ASSIGNMENT 3

Date	10 october 2022
Team ID	PNT2022TMID38667
Project Name	Project – Early Detection of Chronic Kidney Disease using Machine Learning
Maximum Marks	2 Marks

1.Download the dataset: Dataset

	A	B	C	D	E	F	G	H	I
1	Sex	Length	Diameter	Height	Whole we	Shucked w	Viscera we	Shell weig	Rings
2	M	0.455	0.365	0.095	0.514	0.2245	0.101	0.15	15
3	M	0.35	0.265	0.09	0.2255	0.0995	0.0485	0.07	7
4	F	0.53	0.42	0.135	0.677	0.2565	0.1415	0.21	9
5	M	0.44	0.365	0.125	0.516	0.2155	0.114	0.155	10
6	I	0.33	0.255	0.08	0.205	0.0895	0.0395	0.055	7
7	I	0.425	0.3	0.095	0.3515	0.141	0.0775	0.12	8
8	F	0.53	0.415	0.15	0.7775	0.237	0.1415	0.33	20
9	F	0.545	0.425	0.125	0.768	0.294	0.1495	0.26	16
10	M	0.475	0.37	0.125	0.5095	0.2165	0.1125	0.165	9
11	F	0.55	0.44	0.15	0.8945	0.3145	0.151	0.32	19
12	F	0.525	0.38	0.14	0.6065	0.194	0.1475	0.21	14
13	M	0.43	0.35	0.11	0.406	0.1675	0.081	0.135	10
14	M	0.49	0.38	0.135	0.5415	0.2175	0.095	0.19	11
15	F	0.535	0.405	0.145	0.6845	0.2725	0.171	0.205	10
16	F	0.47	0.355	0.1	0.4755	0.1675	0.0805	0.185	10
17	M	0.5	0.4	0.13	0.6645	0.258	0.133	0.24	12
18	I	0.355	0.28	0.085	0.2905	0.095	0.0395	0.115	7
19	F	0.44	0.34	0.1	0.451	0.188	0.087	0.13	10
20	M	0.365	0.295	0.08	0.2555	0.097	0.043	0.1	7
21	M	0.45	0.32	0.1	0.381	0.1705	0.075	0.115	9
22	M	0.355	0.28	0.095	0.2455	0.0955	0.062	0.075	11

abalone

2.Load the dataset into the tool

1. .

In [1]:
```
## import required libraries

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib import rcParams

## 2.loading dataset

df=pd.read_csv('abalone.csv')
df.head()
```

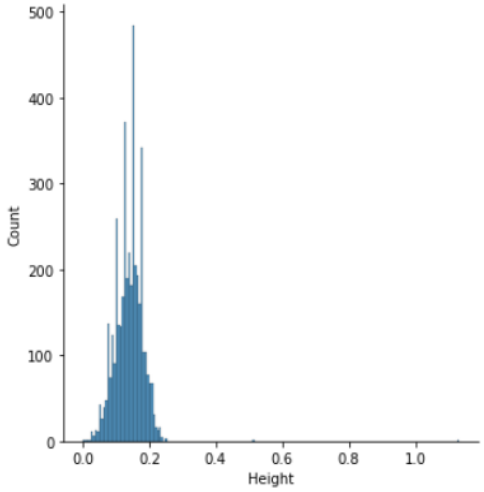
Out[1]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150	15
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	7
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	9
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	10
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055	7

3.Univariate Analysis

In [2]:
```
## import required libraries

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib import rcParams

## 3.univariate analysis

df=pd.read_csv('abalone.csv')
df.head()
sns.displot(df.Height)
```

Out[2]:
```
<seaborn.axisgrid.FacetGrid at 0x18bba4e4340>
```

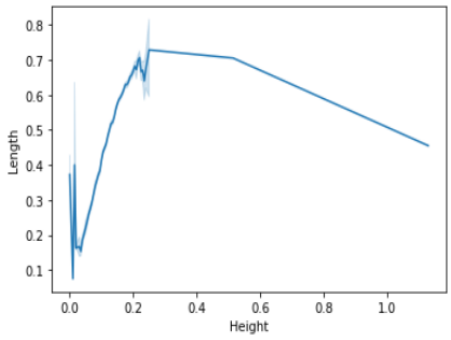


3.Bi-Variate Analysis

In [8]:
```
## import required libraries

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib import rcParams

## 3.bi-variate analysis

df=pd.read_csv('abalone.csv')
df.head()
sns.lineplot(df.Height,df.Length)
```

```
C:\Users\ELCOT\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variables as keyword ar
gs: x, y. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit
keyword will result in an error or misinterpretation.
  warnings.warn(
```

