internship

November 17, 2023

1 Import All Needed Library

[1]:
```
import pandas as pd
import numpy as np
from matplotlib import pyplot as plt
import seaborn as sns
import math
import random
import statistics as st
from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import mean_squared_error, mean_absolute_error,r2_score
from sklearn.metrics import confusion_matrix,␣
 ↪classification_report,accuracy_score
from sklearn.linear_model import LinearRegression
from sklearn.linear_model import LogisticRegression
from sklearn.naive_bayes import GaussianNB
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestRegressor
from sklearn.ensemble import RandomForestClassifier
from sklearn.svm import SVC
import statsmodels.api as sm
```

2 Load Data From CSV File as DataFrame

[2]:
```
data=pd.read_csv("bmi.csv")
```

3 First Few Rows Of The Datsset

[3]:
```
data
```

[3]:

	Age	Height	Weight	Bmi	BmiClass
0	61	1.85	109.30	31.935720	Obese Class 1
1	60	1.71	79.02	27.023700	Overweight
2	60	1.55	74.70	31.092612	Obese Class 1

```
3     60    1.46   35.90  16.841809    Underweight
4     60    1.58   97.10  38.896010  Obese Class 2
..   ...    ...    ...       ...            ...
736   34    1.86   95.70  27.662157     Overweight
737   44    1.91  106.90  29.302925     Overweight
738   25    1.82   88.40  26.687598     Overweight
739   35    1.88   98.50  27.868945     Overweight
740   45    1.93  109.90  29.504148     Overweight

[741 rows x 5 columns]
```

4 Summary Of Dataset

[4]:
```
data.shape
```

[4]:
```
(741, 5)
```

[5]:
```
data.describe()
```

[5]:

	Age	Height	Weight	Bmi
count	741.000000	741.000000	741.000000	741.000000
mean	31.618084	1.709427	78.412497	26.365427
std	11.655466	0.085974	32.254547	9.223191
min	15.000000	1.460000	25.900000	12.150497
25%	22.000000	1.670000	63.000000	22.129740
50%	29.000000	1.721000	72.900000	24.132412
75%	40.000000	1.751000	83.300000	27.249306
max	61.000000	2.070000	270.000000	66.301350

5 Initial Insights Of Dataset

[6]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 741 entries, 0 to 740
Data columns (total 5 columns):
 #   Column    Non-Null Count  Dtype
---  ------    --------------  -----
 0   Age       741 non-null    int64
 1   Height    741 non-null    float64
 2   Weight    741 non-null    float64
 3   Bmi       741 non-null    float64
 4   BmiClass  741 non-null    object
dtypes: float64(3), int64(1), object(1)
memory usage: 29.1+ KB
```

6 Handling Missing Values

[7]:
```
data.isnull().sum()
```

[7]:
```
Age         0
Height      0
Weight      0
Bmi         0
BmiClass    0
dtype: int64
```

[8]:
```
data['BmiClass'].value_counts()
```

[8]:
```
BmiClass
Normal Weight    342
Overweight       166
Underweight       96
Obese Class 3     62
Obese Class 2     55
Obese Class 1     20
Name: count, dtype: int64
```

[9]:
```
data['BmiClass'].unique()
```

[9]:
```
array(['Obese Class 1', 'Overweight', 'Underweight', 'Obese Class 2',
       'Obese Class 3', 'Normal Weight'], dtype=object)
```

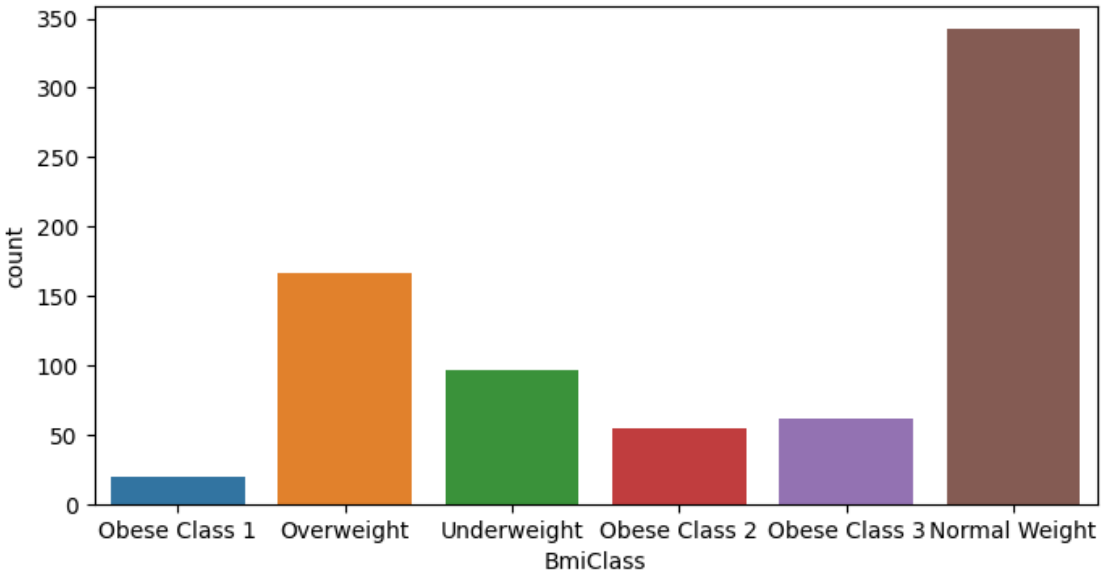
Dataset Splitting And Store It As A New DataFrame For Furthur Need In Programming

[10]:
```
data_Obese_1=data[data['BmiClass']=="Obese Class 1"]
data_Obese_2=data[data['BmiClass']=="Obese Class 2"]
data_Obese_3=data[data['BmiClass']=="Obese Class 3"]
data_Underweight=data[data['BmiClass']=="Underweight"]
data_Overweight=data[data['BmiClass']=="Overweight"]
```

7 Data Visualization

[11]:
```
plt.figure(figsize = (8,4))
sns.countplot(x="BmiClass", data=data)
```

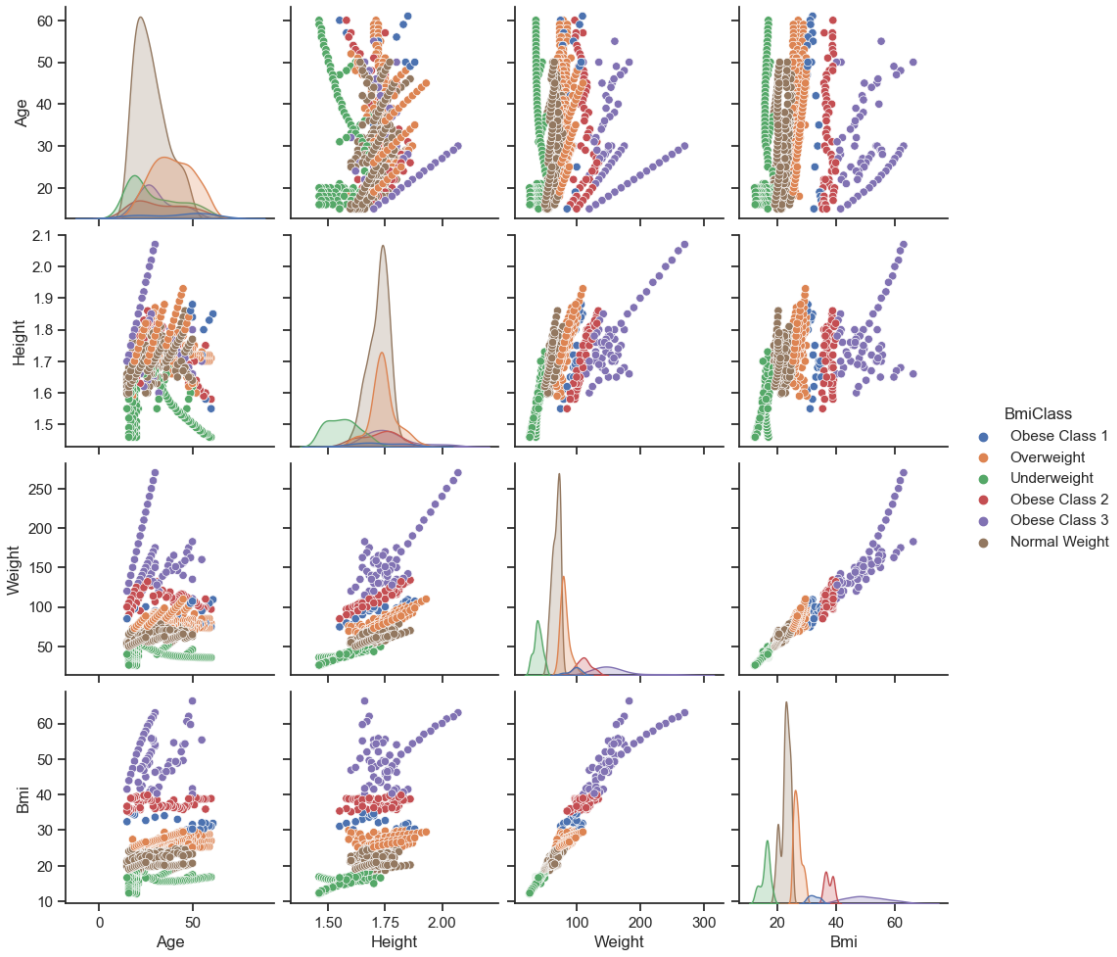
[11]:
```
<Axes: xlabel='BmiClass', ylabel='count'>
```



[12]:
```
sns.set(style="ticks", color_codes=True)
sns.pairplot(data.iloc[:,0:5],hue='BmiClass')
```

