naalaithiran-project

October 15, 2023

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

     import warnings
     warnings.filterwarnings('ignore')
```

```
[ ]: dataset = pd.read_csv('/content/diabetes.csv')
```

```
[ ]: dataset.head()
```

```
[ ]:    Pregnancies  Glucose  BloodPressure  SkinThickness  Insulin   BMI  \
     0            6      148             72             35        0  33.6
     1            1       85             66             29        0  26.6
     2            8      183             64              0        0  23.3
     3            1       89             66             23       94  28.1
     4            0      137             40             35      168  43.1

        DiabetesPedigreeFunction  Age  Outcome
     0                     0.627   50        1
     1                     0.351   31        0
     2                     0.672   32        1
     3                     0.167   21        0
     4                     2.288   33        1
```

```
[ ]: dataset.shape
```

```
[ ]: (768, 9)
```

```
[ ]: dataset.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
```

[ ]:
```
dataset.describe().T
```

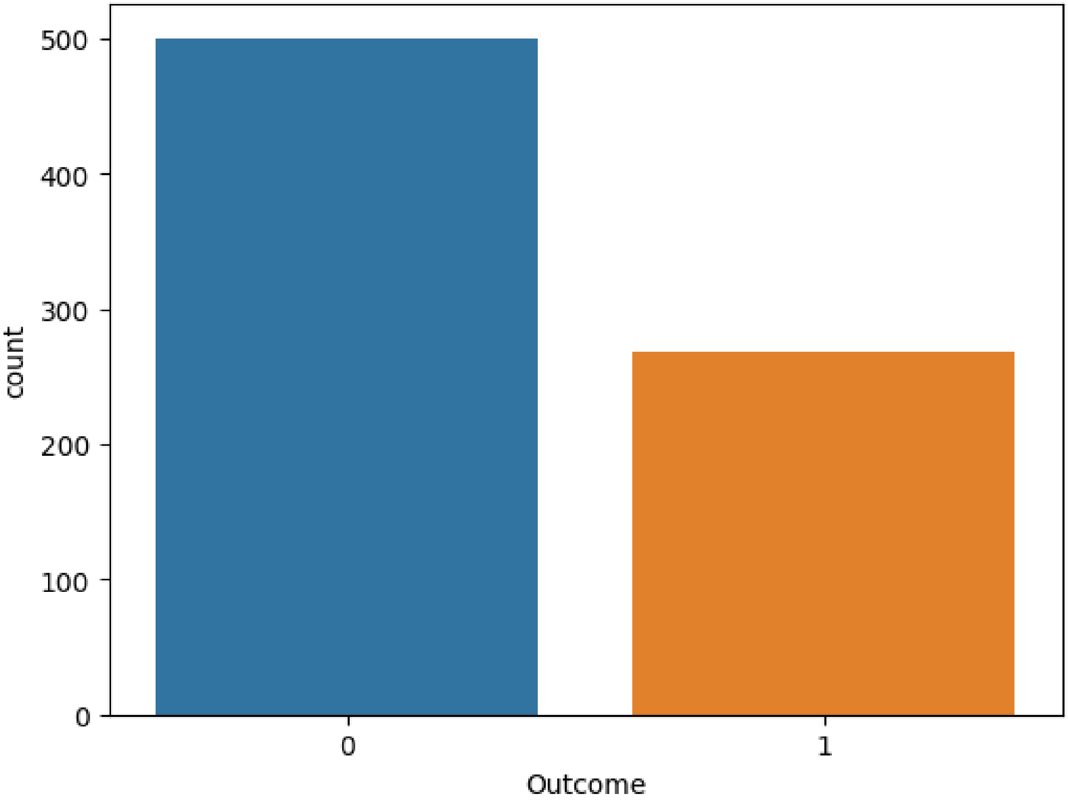
[ ]:
```
                          count        mean         std     min       25%  \
Pregnancies               768.0    3.845052    3.369578   0.000   1.00000
Glucose                   768.0  120.894531   31.972618   0.000  99.00000
BloodPressure             768.0   69.105469   19.355807   0.000  62.00000
SkinThickness             768.0   20.536458   15.952218   0.000   0.00000
Insulin                   768.0   79.799479  115.244002   0.000   0.00000
BMI                       768.0   31.992578    7.884160   0.000  27.30000
DiabetesPedigreeFunction  768.0    0.471876    0.331329   0.078   0.24375
Age                       768.0   33.240885   11.760232  21.000  24.00000
Outcome                   768.0    0.348958    0.476951   0.000   0.00000