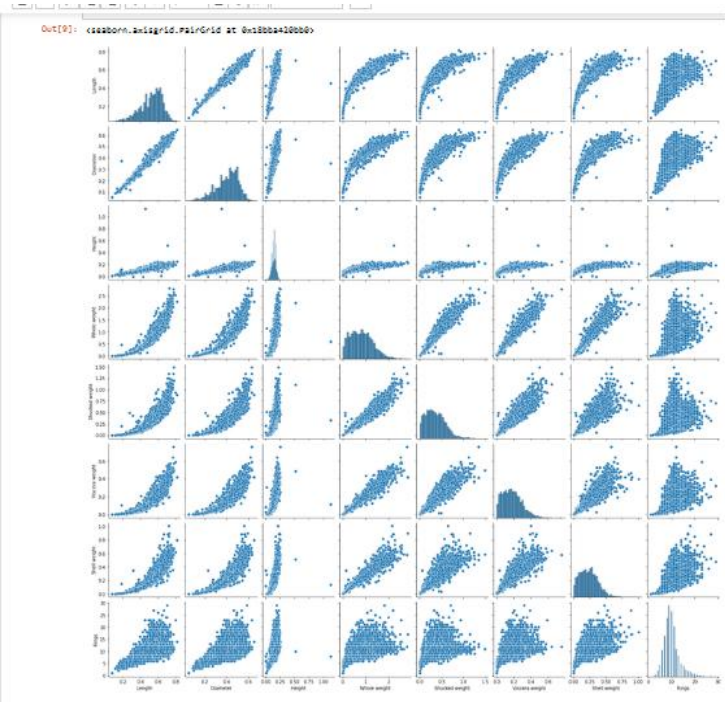
Out[8]:
```
<AxesSubplot:xlabel='Height', ylabel='Length'>
```



3.Multi-Variate Analysis

In [9]:
```
## import required libraries

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib import rcParams

## 3.multi-variate analysis

df=pd.read_csv('abalone.csv')
df.head()
sns.pairplot(df)
```

Out[9]: <seaborn.axisgrid.PairGrid at 0x18bba420bb0>



4. Perform descriptive statistics on the dataset.

In [10]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib import rcParams

## 4.descriptive analysis

df=pd.read_csv('abalone.csv')
df.head()
df.describe()
```

Out[10]:

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
count	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000
mean	0.523992	0.407881	0.139516	0.828742	0.359367	0.180594	0.238831	9.933684
std	0.120093	0.099240	0.041827	0.490389	0.221963	0.109614	0.139203	3.224169
min	0.075000	0.055000	0.000000	0.002000	0.001000	0.000500	0.001500	1.000000
25%	0.450000	0.350000	0.115000	0.441500	0.186000	0.093500	0.130000	8.000000
50%	0.545000	0.425000	0.140000	0.799500	0.336000	0.171000	0.234000	9.000000
75%	0.615000	0.480000	0.165000	1.153000	0.502000	0.253000	0.329000	11.000000
max	0.815000	0.650000	1.130000	2.825500	1.488000	0.760000	1.005000	29.000000

5. Check for Missing values and deal with them.

In [11]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib import rcParams

## 5.no missing value

df=pd.read_csv('abalone.csv')
df.head()
df.isnull().any()
```

Out[11]:
```
Sex               False
Length            False
Diameter          False
Height            False
Whole weight      False
Shucked weight    False
Viscera weight    False
Shell weight      False
Rings             False
dtype: bool
```

