In [ ]:

```
Course: Laboratory Practice-III (Machine Learning)
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Class: BE-4
Batch : R4
Roll No. : 41443
Assignment Number : Group B - 05
Title: Implement K-Nearest Neighbors algorithm on diabetes.csv
dataset. Compute confusion matrix, accuracy, error rate, precision
and recall on the given dataset.

Dataset link :
https://www.kaggle.com/datasets/abdallamahgoub/diabetes
```

In [ ]:

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

In [ ]:

```
data = pd.read_csv('/content/diabetes.csv')
```

In [ ]:

```
data.head()
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	Pedigree	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 [ ]:

```
data.tail()
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	Pedigree	Age	Outco
763	10	101	76	48	180	32.9	0.171	63	0
764	2	122	70	27	0	36.8	0.340	27	0
765	5	121	72	23	112	26.2	0.245	30	0
766	1	126	60	0	0	30.1	0.349	47	1
767	1	93	70	31	0	30.4	0.315	23	0

In [ ]:

```
data.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   Pedigree       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
```

In [ ]:

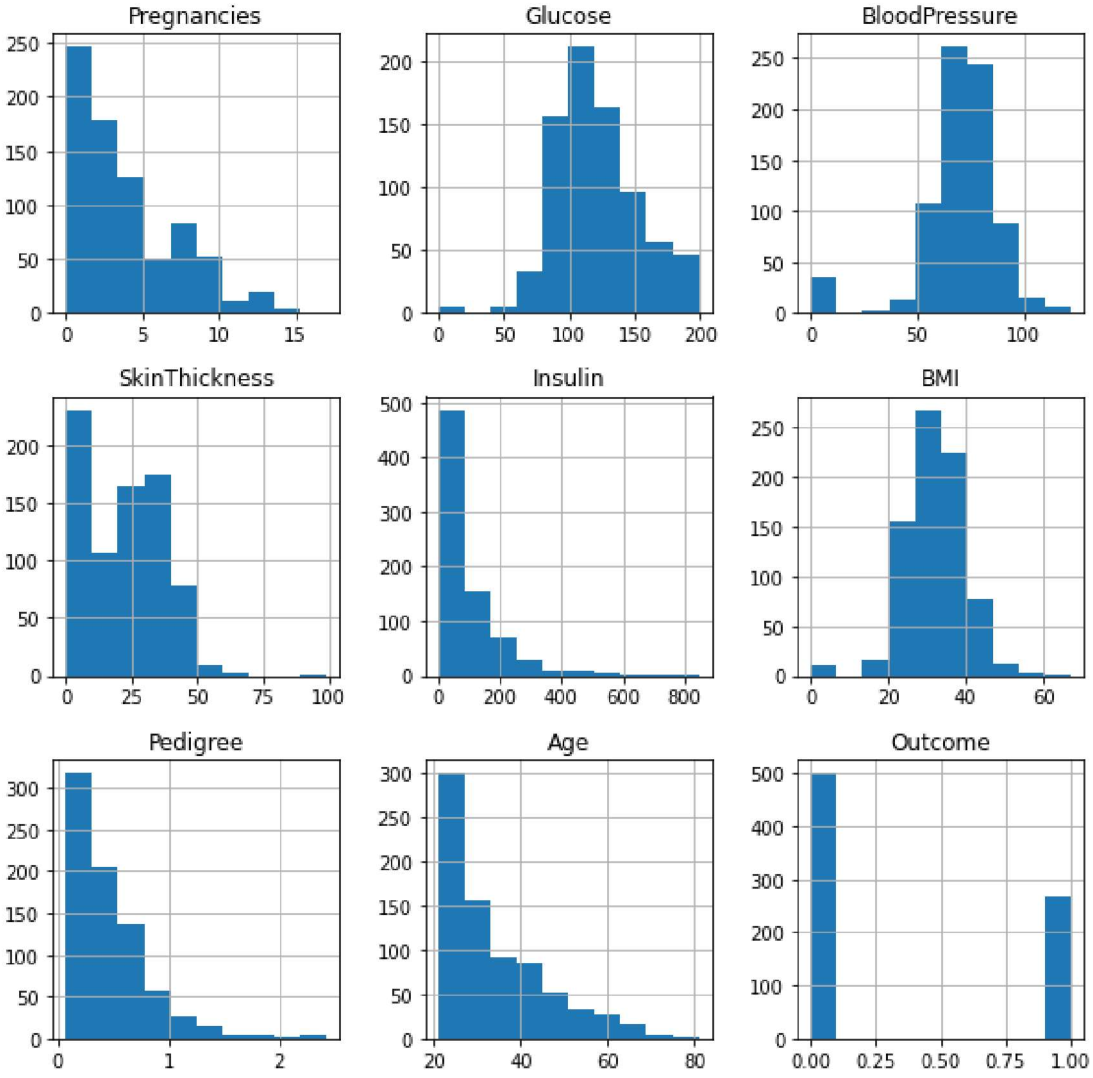
```
data.describe()
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	Pedigre
count	768.000000	768.000000	768.000000	768.000000	768.000000	768.000000	768.0000
mean	3.845052	120.894531	69.105469	20.536458	79.799479	31.992578	0.47187
std	3.369578	31.972618	19.355807	15.952218	115.244002	7.884160	0.33132
min	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.07800
25%	1.000000	99.000000	62.000000	0.000000	0.000000	27.300000	0.24375
50%	3.000000	117.000000	72.000000	23.000000	30.500000	32.000000	0.37250
75%	6.000000	140.250000	80.000000	32.000000	127.250000	36.600000	0.62625
max	17.000000	199.000000	122.000000	99.000000	846.000000	67.100000	2.42000