                               50%        75%     max
Pregnancies                 3.0000    6.00000   17.00
Glucose                   117.0000  140.25000  199.00
BloodPressure              72.0000   80.00000  122.00
SkinThickness              23.0000   32.00000   99.00
Insulin                    30.5000  127.25000  846.00
BMI                        32.0000   36.60000   67.10
DiabetesPedigreeFunction    0.3725    0.62625    2.42
Age                        29.0000   41.00000   81.00
Outcome                     0.0000    1.00000    1.00
```

[ ]:
```
dataset.isnull().sum()
```

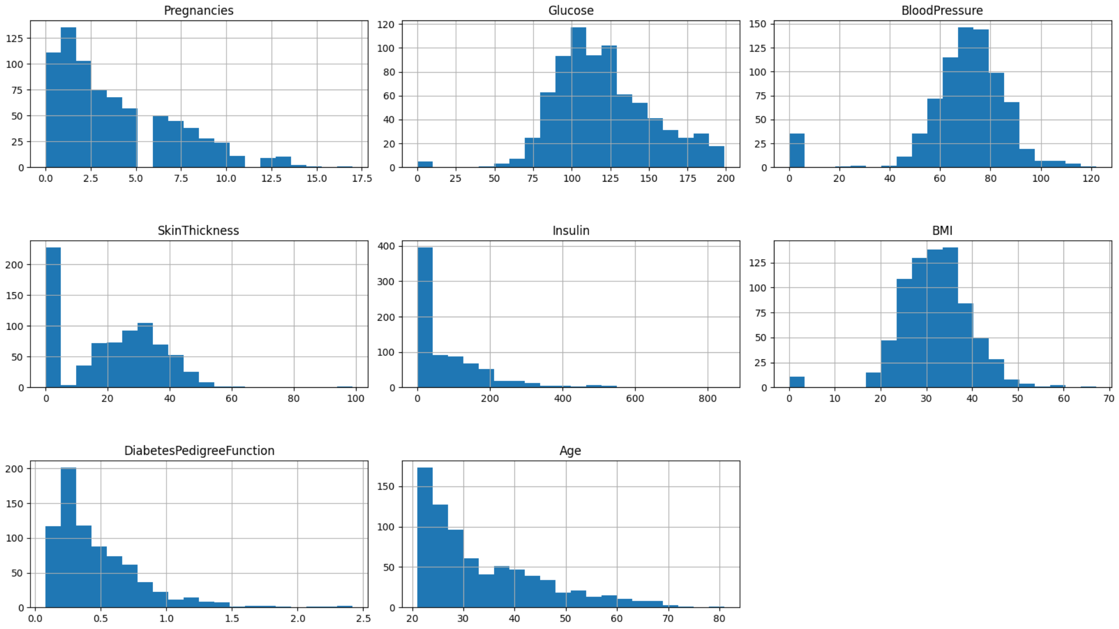
[ ]:
```
Pregnancies                 0
Glucose                     0
BloodPressure               0
SkinThickness               0
Insulin                     0
BMI                         0
DiabetesPedigreeFunction    0
Age                         0
Outcome                     0
dtype: int64
```

[ ]:
```
sns.countplot(x = 'Outcome',data = dataset)
```

[ ]:
```
<Axes: xlabel='Outcome', ylabel='count'>
```

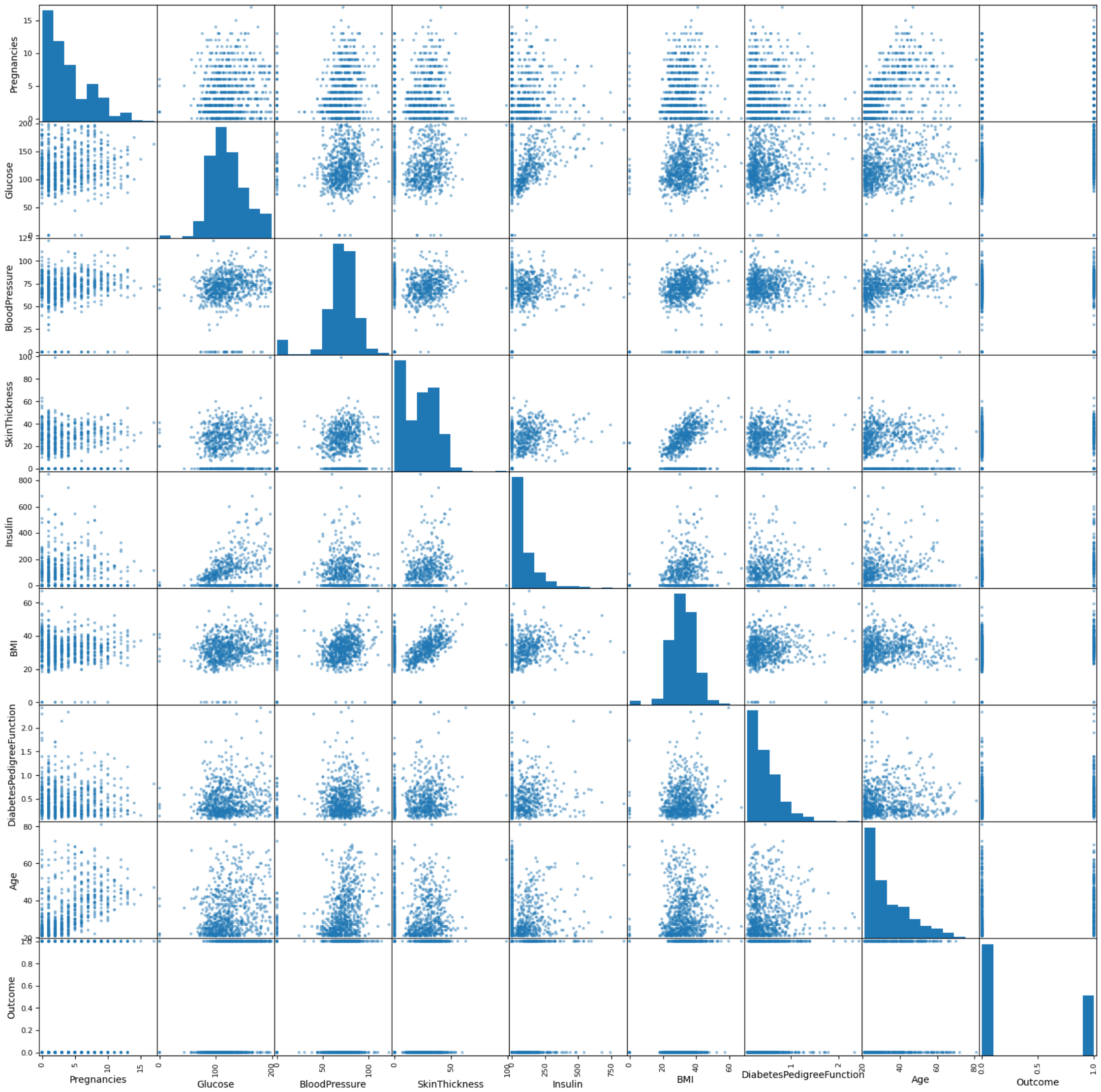


[ ]:
```
import itertools