```
C:\Users\DELL\AppData\Local\Programs\Python\Python311\Lib\site-
packages\seaborn\axisgrid.py:118: UserWarning: The figure layout has changed to
tight
  self._figure.tight_layout(*args, **kwargs)
```

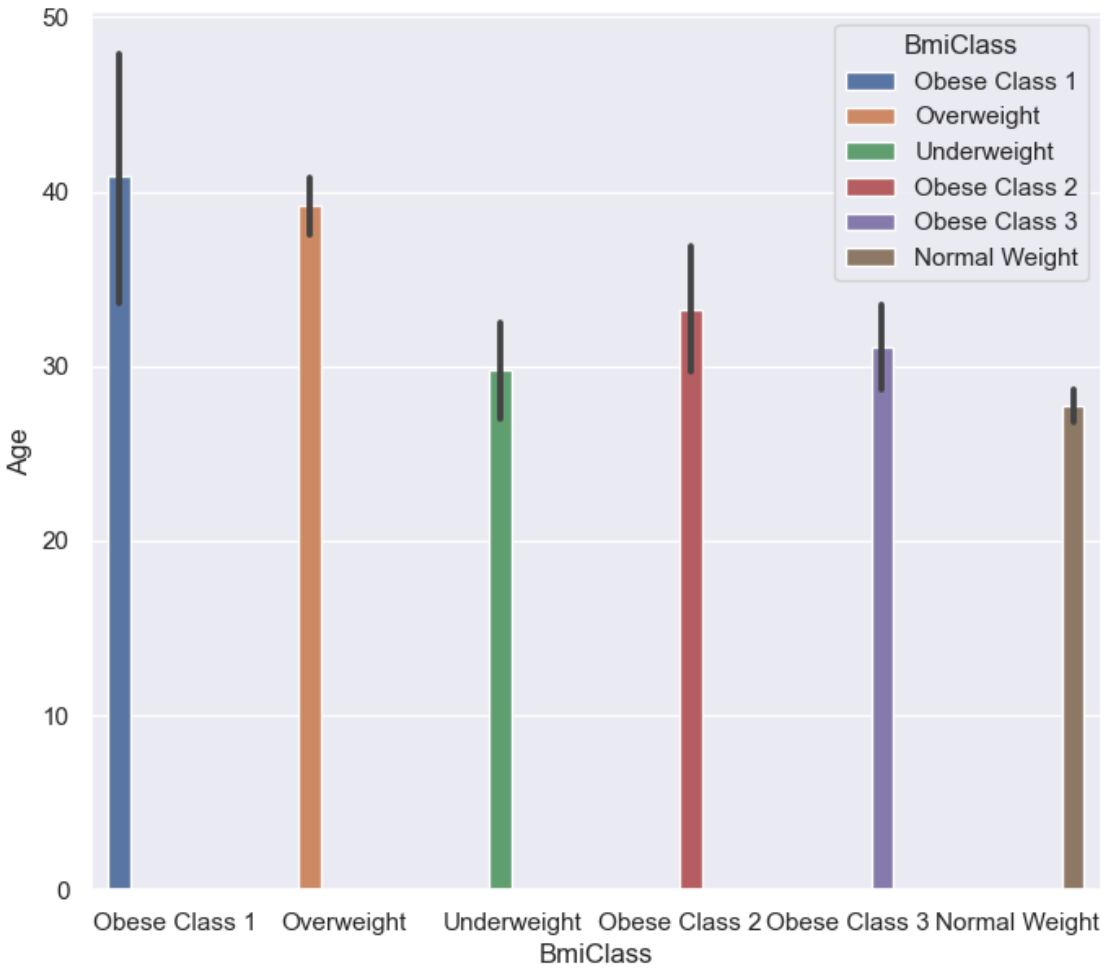
[12]: <seaborn.axisgrid.PairGrid at 0x16ae8b640d0>



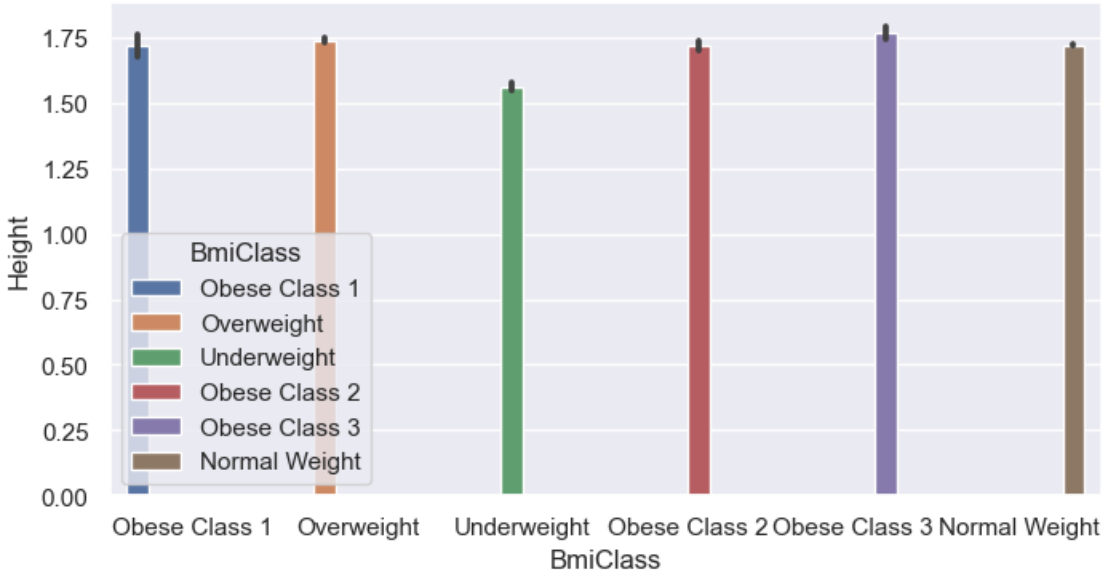
[13]:
```
# features = ['Age', 'Height', 'Weight', 'Bmi']
# plt.subplots(figsize=(20,10))
# for i, col in enumerate(features):
#     plt.subplot(2,3,i+1)
#     plt.title(col)
#     sns.boxplot(data[col])
# plt.show()
```

[14]:
```
sns.set(rc={'figure.figsize':(8,7)})
sns.barplot(x='BmiClass',y='Age',data=data,hue='BmiClass')
plt.show
```

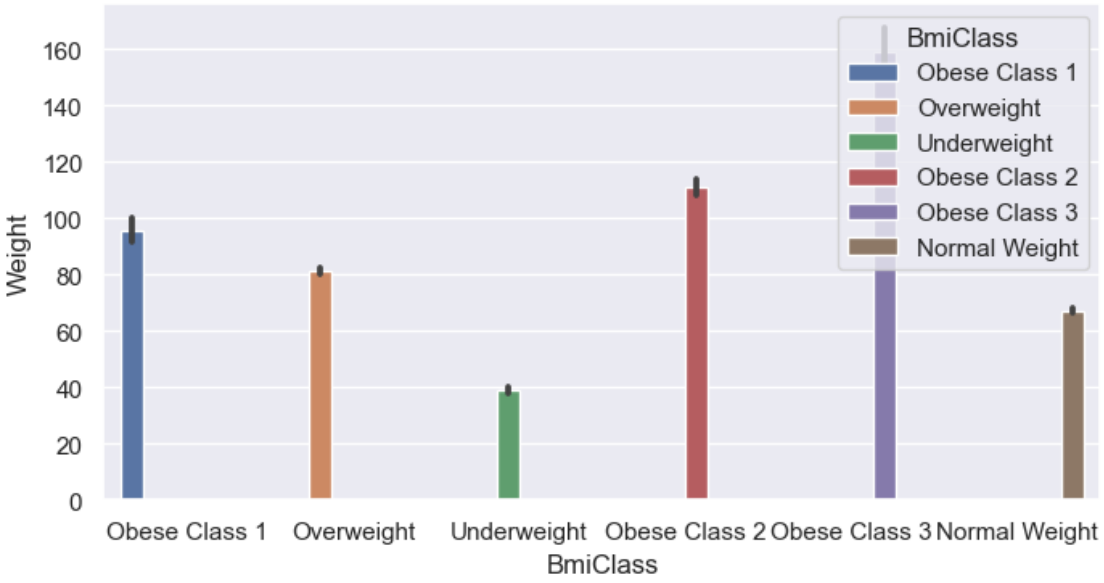
[14]:
```
<function matplotlib.pyplot.show(close=None, block=None)>
