Course: Laboratory Practice III

Course Code: 410246

Name.Ahire Kalpesh Bapurao

Class: BE

Roll No.12

Div: A

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

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

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

```
data.head()
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	Pedigree	Ag
0	6	148	72	35	0	33.6	0.627	5
1	1	85	66	29	0	26.6	0.351	3
2	8	183	64	0	0	23.3	0.672	3
3	1	89	66	23	94	28.1	0.167	2
4	0	137	40	35	168	43.1	2.288	3

```
data.tail()
```

```
          Pregnancies  Glucose  BloodPressure  SkinThickness  Insulin   BMI  Pedigree
```

```
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
```

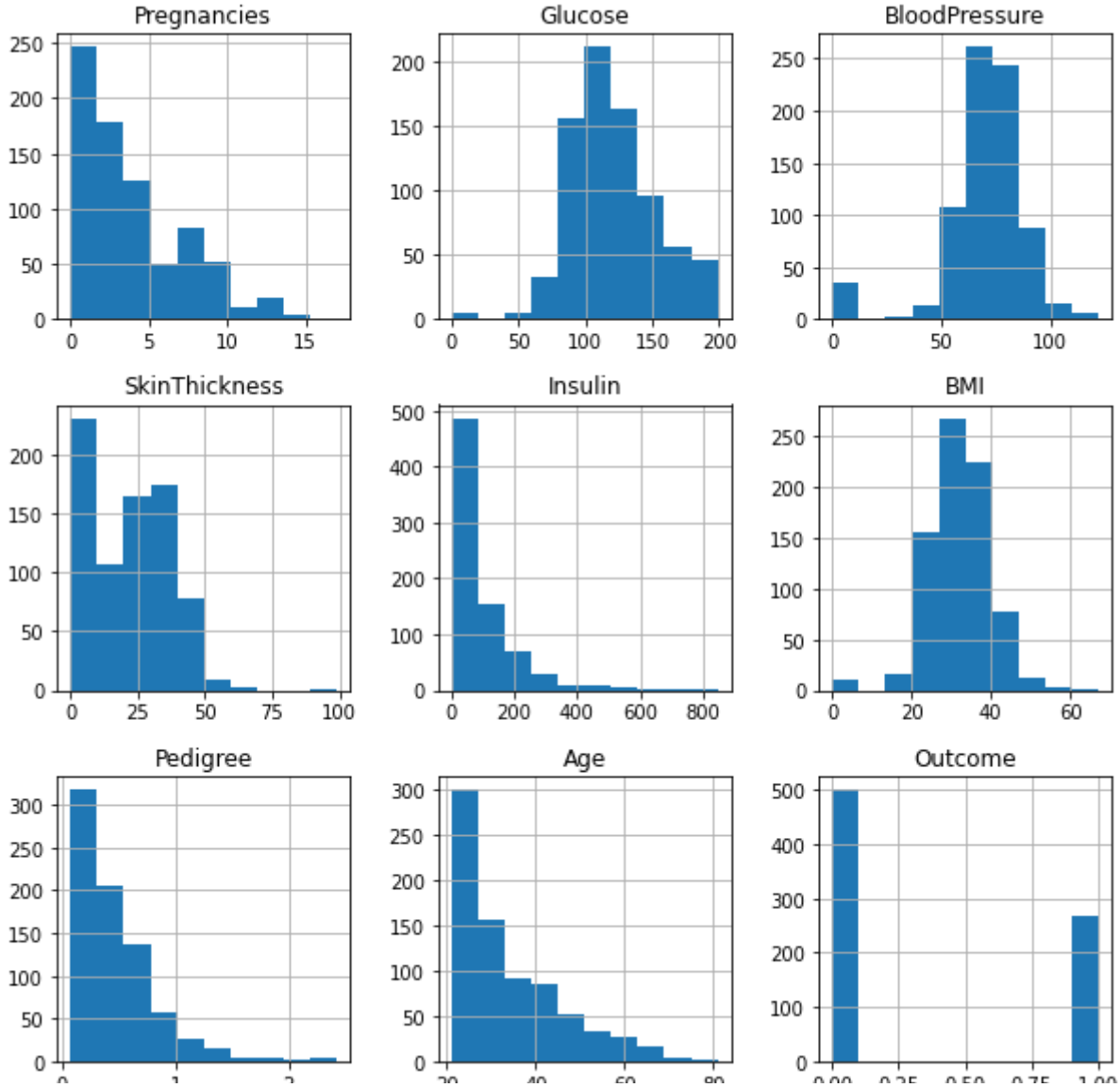
```
data.describe()
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BM
count	768.000000	768.000000	768.000000	768.000000	768.000000	768.00000
mean	3.845052	120.894531	69.105469	20.536458	79.799479	31.99257
std	3.369578	31.972618	19.355807	15.952218	115.244002	7.88416
min	0.000000	0.000000	0.000000	0.000000	0.000000	0.00000
25%	1.000000	99.000000	62.000000	0.000000	0.000000	27.30000
50%	3.000000	117.000000	72.000000	23.000000	30.500000	32.00000
75%	6.000000	140.250000	80.000000	32.000000	127.250000	36.60000
max	17.000000	199.000000	122.000000	99.000000	846.000000	67.10000