```
In [ ]: data.isnull().sum()
```

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

```
In [ ]: hist=data.hist(figsize=(10,10))
```



In [ ]:

```
zero_not_accepted=['Glucose','BloodPressure','SkinThickness','BMI','Insuli
for col in zero_not_accepted:
  data[col]=data[col].replace(0,np.NaN)
  mean=int(data[col].mean(skipna=True))
  data[col]=data[col].replace(np.NaN,mean)
```

In [ ]:

```
x=data.iloc[:,:-1].values
print(x)
```

```
[[  6.    148.     72.    ...  33.6     0.627  50.   ]
 [  1.     85.     66.    ...  26.6     0.351  31.   ]
 [  8.    183.     64.    ...  23.3     0.672  32.   ]
 ...
 [  5.    121.     72.    ...  26.2     0.245  30.   ]
 [  1.    126.     60.    ...  30.1     0.349  47.   ]
 [  1.     93.     70.    ...  30.4     0.315  23.   ]]
```

In [ ]:

```
y=data.iloc[:,-1].values
print(y)
```

```
[1 0 1 0 1 0 1 0 1 1 0 1 0 1 1 1 1 1 0 1 0 0 1 1 1 1 1 0 0 0 0 1 0 0 0 0 0
 1 1 1 0 0 0 1 0 1 0 0 1 0 0 0 0 1 0 0 1 0 0 0 0 1 0 0 1 0 1 0 0 0 1 0 1 0
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 1 0 0 1 0 0 1 0 1 1 1 0 0 1 1 1 0 1 0 1 0 1 0 0 0 0 1 0]
```
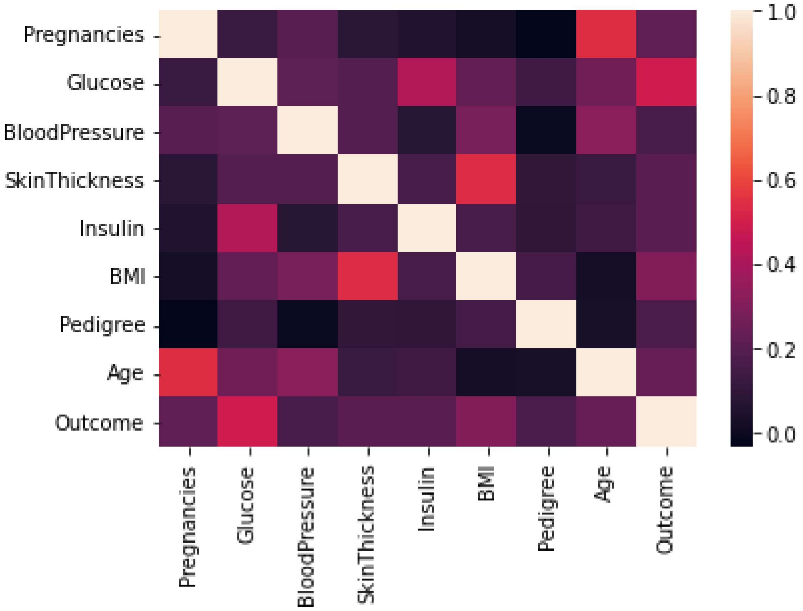

In [ ]:

```
sns.heatmap(data.corr())
```

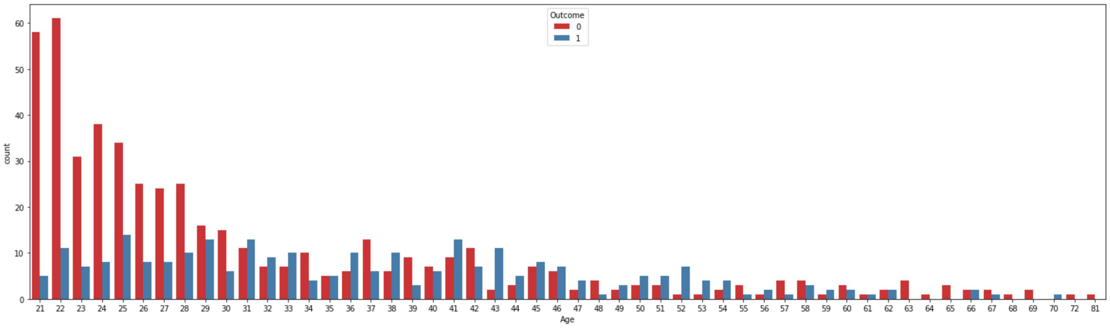
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f72ff4ea710>
```



In [ ]:

```
plt.figure(figsize=(25,7))
sns.countplot(x='Age',hue='Outcome',data=data,palette='Set1')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f72ff475150>
```



In [ ]:

```
xtrain,xtest,ytrain,ytest=train_test_split(x,y,test_size=0.2,random_state=
In [ ]: scaler=StandardScaler()
```

```
In [ ]: xtrain=scaler.fit_transform(xtrain)
        xtest=scaler.transform(xtest)
```

```
In [ ]: classifier=KNeighborsClassifier(n_neighbors=11,p=2,metric='euclidean')
```

```
In [ ]: classifier.fit(xtrain,ytrain)
```

```
KNeighborsClassifier(metric='euclidean', n_neighbors=11)
```

```
In [ ]: ypred=classifier.predict(xtest)
```

```
In [ ]: confusion_matrix2=confusion_matrix(ytest,ypred)
        print(confusion_matrix2)
```

```
[[94 13]
 [15 32]]
```

```
In [ ]: print("F1 Score: ",f1_score(ytest,ypred))
```

```
F1 Score:  0.6956521739130436
```

```
In [ ]: print("Accuracy: ",accuracy_score(ytest,ypred))
```

```
Accuracy:  0.8181818181818182
```

```
In [ ]: print("Precision: ",precision_score(ytest,ypred))
        print("Recall: ",recall_score(ytest,ypred))
```

```
Precision:  0.7111111111111111
Recall:  0.6808510638297872
```

```
In [ ]: print("Error Rate: ",1-accuracy_score(ytest,ypred))
```

```
Error Rate:  0.18181818181818177
```

```
In [ ]:
```