```



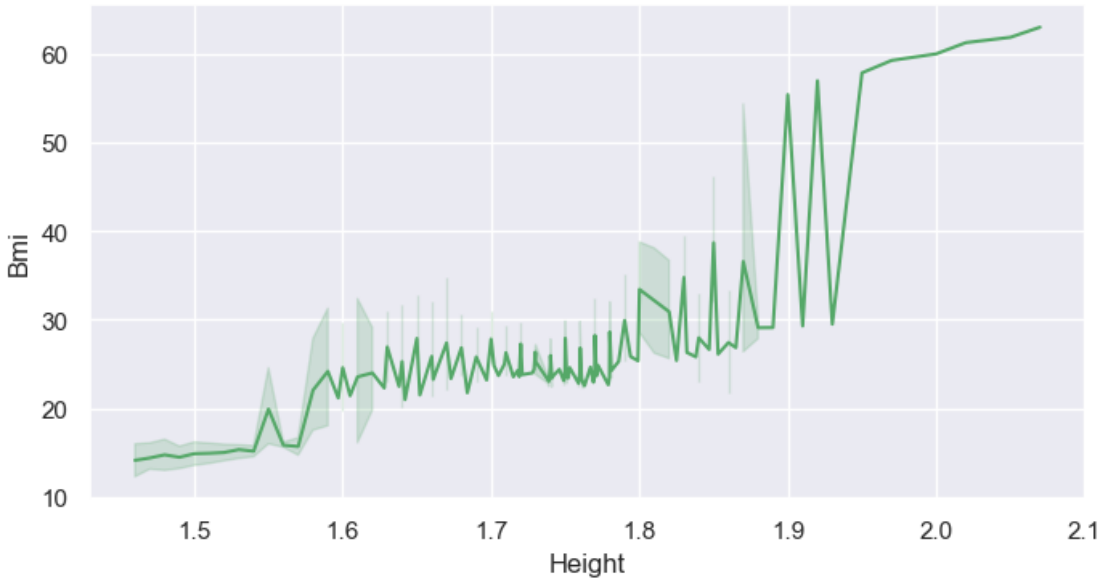
[15]:
```
sns.set(rc={'figure.figsize':(8,4)})
sns.barplot(x='BmiClass',y='Height',data=data,hue='BmiClass')
plt.show()
```



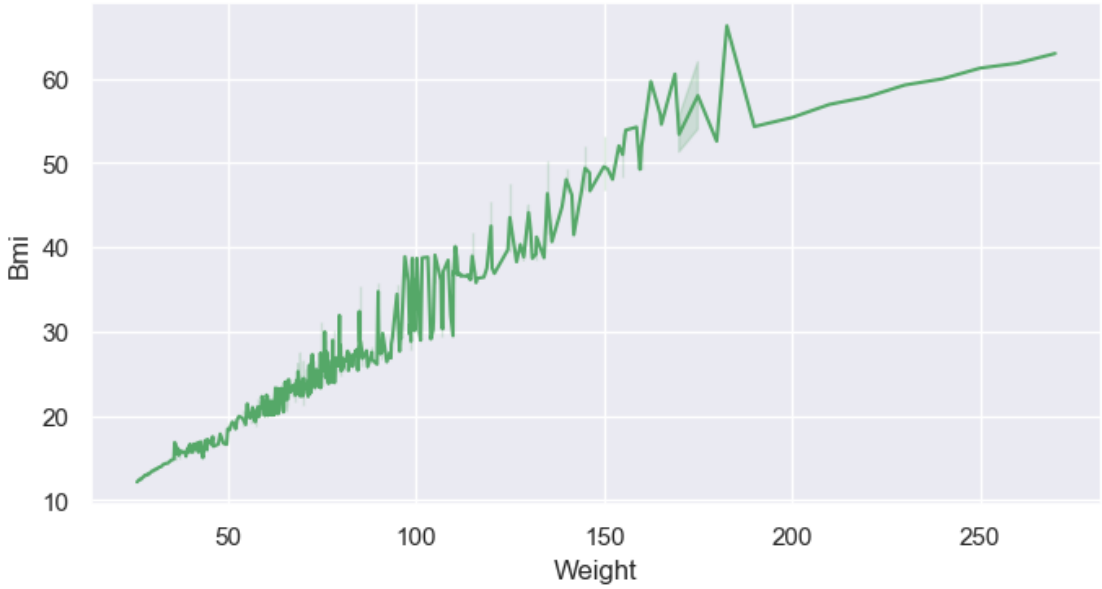
[16]:
```
sns.set(rc={'figure.figsize':(8,4)})
sns.barplot(x='BmiClass',y='Weight',data=data,hue='BmiClass')
plt.show()
```



[17]:
```
sns.set(rc={'figure.figsize':(8,4)})
sns.lineplot(x='Height',y='Bmi',data=data,color='g')
plt.show()
```

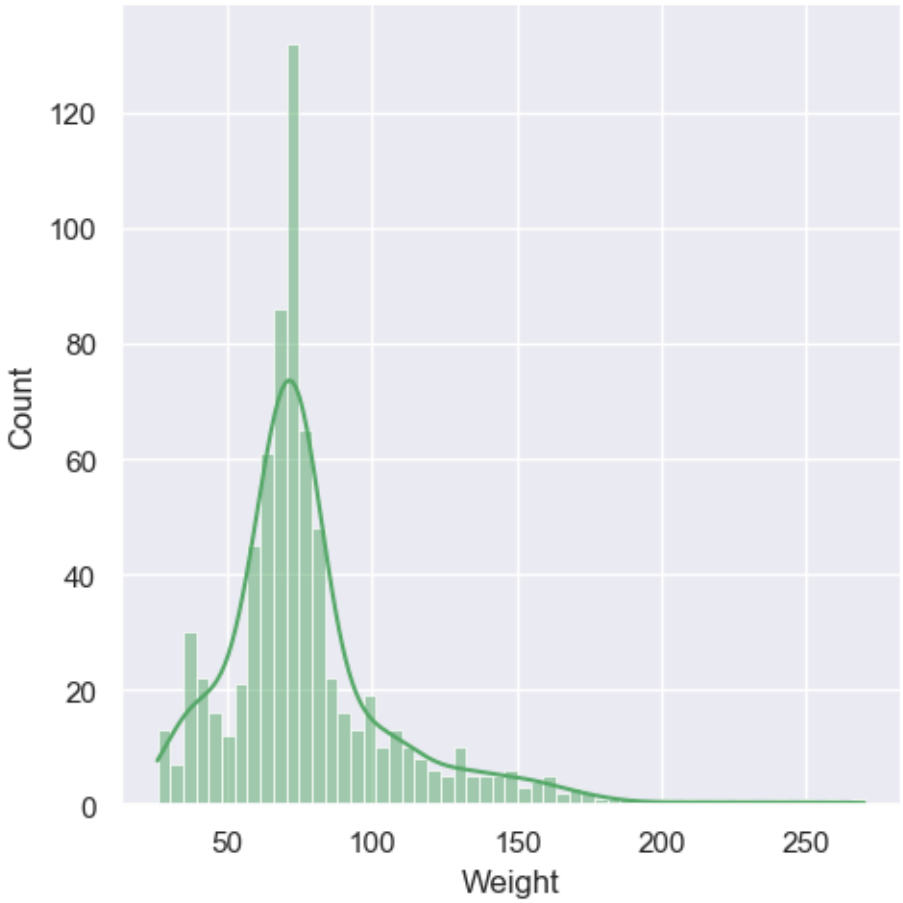


[18]:
```
sns.set(rc={'figure.figsize':(8,4)})
sns.lineplot(x='Weight',y='Bmi',data=data,color='g')
plt.show()
```



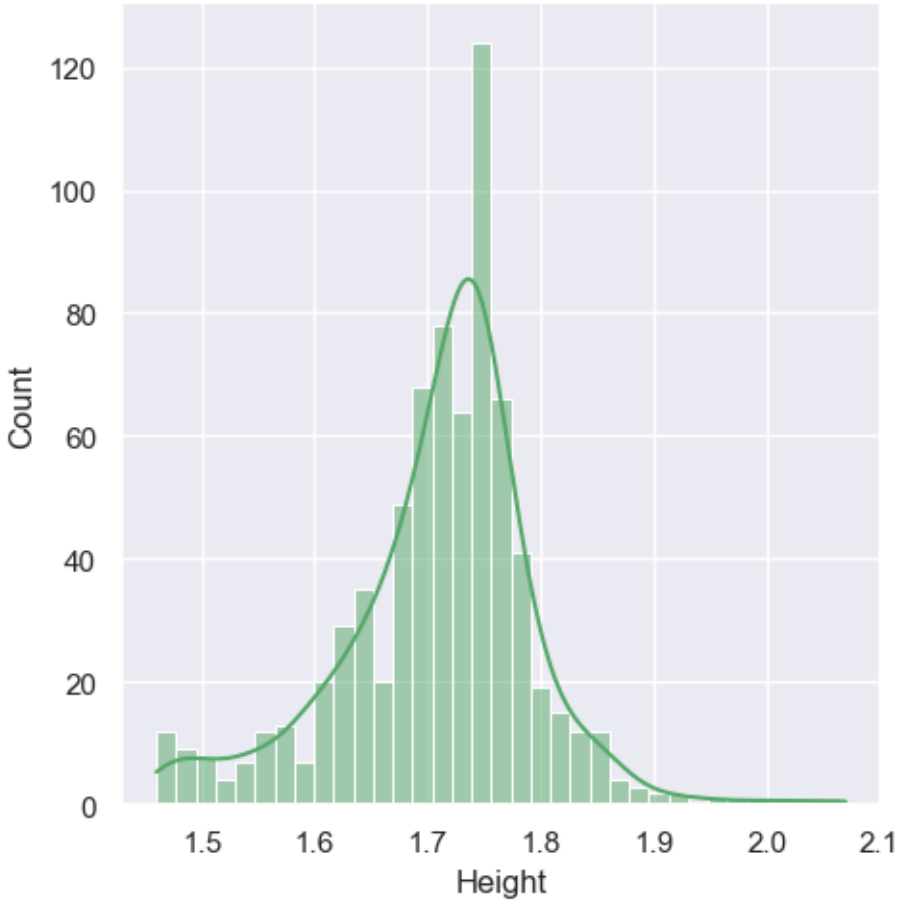
[19]:
```
sns.set(rc={'figure.figsize':(20,10)})
sns.displot(data,x='Weight',kde=True,color='g')
plt.show()
```