col = dataset.columns[:8]
plt.subplots(figsize = (20, 15))
length = len(col)

for i, j in itertools.zip_longest(col, range(length)):
    plt.subplot((length//2), 3, j + 1)
    plt.subplots_adjust(wspace = 0.1,hspace = 0.5)
    dataset[i].hist(bins = 20)
    plt.title(i)
plt.show()
```



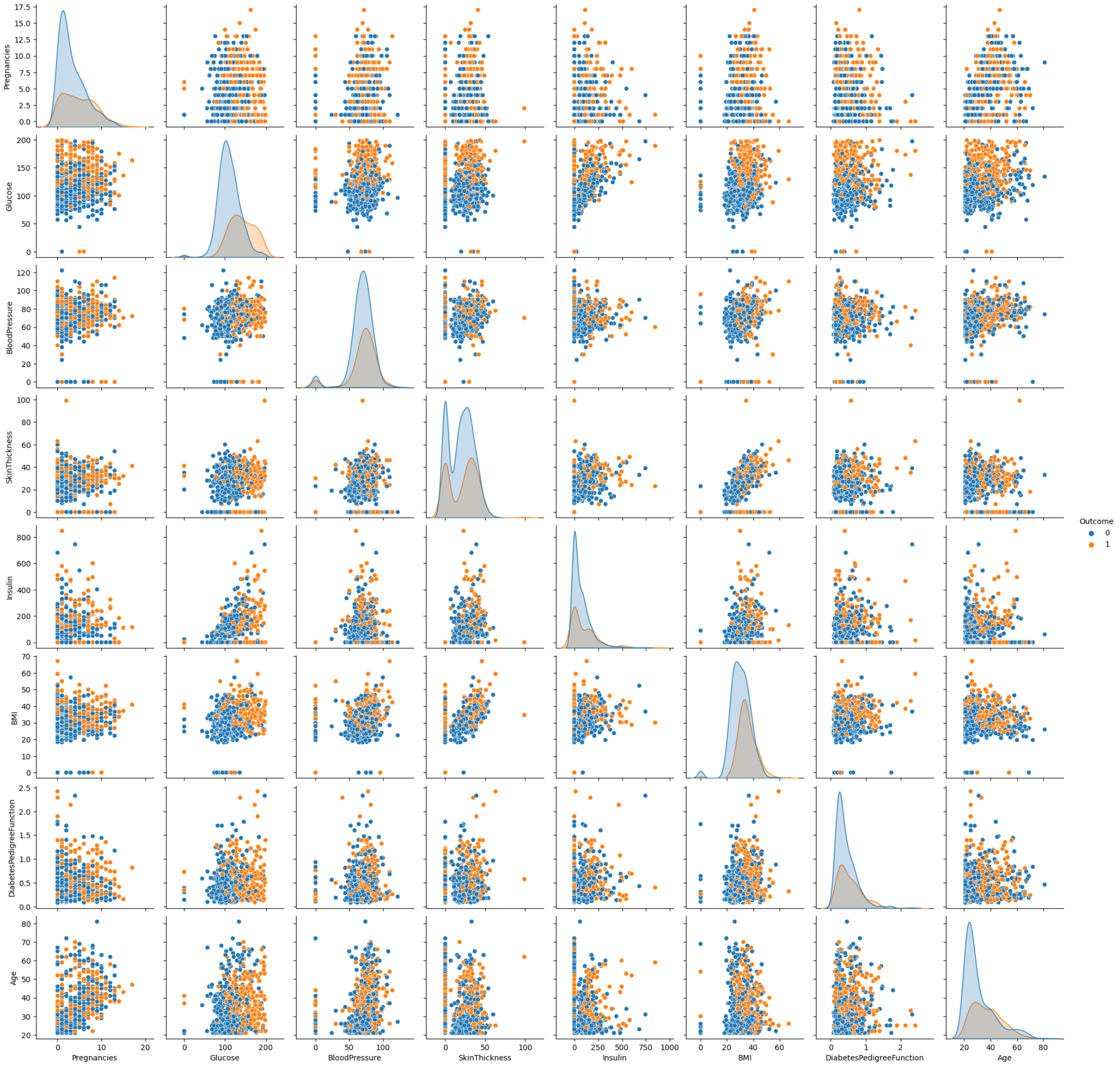
[ ]:

