937	-0.028721	0.281132	-0.002378	0.324915	0.165723
SkinThickness	-0.081672	0.074455	0.007937	1.000000	0.397161	0.381740	0.183928	-0.113970	0.074752
Insulin	-0.055697	0.357573	-0.028721	0.397161	1.000000	0.189022	0.178029	-0.015413	0.148457
BMI	0.021546	0.231400	0.281132	0.381740	0.189022	1.000000	0.153506	0.025744	0.312249
DiabetesPedigreeFunction	-0.033523	0.137327	-0.002378	0.183928	0.178029	0.153506	1.000000	0.033561	0.173844
Age	0.544341	0.266909	0.324915	-0.113970	-0.015413	0.025744	0.033561	1.000000	0.238356
Outcome	0.221898	0.492782	0.165723	0.074752	0.148457	0.312249	0.173844	0.238356	1.000000

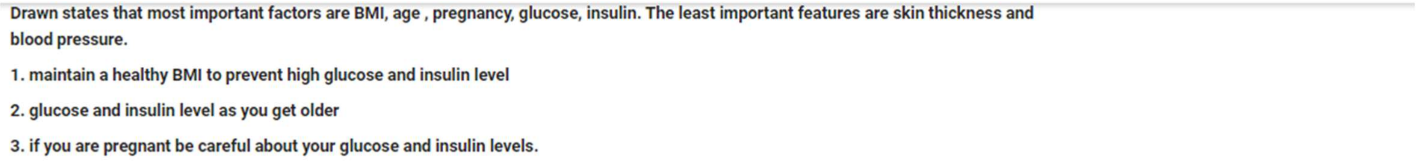


```
[23] plt.figure(figsize=(20,10))
     sns.heatmap(df.corr(),annot=True)
```



	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
Pregnancies	1	0.13	0.21	-0.082	-0.056	0.022	-0.034	0.54	0.22
Glucose	0.13	1	0.22	0.074	0.36	0.23	0.14	0.27	0.49
BloodPressure	0.21	0.22	1	0.0079	-0.029	0.28	-0.0024	0.32	0.17
SkinThickness	-0.082	0.074	0.0079	1	0.4	0.38	0.18	-0.11	0.075
Insulin	-0.056	0.36	-0.029	0.4	1	0.19	0.18	-0.015	0.15
BMI	0.022	0.23	0.28	0.38	0.19	1	0.15	0.026	0.31
DiabetesPedigreeFunction	-0.034	0.14	-0.0024	0.18	0.18	0.15	1	0.034	0.17
Age	0.54	0.27	0.32	-0.11	-0.015	0.026	0.034	1	0.24
Outcome	0.22	0.49	0.17	0.075	0.15	0.31	0.17	0.24	1

1.0
0.8
0.6
0.4
0.2
0.0

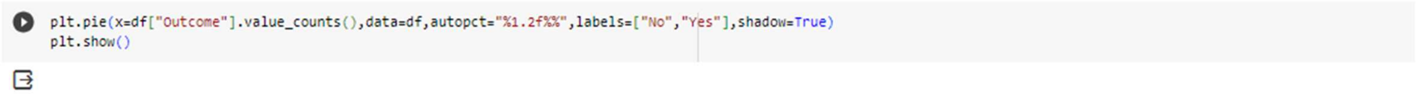


Drawn states that most important factors are BMI, age , pregnancy, glucose, insulin. The least important features are skin thickness and blood pressure.

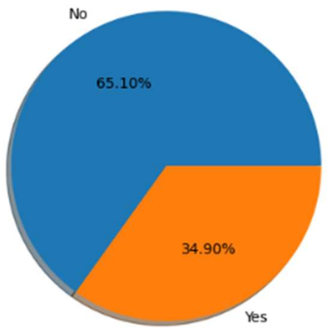
1. maintain a healthy BMI to prevent high glucose and insulin level

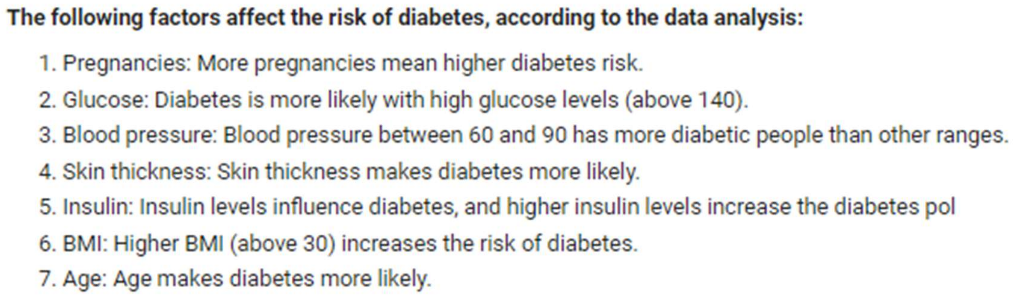
2. glucose and insulin level as you get older

3. if you are pregnant be careful about your glucose and insulin levels.



```
plt.pie(x=df["Outcome"].value_counts(),data=df,autopct="%1.2f%%",labels=["No","Yes"],shadow=True)
plt.show()
```





The following factors affect the risk of diabetes, according to the data analysis:

1. Pregnancies: More pregnancies mean higher diabetes risk.
2. Glucose: Diabetes is more likely with high glucose levels (above 140).
3. Blood pressure: Blood pressure between 60 and 90 has more diabetic people than other ranges.
4. Skin thickness: Skin thickness makes diabetes more likely.
5. Insulin: Insulin levels influence diabetes, and higher insulin levels increase the diabetes pol
6. BMI: Higher BMI (above 30) increases the risk of diabetes.
7. Age: Age makes diabetes more likely.

Project Link: https://colab.research.google.com/drive/15hRxETpp4GdNv4zSykvnbeZrufb9MKhs?usp=sharing

Github Link: https://github.com/ankit5163/Diabetics_analysis_mreiskill_P2.git