```
C:\Users\DELL\AppData\Local\Programs\Python\Python311\Lib\site-
packages\seaborn\axisgrid.py:118: UserWarning: The figure layout has changed to
tight
  self._figure.tight_layout(*args, **kwargs)
```



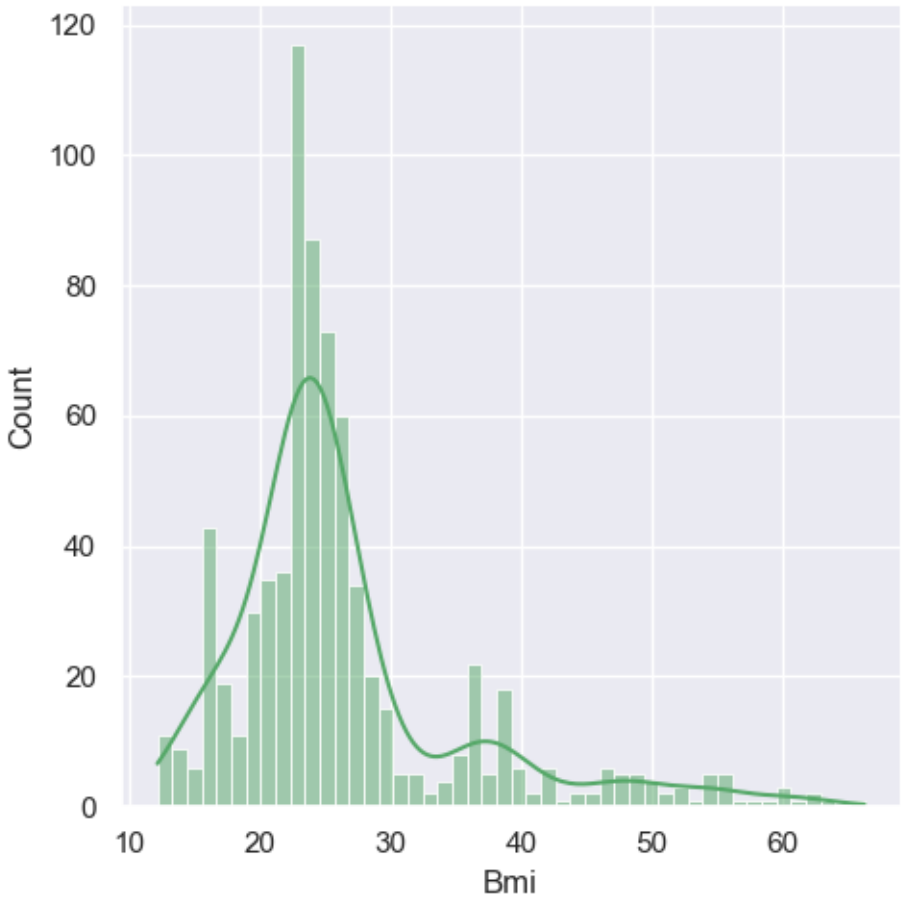
[20]:
```
sns.set(rc={'figure.figsize':(20,10)})
sns.displot(data,x='Height',kde=True,color='g')
plt.show()
```