```
from pandas.plotting import scatter_matrix
scatter_matrix(dataset, figsize = (20, 20));
```



[ ]:

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

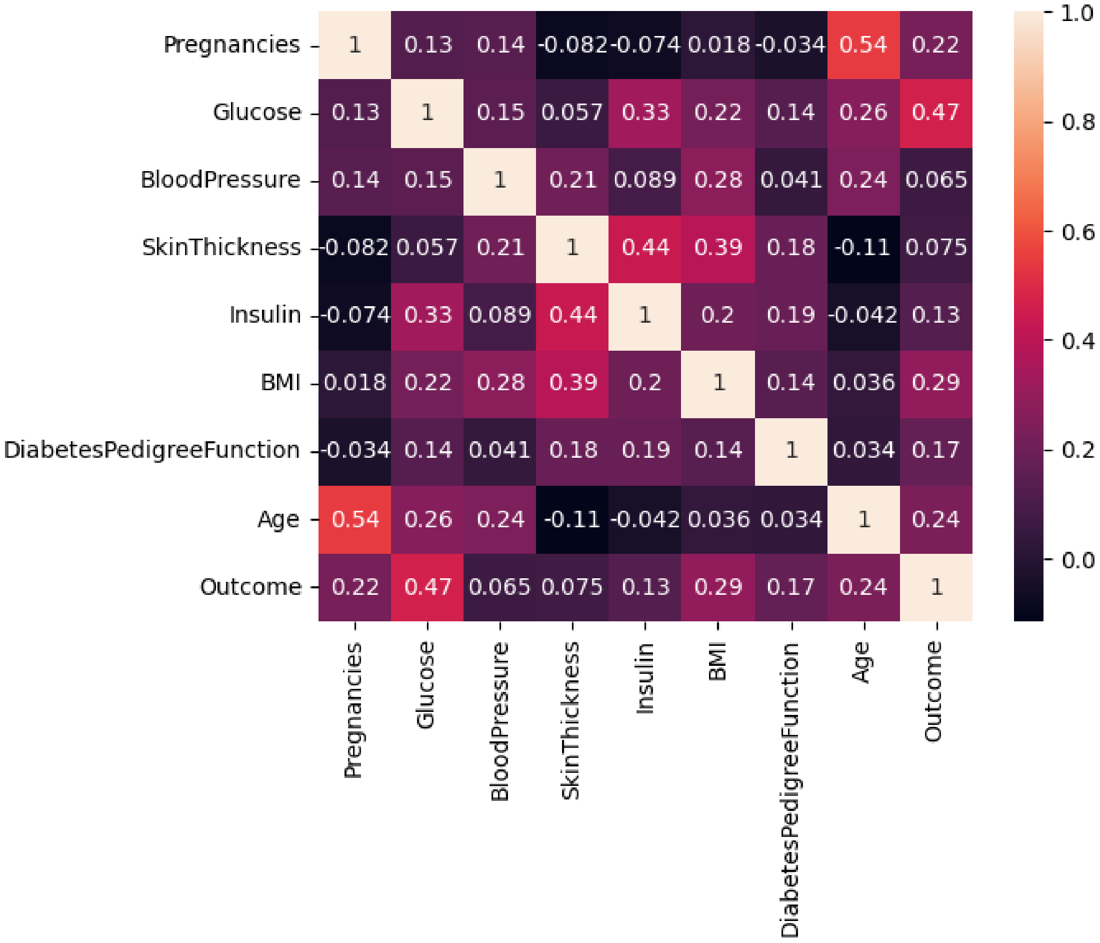


[ ]:

```
pip install pandas
```

```
Requirement already satisfied: pandas in /usr/local/lib/python3.10/dist-packages
(1.5.3)
Requirement already satisfied: python-dateutil>=2.8.1 in
/usr/local/lib/python3.10/dist-packages (from pandas) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-
packages (from pandas) (2023.3.post1)
Requirement already satisfied: numpy>=1.21.0 in /usr/local/lib/python3.10/dist-
packages (from pandas) (1.23.5)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-
packages (from python-dateutil>=2.8.1->pandas) (1.16.0)
```

```
[ ]: sns.heatmap(dataset.corr(), annot = True)
     plt.show()
```



```
[ ]: dataset_new = dataset
```

```
[ ]: dataset_new[["Glucose", "BloodPressure", "SkinThickness", "Insulin", "BMI"]] =␣
      ↪dataset_new[["Glucose", "BloodPressure", "SkinThickness", "Insulin", "BMI"]].
      ↪replace(0, np.NaN)
```

```
[ ]: dataset_new.isnull().sum()
```

```
[ ]: Pregnancies                   0
     Glucose                       5
     BloodPressure                35
     SkinThickness               227
     Insulin                     374
     BMI                          11
```

```
DiabetesPedigreeFunction      0
Age                           0
Outcome                       0
dtype: int64
```