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

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

```
hist=data.hist(figsize=(10,10))
```




```
zero_not_accepted=['Glucose','BloodPressure','SkinThickness','BMI','Insulin']
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)
```

```
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.   ]]
```

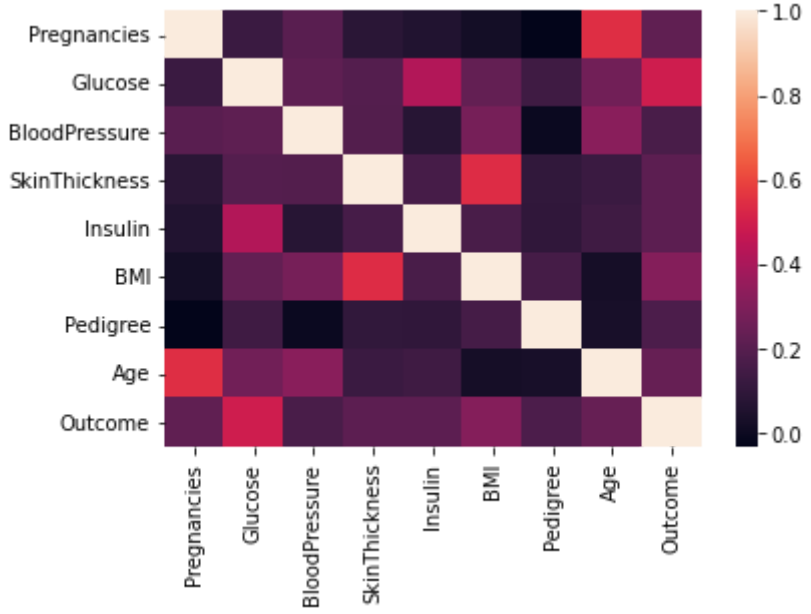
```
y=data.iloc[:,-1].values
print(y)
```

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

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

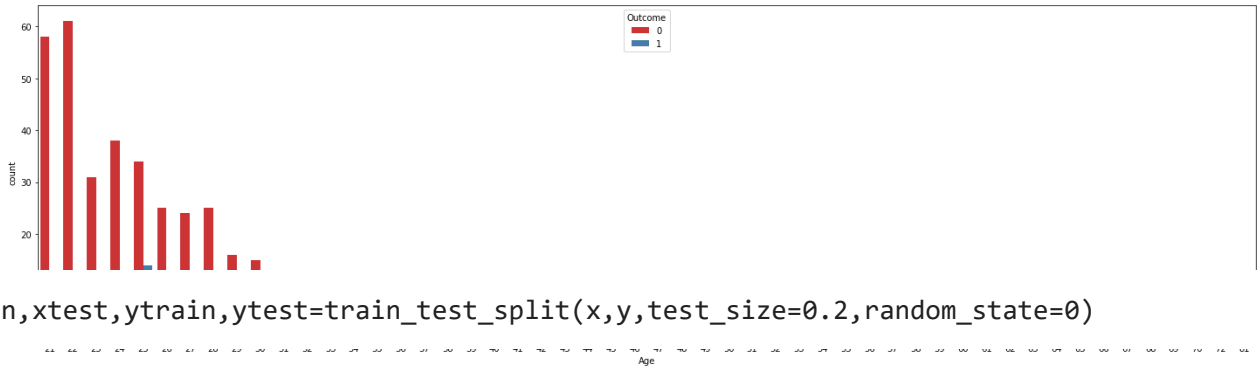
```
sns.heatmap(data.corr())
```

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




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

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




```
xtrain,xtest,ytrain,ytest=train_test_split(x,y,test_size=0.2,random_state=0)
```

```
scaler=StandardScaler()


xtrain=scaler.fit_transform(xtrain)
xtest=scaler.transform(xtest)


classifier=KNeighborsClassifier(n_neighbors=11,p=2,metric='euclidean')


classifier.fit(xtrain,ytrain)
```

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

```
ypred=classifier.predict(xtest)


confusion_matrix2=confusion_matrix(ytest,ypred)
print(confusion_matrix2)
```

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

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

```
F1 Score:  0.6956521739130436
```

```
print("Accuracy: ",accuracy_score(ytest,ypred))
```

```
Accuracy:  0.8181818181818182
```

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

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

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

```
Error Rate:  0.18181818181818177
```