```
C:\Users\DELL\AppData\Local\Programs\Python\Python311\Lib\site-
packages\seaborn\axisgrid.py:118: UserWarning: The figure layout has changed to
tight
  self._figure.tight_layout(*args, **kwargs)
```



[21]:
```
sns.set(rc={'figure.figsize':(20,10)})
sns.displot(data,x='Bmi',kde=True,color='g')
plt.show()
```

```
C:\Users\DELL\AppData\Local\Programs\Python\Python311\Lib\site-
packages\seaborn\axisgrid.py:118: UserWarning: The figure layout has changed to
tight
  self._figure.tight_layout(*args, **kwargs)
```



7.1 Correlation Heatmap Of Features

[22]:
```
corr=data.iloc[:,0:4].corr()
```

[23]:
```
# heatmap
plt.figure(figsize=(8,4))
sns.heatmap(corr, annot=True,linewidths=.5, cmap="Purples")
```

[23]: <Axes: >

8 Modelling

8.1 Splliting the dataset as train and test set

[24]:
```
def Split(X,Y):
    X_train,X_test,Y_train,Y_test=train_test_split(X,Y,test_size=0.
 ↪3,random_state=42)
    return X_train,X_test,Y_train,Y_test
```

8.2 Prediction Using KNN Classifier

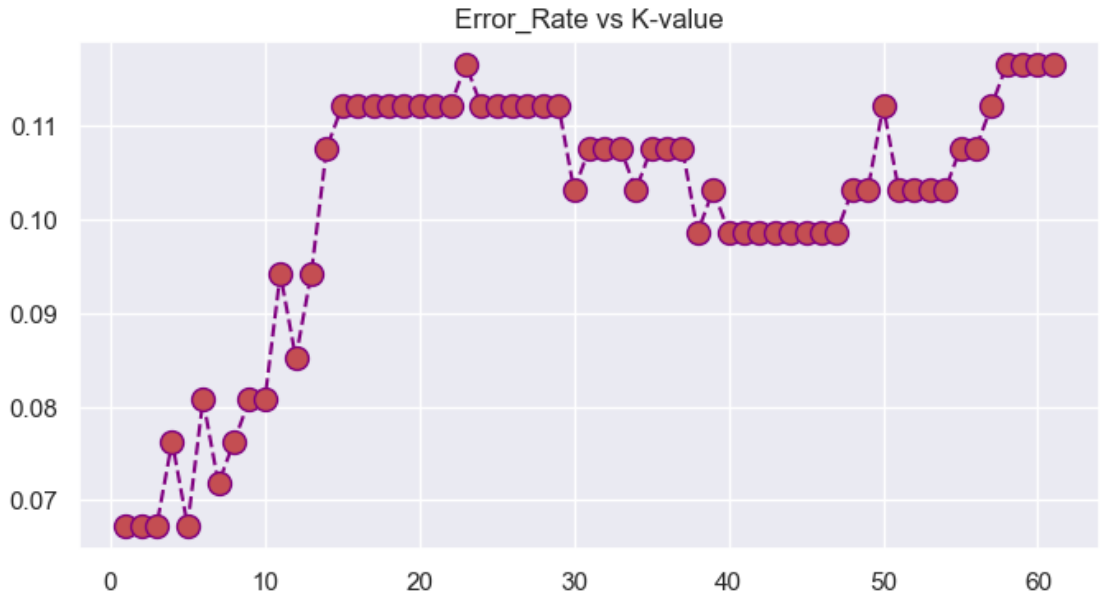
[25]:
```
x=data.iloc[:,0:4].values
y=data['BmiClass'].values
```

[26]:
```
# to find which value shows the lowest mean error
def KNN(X,Y):
    error_rate = []
    X_train,X_test,y_train,y_test=Split(X,Y)
    for i in range(1,62):
        knn = KNeighborsClassifier(n_neighbors=i)
        knn.fit(X_train, y_train)
        pred_i = knn.predict(X_test)
        error_rate.append(np.mean(pred_i != y_test))
    knn = KNeighborsClassifier(n_neighbors=9)
    knn.fit(X_train, y_train)
```