6. Find the outliers and replace them outliers.

In [13]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib import rcParams

##  6.Find outliers

df=pd.read_csv('abalone.csv')
df.head()
Q1=df.Height.quantile(0.25)
Q3=df.Height.quantile(0.75)
Q1,Q3
```

Out[13]:
```
(0.115, 0.165)
```

In [14]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib import rcParams

##  6.replace the outlier

df=pd.read_csv('abalone.csv')
df.head()
Q1=df.Height.quantile(0.25)
Q3=df.Height.quantile(0.75)
Q1,Q3
IQR=Q3-Q1
IQR
lower_limit =Q1-1.5*IQR
upper_limit =Q1+1.5*IQR
lower_limit, upper_limit
df_no_outlier = df[(df.Height>lower_limit)&(df.Height< upper_limit)]
df_no_outlier
```

7. Check for Categorical columns and perform encoding.

Out[14]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings

In [17]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib import rcParams
from sklearn.preprocessing import LabelEncoder

## 7.categorical columns encoding

df=pd.read_csv('abalone.csv')
le=LabelEncoder()
df.Surname=le.fit_transform(df.Length)
df.Gender=le.fit_transform(df.Height)
df.head()
```

```
C:\Users\ELCOT\AppData\Local\Temp\ipykernel_3712\3809871668.py:12: UserWarning: Pandas doesn't allow columns to be created
via a new attribute name - see https://pandas.pydata.org/pandas-docs/stable/indexing.html#attribute-access
  df.Surname=le.fit_transform(df.Length)
C:\Users\ELCOT\AppData\Local\Temp\ipykernel_3712\3809871668.py:13: UserWarning: Pandas doesn't allow columns to be created
via a new attribute name - see https://pandas.pydata.org/pandas-docs/stable/indexing.html#attribute-access
  df.Gender=le.fit_transform(df.Height)
```

Out[17]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150	15
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	7
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	9
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	10
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055	7

8. Split the data into dependent and independent variables.

In [26]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib import rcParams

## 8.independent variable-x

df_main=pd.read_csv('abalone.csv')
df_main.head()
x=df_main.drop(columns=['Rings'],axis=1)
x.head()
```

Out[26]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055

In [25]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib import rcParams

## 8.dependent variable-y

df_main=pd.read_csv('abalone.csv')

df_main.head()
x=df_main.drop(columns=['Rings'],axis=1)
x.head()
y=df_main.Rings
y
```

Out[25]:
```
0       15
1        7
2        9
3       10
4        7
        ..
4172    11
4173    10
4174     9
4175    10
4176    12
Name: Rings, Length: 4177, dtype: int64
```

9. Scale the independent variables.

In [27]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.preprocessing import StandardScaler
from sklearn.model_selection import train_test_split

df_main=pd.read_csv('abalone.csv')
df_main.head()
X=df_main.drop(columns=['Shell weight'],axis=1)
X.head()

##9.Scaling

X_train = pd.DataFrame(X)
X_train.head()
```

Out[27]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Rings
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010	15
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	7
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	9
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	10
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	7

10. Split the data into training and testing.

In [47]:
```
X_train
```

Out[47]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight
1794	1	0.575	0.450	0.130	0.8145	0.4030	0.1715	0.2130
1466	2	0.515	0.425	0.145	0.9365	0.4970	0.1810	0.2185
2275	2	0.655	0.525	0.185	1.2590	0.4870	0.2215	0.4450
3929	0	0.650	0.515	0.215	1.4980	0.5640	0.3230	0.4250
1955	0	0.645	0.510	0.180	1.6195	0.7815	0.3220	0.4675
...	...	...	...	...	...	...	...	...
2103	2	0.375	0.290	0.100	0.2760	0.1175	0.0565	0.0850
3603	1	0.420	0.325	0.110	0.3250	0.1245	0.0755	0.1025
3340	1	0.540	0.435	0.145	0.9700	0.4285	0.2200	0.2640
3064	2	0.635	0.500	0.180	1.1540	0.4405	0.2315	0.3870
3398	2	0.365	0.285	0.085	0.2205	0.0855	0.0515	0.0700

3341 rows × 8 columns

In [48]:
```
y_train
```

Out[48]:
```
1794    10
1466     8
2275    20
3929    16
1955    12
        ..
2103     9
3603     7
3340    17
3064     9
3398     9
```