```
[ ]: dataset_new["Glucose"].fillna(dataset_new["Glucose"].mean(), inplace = True)
     dataset_new["BloodPressure"].fillna(dataset_new["BloodPressure"].mean(),␣
      ↪inplace = True)
     dataset_new["SkinThickness"].fillna(dataset_new["SkinThickness"].mean(),␣
      ↪inplace = True)
     dataset_new["Insulin"].fillna(dataset_new["Insulin"].mean(), inplace = True)
     dataset_new["BMI"].fillna(dataset_new["BMI"].mean(), inplace = True)
```

```
[ ]: dataset_new.describe().T
```

```
[ ]:                           count        mean        std     min        25%  \
     Pregnancies               768.0    3.845052   3.369578   0.000    1.00000
     Glucose                   768.0  121.686763  30.435949  44.000   99.75000
     BloodPressure             768.0   72.405184  12.096346  24.000   64.00000
     SkinThickness             768.0   29.153420   8.790942   7.000   25.00000
     Insulin                   768.0  155.548223  85.021108  14.000  121.50000
     BMI                       768.0   32.457464   6.875151  18.200   27.50000
     DiabetesPedigreeFunction  768.0    0.471876   0.331329   0.078    0.24375
     Age                       768.0   33.240885  11.760232  21.000   24.00000
     Outcome                   768.0    0.348958   0.476951   0.000    0.00000

                                      50%         75%     max
     Pregnancies                 3.000000    6.000000   17.00
     Glucose                   117.000000  140.250000  199.00
     BloodPressure              72.202592   80.000000  122.00
     SkinThickness              29.153420   32.000000   99.00
     Insulin                   155.548223  155.548223  846.00
     BMI                        32.400000   36.600000   67.10
     DiabetesPedigreeFunction    0.372500    0.626250    2.42
     Age                        29.000000   41.000000   81.00
     Outcome                     0.000000    1.000000    1.00
```

```
[ ]: from sklearn.preprocessing import MinMaxScaler
     sc = MinMaxScaler(feature_range = (0, 1))
     dataset_scaled = sc.fit_transform(dataset_new)
```

```
[ ]: dataset_scaled = pd.DataFrame(dataset_scaled)
```

```
[ ]: X = dataset_scaled.iloc[:, [1, 4, 5, 7]].values
     Y = dataset_scaled.iloc[:, 8].values
```

[ ]:

```
from sklearn.model_selection import train_test_split
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size = 0.20,␣
 ↪random_state = 42, stratify = dataset_new['Outcome'] )
```

[ ]:

```
print("X_train shape:", X_train.shape)
print("X_test shape:", X_test.shape)
print("Y_train shape:", Y_train.shape)
print("Y_test shape:", Y_test.shape)
```

```
X_train shape: (614, 4)
X_test shape: (154, 4)
Y_train shape: (614,)
Y_test shape: (154,)
```

[ ]:

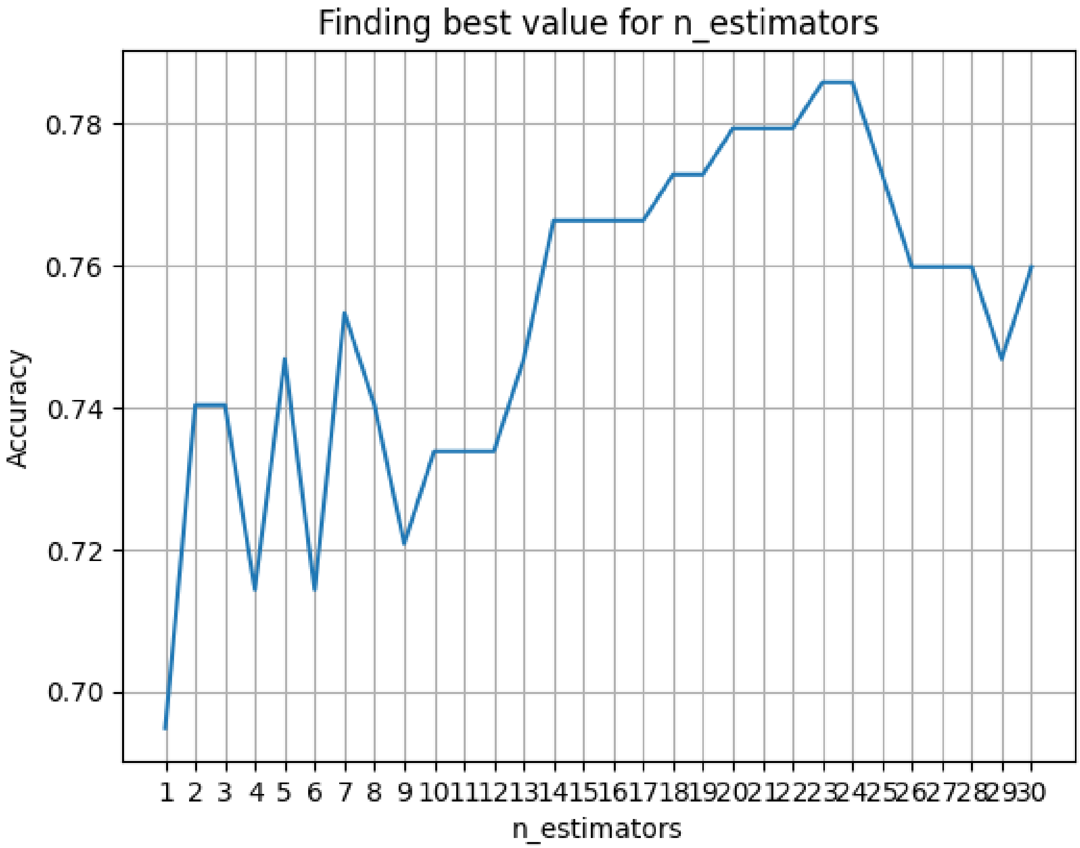
```
from sklearn.linear_model import LogisticRegression
logreg = LogisticRegression(random_state = 42)
logreg.fit(X_train, Y_train)
```

[ ]:

```
LogisticRegression(random_state=42)
```

[ ]:

```
from sklearn import metrics
from sklearn.neighbors import KNeighborsClassifier

X_axis = list(range(1, 31))
acc = pd.Series()
x = range(1,31)

for i in list(range(1, 31)):
    knn_model = KNeighborsClassifier(n_neighbors = i)
    knn_model.fit(X_train, Y_train)
    prediction = knn_model.predict(X_test)
    acc = acc.append(pd.Series(metrics.accuracy_score(prediction, Y_test)))
plt.plot(X_axis, acc)
plt.xticks(x)
plt.title("Finding best value for n_estimators")
plt.xlabel("n_estimators")
plt.ylabel("Accuracy")
plt.grid()
plt.show()
print('Highest value: ',acc.values.max())
```



```
Highest value:  0.7857142857142857
```

[ ]:

```
from sklearn.neighbors import KNeighborsClassifier
knn = KNeighborsClassifier(n_neighbors = 24, metric = 'minkowski', p = 2)
knn.fit(X_train, Y_train)
```

[ ]:

```
KNeighborsClassifier(n_neighbors=24)
```

[ ]:

```
from sklearn.svm import SVC
svc = SVC(kernel = 'linear', random_state = 42)
svc.fit(X_train, Y_train)
```

[ ]:

```
SVC(kernel='linear', random_state=42)
```

[ ]:

```
from sklearn.naive_bayes import GaussianNB
nb = GaussianNB()
nb.fit(X_train, Y_train)
```

[ ]:

```
GaussianNB()
```

[ ]:

```
from sklearn.tree import DecisionTreeClassifier
dectree = DecisionTreeClassifier(criterion = 'entropy', random_state = 42)
dectree.fit(X_train, Y_train)
```

[ ]:

```
DecisionTreeClassifier(criterion='entropy', random_state=42)
```

[ ]:

```
from sklearn.ensemble import RandomForestClassifier
ranfor = RandomForestClassifier(n_estimators = 11, criterion = 'entropy',␣
 ↪random_state = 42)
ranfor.fit(X_train, Y_train)
```

[ ]:

```
RandomForestClassifier(criterion='entropy', n_estimators=11, random_state=42)
```

[ ]:

```
Y_pred_logreg = logreg.predict(X_test)
Y_pred_knn = knn.predict(X_test)
Y_pred_svc = svc.predict(X_test)
Y_pred_nb = nb.predict(X_test)
Y_pred_dectree = dectree.predict(X_test)
Y_pred_ranfor = ranfor.predict(X_test)
```

[ ]:

```
from sklearn.metrics import accuracy_score
accuracy_logreg = accuracy_score(Y_test, Y_pred_logreg)
accuracy_knn = accuracy_score(Y_test, Y_pred_knn)
accuracy_svc = accuracy_score(Y_test, Y_pred_svc)
accuracy_nb = accuracy_score(Y_test, Y_pred_nb)
accuracy_dectree = accuracy_score(Y_test, Y_pred_dectree)
accuracy_ranfor = accuracy_score(Y_test, Y_pred_ranfor)
```

[ ]:

```
print("Logistic Regression: " + str(accuracy_logreg * 100))
print("K Nearest neighbors: " + str(accuracy_knn * 100))
print("Support Vector Classifier: " + str(accuracy_svc * 100))
print("Naive Bayes: " + str(accuracy_nb * 100))
print("Decision tree: " + str(accuracy_dectree * 100))
print("Random Forest: " + str(accuracy_ranfor * 100))
```

```
Logistic Regression: 72.07792207792207
K Nearest neighbors: 78.57142857142857
Support Vector Classifier: 73.37662337662337
Naive Bayes: 71.42857142857143
Decision tree: 68.18181818181817
Random Forest: 75.97402597402598
```

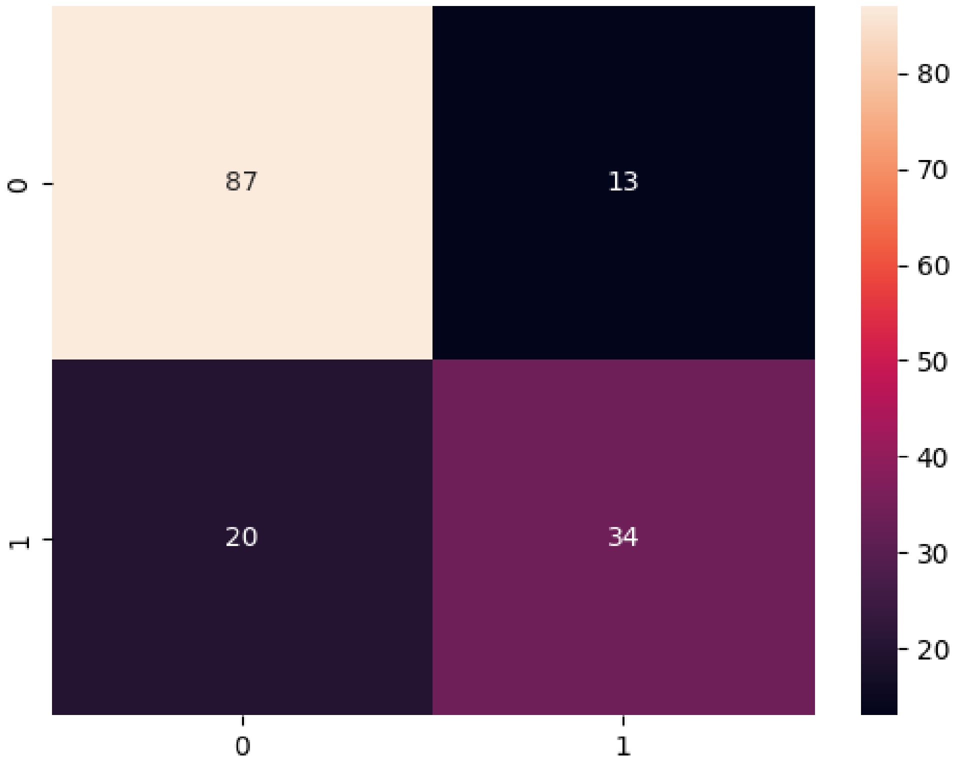
[ ]:

```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(Y_test, Y_pred_knn)
cm
```

```
[ ]: array([[87, 13],
            [20, 34]])
```

```
[ ]: sns.heatmap(pd.DataFrame(cm), annot=True)
```

```
[ ]: <Axes: >
```



```
[ ]: from sklearn.metrics import classification_report
     print(classification_report(Y_test, Y_pred_knn))
```

```
              precision    recall  f1-score   support

         0.0       0.81      0.87      0.84       100
         1.0       0.72      0.63      0.67        54

    accuracy                           0.79       154
   macro avg       0.77      0.75      0.76       154
weighted avg       0.78      0.79      0.78       154
```