```
    y_pred = knn.predict(X_test)
    return error_rate,confusion_matrix(y_test,␣
↪y_pred),classification_report(y_test, y_pred),accuracy_score(y_test, y_pred)
```

[27]:
```
Knn=KNN(x,y)
```

[29]:
```
plt.figure(figsize=(8,4))
plt.plot(range(1,62), Knn[0], color='purple', linestyle="--",
         marker='o', markersize=10, markerfacecolor='r')
plt.title('Error_Rate vs K-value')
plt.show()
```



[29]:
```
Knn[1]
```

[29]:
```
array([[101,   0,   0,   0,   0,   0],
       [  0,   1,   2,   0,   3,   0],
       [  0,   0,  10,   3,   0,   0],
       [  0,   0,   2,  17,   0,   0],
       [  8,   0,   0,   0,  49,   0],
       [  0,   0,   0,   0,   0,  27]], dtype=int64)
```

[30]:
```
Knn[2]
```

[30]:
```
'              precision    recall  f1-score   support\n\nNormal Weight
0.93      1.00      0.96       101\nObese Class 1       1.00      0.17      0.29
6\nObese Class 2       0.71      0.77      0.74        13\nObese Class 3
0.85      0.89      0.87        19\n   Overweight       0.94      0.86      0.90
```

```
57\n  Underweight       1.00      1.00      1.00        27\n\n     accuracy
0.92       223\n    macro avg       0.91      0.78      0.79       223\n
weighted avg       0.92      0.92      0.91       223\n'
```

[31]:
```
Knn[3]
```

[31]:
```
0.9192825112107623
```

8.3 Linear Regreession Model

[32]:
```
x=data[['Bmi']]
y=data[['Height']]
def Linear_Reg(X,Y):
    X_train,X_test,y_train,y_test=Split(X,Y)
    LinReg=LinearRegression()
    l=LinReg.fit(X_train,y_train)
    y_pred=LinReg.predict(X_test)
    return ␣
 ↪mean_squared_error(y_test,y_pred),mean_absolute_error(y_test,y_pred),r2_score(y_test,y_pred
```

[33]:
```
# mean_squared_error
Linear_Reg(x,y)[0]
```

[33]:
```
0.006096558141684684
```

[34]:
```
# mean_absolute_error
Linear_Reg(x,y)[1]
```

[34]:
```
0.06067026576255947
```

[35]:
```
# r2_score
Linear_Reg(x,y)[2]
```

[35]:
```
0.2013455828819274
```

[36]:
```
x=data[['Weight']]
y=data[['Bmi']]
```

[37]:
```
# mean_squared_error
Linear_Reg(x,y)[0]
```

[37]:
```
5.416325784207428
```

[38]:
```
# mean_absolute_error
Linear_Reg(x,y)[1]
```

[38]:
```
1.4607829385305107
```

[39]:
```
# r2_score
Linear_Reg(x,y)[2]
```

[39]: 0.929236939941767

8.4 Multiple Linear Regreession Model

[40]:
```
y=data[['Height','Weight','Age']]
x=data[['Bmi']]
```

[41]:
```
# mean_squared_error
Linear_Reg(y,x)[0]
```

[41]: 2.3585426416090725

[42]:
```
# mean_absolute_error
Linear_Reg(y,x)[1]
```

[42]: 0.7378353946495149

[43]:
```
# r2_score
Linear_Reg(y,x)[2]
```

[43]: 0.9691861787404451

8.5 Logistic Regreession Model

[44]:
```
#Because there is no features as 0 & 1 format....I create a new feature named
 ↪Having_Thyroid ......Which I take as Randomly True or False
```

[45]:
```
data1=data.copy()
random.seed(42)
random_text = [True,False,True]
random_text_column = [random.choice(random_text) for _ in range(len(data1))]
data1['Have_Thyroid'] = random_text_column
data1.head()
```

[45]:

	Age	Height	Weight	Bmi	BmiClass	Have_Thyroid
0	61	1.85	109.30	31.935720	Obese Class 1	True
1	60	1.71	79.02	27.023700	Overweight	True
2	60	1.55	74.70	31.092612	Obese Class 1	True
3	60	1.46	35.90	16.841809	Underweight	True
4	60	1.58	97.10	38.896010	Obese Class 2	False

[46]:
```
x=data1.drop(['Have_Thyroid','BmiClass'],axis=1)
y=data1['Have_Thyroid']
```