In [49]:
```
X_test
```

Out[49]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight
341	0	0.620	0.510	0.205	1.3475	0.4775	0.2565	0.480
3413	2	0.490	0.395	0.120	0.6740	0.3325	0.1235	0.185
1088	1	0.450	0.340	0.120	0.4925	0.2410	0.1075	0.120
98	2	0.470	0.370	0.130	0.5225	0.2010	0.1330	0.165
3661	1	0.550	0.415	0.150	0.7915	0.3535	0.1760	0.236
...	...	...	...	...	...	...	...	...
1662	0	0.605	0.455	0.145	0.9775	0.4680	0.1775	0.275
2656	2	0.545	0.420	0.120	0.7865	0.4030	0.1850	0.170
2185	2	0.445	0.340	0.120	0.4475	0.1930	0.1035	0.130
727	0	0.480	0.375	0.105	0.5250	0.2185	0.1195	0.155
3796	0	0.675	0.540	0.210	1.5930	0.6860	0.3180	0.450

836 rows × 8 columns

In [50]:
```
y_test
```

Out[50]:
```
341     14
3413     9
1088     6
98       7
3661    10
        ..
1662     9
2656     7
2185     9
727     12
3796    11
```

In [19]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split

## 10.split train and test data
y=df_main.Height
y
X_train, X_test, y_train, y_test = train_test_split(X,y,test_size=0.25,random_state=0)
print('X_train.shape:',X_train.shape)
print('y_train.shape:',y_train.shape)
print('X_test.shape:',X_test.shape)
print('y_test.shape:',X_test.shape)
```

```
X_train.shape: (3132, 8)
y_train.shape: (3132,)
X_test.shape: (1045, 8)
y_test.shape: (1045, 8)
```

11.Build the model

12.Train the model

13.Test the model

Build the model

In [61]:
```
logreg = LogisticRegression()
```

Train and Test the model

In [53]:
```
y_pred = logreg.predict(X_test)
print('Accuracy of logistic regression classifier on test set: {:.3f}'. format(logreg.score (X_test, y_test)))
```

```
Accuracy of logistic regression classifier on test set: 0.261
```

Measure the performance using metrics

In [59]:
```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(y_test, y_pred)
print('Confusion matrix\n\n', cm)
```

```
Confusion matrix

 [[ 0  5  4  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0  2 15  5  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0  2  9 30  5  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0  0  7 32 27  7  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0  0  2 22 43 36 12  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0  0  2 11 25 70 30  5  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0  0  0  9 12 37 47 14  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0  0  0  5  9 29 32 15  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0  0  0  3 10 13 20 15  0  1  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0  0  0  2  5  9 20 13  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
 [ 0  0  0  0  5  6 12  9  0  0  0  0  0  0  0  0  0  0  0  0  0  0]
```

14.Measure the performance

In [55]:
```
from sklearn.metrics import classification_report
print(classification_report(y_test, y_pred))
```

```
              precision    recall  f1-score   support

           4       0.00      0.00      0.00         9
           5       0.22      0.09      0.12        23
           6       0.23      0.20      0.21        46
           7       0.27      0.43      0.33        74
           8       0.30      0.37      0.33       115
           9       0.32      0.49      0.39       143
          10       0.23      0.39      0.29       119
          11       0.16      0.17      0.16        90
          12       0.00      0.00      0.00        62
          13       0.00      0.00      0.00        49
          14       0.00      0.00      0.00        32
          15       0.00      0.00      0.00        14
          16       0.00      0.00      0.00        14
          17       0.00      0.00      0.00        12
          18       0.00      0.00      0.00         9
          19       0.00      0.00      0.00         9
          20       0.00      0.00      0.00         5
          21       0.00      0.00      0.00         4
          22       0.00      0.00      0.00         1
          23       0.00      0.00      0.00         4
          26       0.00      0.00      0.00         1
          27       0.00      0.00      0.00         1

    accuracy                           0.26       836
   macro avg       0.08      0.10      0.08       836
weighted avg       0.19      0.26      0.21       836
```