```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.
↪30,random_state=21,stratify=y)
lg=LogisticRegression()
lg.fit(x_train,y_train)
y_pred=lg.predict(x_test)
```

[47]:
```
print(data1['Have_Thyroid'].value_counts(normalize=True).round(2))
```

```
Have_Thyroid
True     0.68
False    0.32
Name: proportion, dtype: float64
```

[48]:
```
model = sm.GLM(y, x, family=sm.families.Binomial())
results = model.fit()
print(results.summary())
```

```
                 Generalized Linear Model Regression Results
==============================================================================
Dep. Variable:           Have_Thyroid   No. Observations:                  741
Model:                            GLM   Df Residuals:                      737
Model Family:                Binomial   Df Model:                            3
Link Function:                  Logit   Scale:                          1.0000
Method:                          IRLS   Log-Likelihood:                -461.76
Date:                Wed, 11 Oct 2023   Deviance:                       923.51
Time:                        21:04:30   Pearson chi2:                     741.
No. Iterations:                     4   Pseudo R-squ. (CS):           0.001006
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          z      P>|z|      [0.025      0.975]
------------------------------------------------------------------------------
Age            0.0033      0.007      0.479      0.632      -0.010       0.017
Height         0.4856      0.185      2.625      0.009       0.123       0.848
Weight     -1.623e-05      0.009     -0.002      0.999      -0.018       0.018
Bmi           -0.0060      0.032     -0.189      0.850      -0.069       0.057
==============================================================================
```

[49]:
```
confusion_matrix=confusion_matrix(y_test,y_pred)
accuracy=accuracy_score(y_test,y_pred)
report=classification_report(y_test,y_pred)
# Print the results
print(f'Accuracy: {accuracy}')
print(f'Confusion Matrix: {confusion_matrix}')
print(f'Classification Report:\n{report}')
```

```
Accuracy: 0.6860986547085202
Confusion Matrix: [[  0  70]
 [  0 153]]
```

```
Classification Report:
              precision    recall  f1-score   support

       False       0.00      0.00      0.00        70
        True       0.69      1.00      0.81       153

    accuracy                           0.69       223
   macro avg       0.34      0.50      0.41       223
weighted avg       0.47      0.69      0.56       223

C:\Users\DELL\AppData\Roaming\Python\Python311\site-
packages\sklearn\metrics\_classification.py:1469: UndefinedMetricWarning:
Precision and F-score are ill-defined and being set to 0.0 in labels with no
predicted samples. Use `zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\DELL\AppData\Roaming\Python\Python311\site-
packages\sklearn\metrics\_classification.py:1469: UndefinedMetricWarning:
Precision and F-score are ill-defined and being set to 0.0 in labels with no
predicted samples. Use `zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\DELL\AppData\Roaming\Python\Python311\site-
packages\sklearn\metrics\_classification.py:1469: UndefinedMetricWarning:
Precision and F-score are ill-defined and being set to 0.0 in labels with no
predicted samples. Use `zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

8.6 Decision Tree

[50]:
```
X=data['Bmi']
Y=data['BmiClass']
# Split the data into training and testing sets
X_train, X_test, y_train, y_test = Split(X,Y)
X_train, X_test, y_train, y_test=np.array(X_train).reshape(-1,1),np.
 ↪array(X_test).reshape(-1,1),np.array(y_train).reshape(-1,1),np.array(y_test).
 ↪reshape(-1,1)
# Create a decision tree classifier
clf = DecisionTreeClassifier()

# Train the classifier on the training data
clf.fit(X_train, y_train)

# Predict the labels of the test set
y_pred = clf.predict(X_test)
```

[51]:
```
accuracy=accuracy_score(y_test,y_pred)
report=classification_report(y_test,y_pred)
# Print the results
```

```
print(f'Accuracy: {accuracy}')
print(f'Classification Report:\n{report}')
```

```
Accuracy: 0.9910313901345291
Classification Report:
               precision    recall  f1-score   support

Normal Weight       1.00      1.00      1.00       101
Obese Class 1       0.86      1.00      0.92         6
Obese Class 2       1.00      0.92      0.96        13
Obese Class 3       0.95      1.00      0.97        19
   Overweight       1.00      0.98      0.99        57
  Underweight       1.00      1.00      1.00        27

     accuracy                           0.99       223
    macro avg       0.97      0.98      0.97       223
 weighted avg       0.99      0.99      0.99       223
```

8.7 Naive Bayes Classifier

[52]:
```
predict=data.iloc[:,0:4]
target=data.iloc[:,4]
pred_train,pred_test,target_train,target_test=train_test_split(predict,target,test_size=0.
 ↪3,random_state=123)
# pred_train, pred_test, target_train, target_test=np.array(pred_train).
 ↪reshape(-1,1),np.array(pred_test).reshape(-1,1),np.array(target_train).
 ↪reshape(-1,1),np.array(target_test).reshape(-1,1)
gnb=GaussianNB()
model=gnb.fit(pred_train,target_train)
prediction=model.predict(pred_test)
df=pd.DataFrame(prediction,target_test)
```

[53]:
```
accuracy=accuracy_score(target_test,prediction)
report=classification_report(target_test,prediction)
# confusion_matrix=confusion_matrix(target_test,prediction)
```

[54]:
```
print(f'Accuracy: {accuracy}')
```

```
Accuracy: 0.9506726457399103
```

[55]:
```
print(f'Classification Report:\n{report}')
```

```
Classification Report:
               precision    recall  f1-score   support

Normal Weight       0.96      0.96      0.96       110
```

```
Obese Class 1       0.67      1.00      0.80         6
Obese Class 2       1.00      0.93      0.97        15
Obese Class 3       1.00      1.00      1.00        17
   Overweight       0.94      0.89      0.91        53
  Underweight       0.96      1.00      0.98        22

     accuracy                           0.95       223
    macro avg       0.92      0.96      0.94       223
 weighted avg       0.95      0.95      0.95       223
```

8.8 RandomForestRegressor

[56]:
```
x=data['Age']
y=data['Bmi']
train_x,test_x,train_y,test_y=train_test_split(x,y,test_size=0.
 ↪3,random_state=42)
rgr=RandomForestRegressor()
rgr.fit(np.array(train_x).reshape(-1,1),np.array(train_y).reshape(-1,1))
test_x=np.array(test_x).reshape(-1,1)
y_pred=rgr.predict(test_x)
mean_squared_error=mean_squared_error(test_y,y_pred)
```

```
C:\Users\DELL\AppData\Roaming\Python\Python311\site-
packages\sklearn\base.py:1151: DataConversionWarning: A column-vector y was
passed when a 1d array was expected. Please change the shape of y to
(n_samples,), for example using ravel().
  return fit_method(estimator, *args, **kwargs)
```

[57]:
```
mean_squared_error
```

[57]:
```
89.09871431264033
```

8.9 Random Forest Classifier

[58]:
```
X=data['Bmi']
Y=data['BmiClass']

X_train, X_test, y_train, y_test = train_test_split(X, Y, test_size=0.2,␣
 ↪random_state=42)
X_train, X_test, y_train, y_test=np.array(X_train).reshape(-1,1),np.
 ↪array(X_test).reshape(-1,1),np.array(y_train).reshape(-1,1),np.array(y_test).
 ↪reshape(-1,1)

# Initialize the Random Forest Classifier
rf_classifier = RandomForestClassifier(n_estimators=100, random_state=42)
```

```
# Train the classifier on the training data
rf_classifier.fit(X_train, y_train)

# Make predictions on the test data
y_pred = rf_classifier.predict(X_test)
df=pd.DataFrame(y_pred,y_test)
# Evaluate the model
accuracy = accuracy_score(y_test, y_pred)
report = classification_report(y_test, y_pred)
# Print the results
print(f'Accuracy: {accuracy}')
print(f'Classification Report:\n{report}')
```

```
C:\Users\DELL\AppData\Roaming\Python\Python311\site-
packages\sklearn\base.py:1151: DataConversionWarning: A column-vector y was
passed when a 1d array was expected. Please change the shape of y to
(n_samples,), for example using ravel().
  return fit_method(estimator, *args, **kwargs)
```

```
Accuracy: 0.9932885906040269
Classification Report:
              precision    recall  f1-score   support

Normal Weight       1.00      1.00      1.00        59
Obese Class 1       1.00      1.00      1.00         3
Obese Class 2       1.00      0.89      0.94         9
Obese Class 3       0.93      1.00      0.96        13
   Overweight       1.00      1.00      1.00        45
  Underweight       1.00      1.00      1.00        20

     accuracy                           0.99       149
    macro avg       0.99      0.98      0.98       149
 weighted avg       0.99      0.99      0.99       149
```

8.10 Support Vector Machine

[59]:
```
from sklearn.svm import SVC
x1=data['Weight']
y1=data['BmiClass']
xtrain,xtest,ytrain,ytest=train_test_split(x1,y1,test_size=0.3)
svc = SVC()
svc.fit(np.array(xtrain).reshape(-1,1),np.array(ytrain).reshape(-1,1))
prediction1=svc.predict(np.array(xtest).reshape(-1,1))
```

```
C:\Users\DELL\AppData\Roaming\Python\Python311\site-
packages\sklearn\utils\validation.py:1184: DataConversionWarning: A column-
vector y was passed when a 1d array was expected. Please change the shape of y
```

```
to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
```

[60]:
```
report = classification_report(ytest, prediction1)
```

```
C:\Users\DELL\AppData\Roaming\Python\Python311\site-
packages\sklearn\metrics\_classification.py:1469: UndefinedMetricWarning:
Precision and F-score are ill-defined and being set to 0.0 in labels with no
predicted samples. Use `zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\DELL\AppData\Roaming\Python\Python311\site-
packages\sklearn\metrics\_classification.py:1469: UndefinedMetricWarning:
Precision and F-score are ill-defined and being set to 0.0 in labels with no
predicted samples. Use `zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\DELL\AppData\Roaming\Python\Python311\site-
packages\sklearn\metrics\_classification.py:1469: UndefinedMetricWarning:
Precision and F-score are ill-defined and being set to 0.0 in labels with no
predicted samples. Use `zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

[61]:
```
print(f"classification_report: {report}")
```

```
classification_report:                precision    recall  f1-score   support

Normal Weight       0.84      0.96      0.90       101
Obese Class 1       0.00      0.00      0.00         9
Obese Class 2       0.67      0.63      0.65        19
Obese Class 3       0.91      0.91      0.91        23
   Overweight       0.65      0.64      0.64        44
  Underweight       1.00      0.89      0.94        27

     accuracy                           0.82       223
    macro avg       0.68      0.67      0.67       223
 weighted avg       0.78      0.82      0.80       223
```

[62]:
```
accuracy = accuracy_score(np.array(ytest).reshape(-1,1),prediction1)
accuracy
```

[62]: 0.8161434977578476

[63]:
```
# (89+1+8+27)/(89+2+3+5+2+3+13+2+3+18+1+2+41+8+2+2+27)
```

[64]:
```
confus= pd.DataFrame(prediction1,ytest)
```

[65]:
```
confus
```

[65]:
```
                          0
BmiClass
Underweight      Underweight
Normal Weight  Normal Weight
Overweight     Normal Weight
Normal Weight  Normal Weight
Obese Class 2     Overweight
…                        …
Overweight     Normal Weight
Obese Class 3  Obese Class 3
Normal Weight  Normal Weight
Obese Class 3  Obese Class 3
Normal Weight  Normal Weight

[223 rows x 1 columns]
```

[ ]: