```
from google.colab import drive
drive.mount('/content/gdrive')
```

```
Mounted at /content/gdrive
```

```
from google.colab import files
uploaded = files.upload()
```

```
<IPython.core.display.HTML object>
```

```
Saving abalone.csv to abalone.csv
```

2. Load the dataset into the tool

```
import pandas as pd
import io
import numpy as np

df = pd.read_csv(io.BytesIO(uploaded['abalone.csv']))

df.head()
```

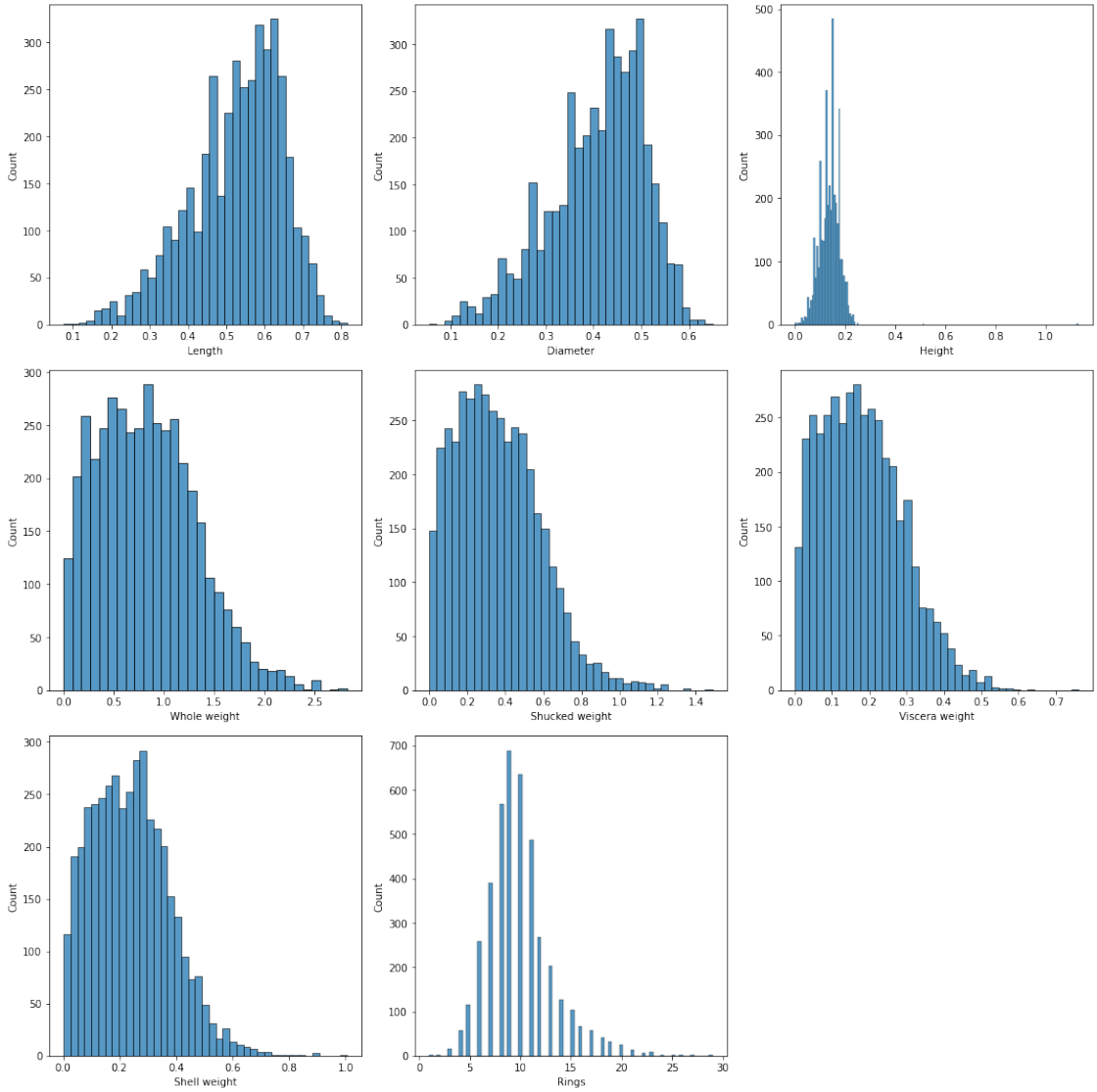
```
  Sex  Length  Diameter  Height  Whole weight  Shucked weight  Viscera
weight  \
0   M   0.455     0.365   0.095        0.5140          0.2245
0.1010
1   M   0.350     0.265   0.090        0.2255          0.0995
0.0485
2   F   0.530     0.420   0.135        0.6770          0.2565
0.1415
3   M   0.440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

   Shell weight  Rings
0         0.150     15
1         0.070      7
2         0.210      9
3         0.155     10
4         0.055      7
```

3.**Perform Below Visualizations. · Univariate Analysis · Bi-Variate Analysis · Multi-Variate Analysis**

Univariate Analysis

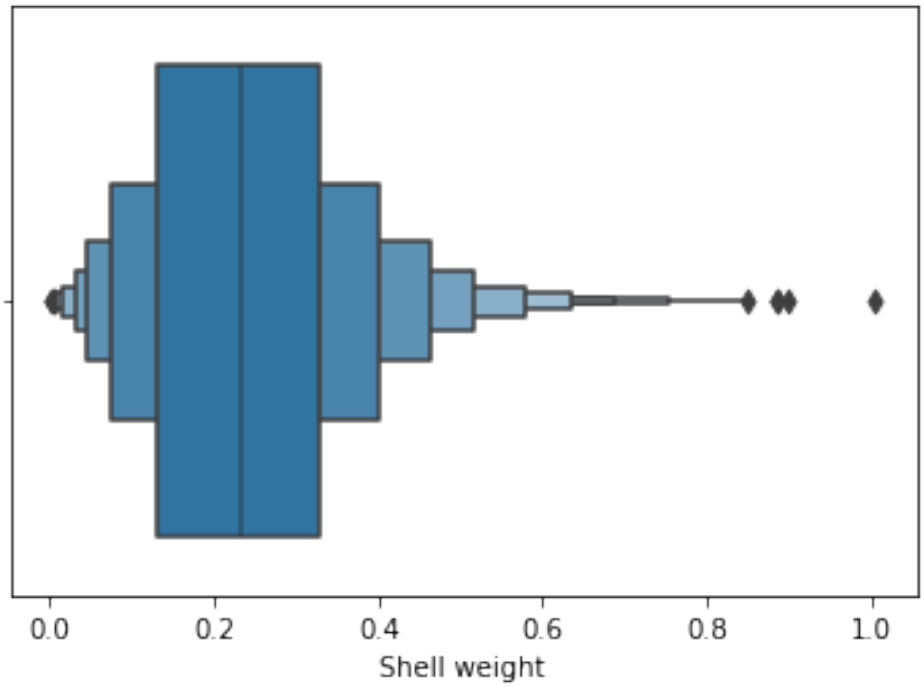
```
import seaborn as sns
import matplotlib.pyplot as plt
import sklearn
import matplotlib.pyplot as plt
```

```
cols = 3
rows = 3
num_cols = df.select_dtypes(exclude='object').columns
fig = plt.figure( figsize=(cols*5, rows*5))
for i, col in enumerate(num_cols):

    ax=fig.add_subplot(rows,cols,i+1)

    sns.histplot(x = df[col], ax = ax)

fig.tight_layout()
plt.show()
```




```
sns.boxenplot(x=df["Shell weight"])
```

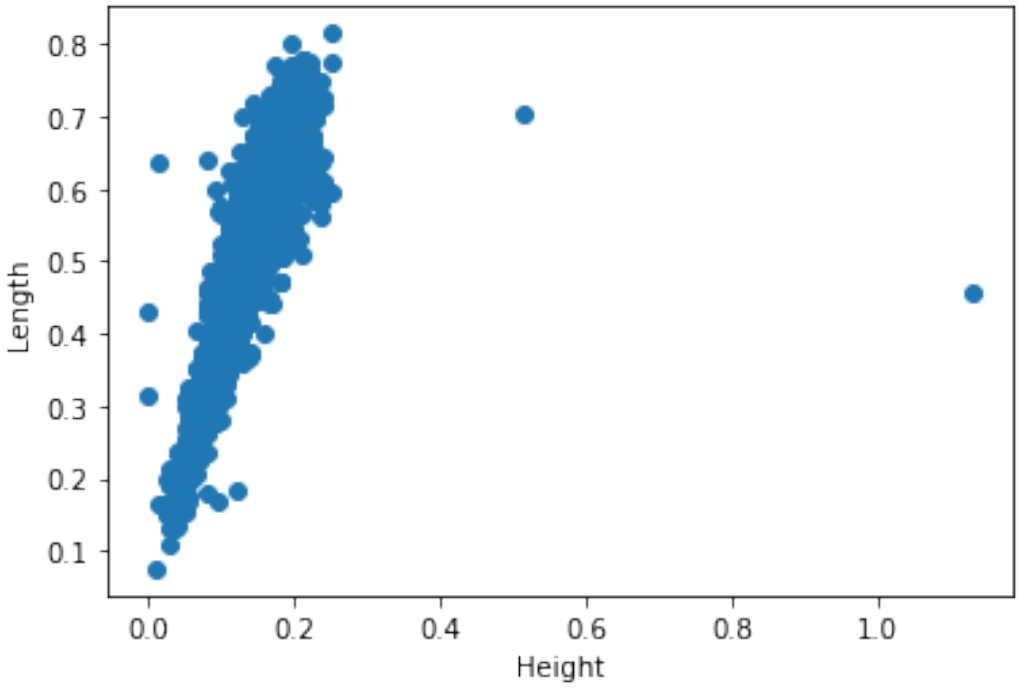
```
<matplotlib.axes._subplots.AxesSubplot at 0x7fafc8665210>
```



Bi-Variate Analysis

```
plt.scatter(df.Height,df.Length)
plt.xlabel('Height')
plt.ylabel('Length')
```

```
Text(0, 0.5, 'Length')
```

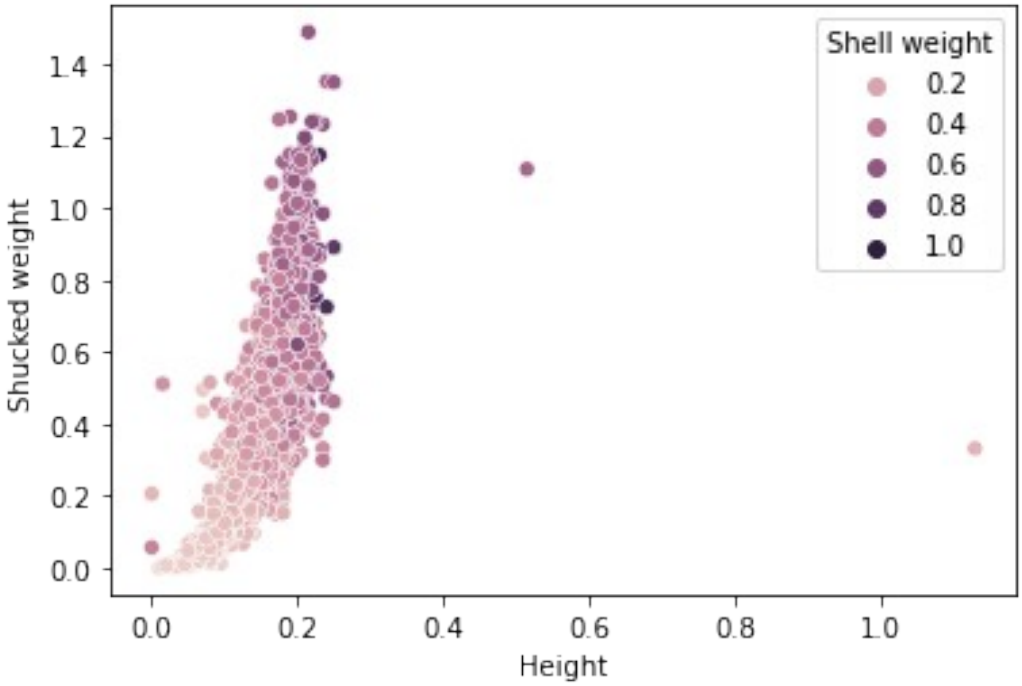


Multi-Variate Analysis

```
sns.scatterplot(df['Height'], df['Shucked weight'], hue = df['Shell
weight'])
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43:
FutureWarning: Pass the following variables as keyword args: 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.
  FutureWarning
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fafcabbb110>
```



4. Perform descriptive statistics on the dataset.

```
df.mean()
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1:
FutureWarning: Dropping of nuisance columns in DataFrame reductions
(with 'numeric_only=None') is deprecated; in a future version this
will raise TypeError.  Select only valid columns before calling the
reduction.
  """Entry point for launching an IPython kernel.
```

```
Length            0.523992
Diameter          0.407881
Height            0.139516
Whole weight      0.828742
Shucked weight    0.359367
```

```
Viscera weight    0.180594
Shell weight      0.238831
Rings             9.933684
dtype: float64
```

```
df.median()
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1:
FutureWarning: Dropping of nuisance columns in DataFrame reductions
(with 'numeric_only=None') is deprecated; in a future version this
will raise TypeError.  Select only valid columns before calling the
reduction.
  """Entry point for launching an IPython kernel.
```

```
Length            0.5450
Diameter          0.4250
Height            0.1400
Whole weight      0.7995
Shucked weight    0.3360
Viscera weight    0.1710
Shell weight      0.2340
Rings             9.0000
dtype: float64
```

```
df.mode()
```

```
   Sex  Length  Diameter  Height  Whole weight  Shucked weight  \
0    M   0.550      0.45    0.15        0.2225           0.175
1  NaN   0.625       NaN     NaN           NaN             NaN

   Viscera weight  Shell weight  Rings
0          0.1715         0.275    9.0
1             NaN           NaN    NaN
```

5. Check for Missing values and deal with them.

```
df.isnull().sum()
```

```
Sex               0
Length            0
Diameter          0
Height            0
Whole weight      0
Shucked weight    0
Viscera weight    0
Shell weight      0
Rings             0
dtype: int64
```

There is no missing values

6.**Find the outliers and replace them outliers**

```
df['Shell weight'] = np.where(df['Shell weight'] > 325, 140, df['Shell
weight'])
df.describe()
```

```
            Length     Diameter       Height  Whole weight  Shucked
weight  \
count  4177.000000  4177.000000  4177.000000   4177.000000
4177.000000
mean      0.523992     0.407881     0.139516      0.828742
0.359367
std       0.120093     0.099240     0.041827      0.490389
0.221963
min       0.075000     0.055000     0.000000      0.002000
0.001000
25%       0.450000     0.350000     0.115000      0.441500
0.186000
50%       0.545000     0.425000     0.140000      0.799500
0.336000
75%       0.615000     0.480000     0.165000      1.153000
0.502000
max       0.815000     0.650000     1.130000      2.825500
1.488000

       Viscera weight  Shell weight        Rings
count     4177.000000   4177.000000  4177.000000
mean         0.180594      0.238831     9.933684
std          0.109614      0.139203     3.224169
min          0.000500      0.001500     1.000000
25%          0.093500      0.130000     8.000000
50%          0.171000      0.234000     9.000000
75%          0.253000      0.329000    11.000000
max          0.760000      1.005000    29.000000
```

1. **Check for Categorical columns and perform encoding.**

```
from sklearn.compose import make_column_selector as selector

categorical_columns_selector = selector(dtype_include=object)
categorical_columns = categorical_columns_selector(df)
categorical_columns
```

```
['Sex']
```

```
data_categorical = df[categorical_columns]
data_categorical.head()
```

```
  Sex
0   M
1   M
2   F
3   M
4   I
```

```
from sklearn import preprocessing

label_encoder = preprocessing.LabelEncoder()

df['Sex']= label_encoder.fit_transform(df['Sex'])
df['Sex'].unique()
```

```
array([2, 0, 1])
```

1. **Split the data into dependent and independent variables.**

```
x=df.iloc[:,:-1]
x.head()
```

```
   Sex  Length  Diameter  Height  Whole weight  Shucked weight  \
0    2   0.455     0.365   0.095        0.5140          0.2245
1    2   0.350     0.265   0.090        0.2255          0.0995
2    0   0.530     0.420   0.135        0.6770          0.2565
3    2   0.440     0.365   0.125        0.5160          0.2155
4    1   0.330     0.255   0.080        0.2050          0.0895

   Viscera weight  Shell weight
0          0.1010         0.150
1          0.0485         0.070
2          0.1415         0.210
3          0.1140         0.155
4          0.0395         0.055
```

```
y=df.iloc[:,-1]
y.head()
```

```
0    15
1     7
2     9
3    10
4     7
Name: Rings, dtype: int64
```

. 9. **Scale the independent variables**

```
from sklearn.preprocessing import StandardScaler
scaler=StandardScaler()
x=scaler.fit_transform(x)


df_scaled =df.copy()
col_names = ['Shucked weight', 'Whole weight']
features = df_scaled[col_names]
from sklearn.preprocessing import MinMaxScaler
scaler = MinMaxScaler()
df_scaled[col_names] = scaler.fit_transform(features.values)
from sklearn.preprocessing import MinMaxScaler
```

```
scaler = MinMaxScaler(feature_range=(5, 10))

df_scaled[col_names] = scaler.fit_transform(features.values)
df_scaled
```

```
      Sex  Length  Diameter  Height  Whole weight  Shucked weight  \
0       2   0.455     0.365   0.095      5.906676        5.751513
1       2   0.350     0.265   0.090      5.395785        5.331204
2       0   0.530     0.420   0.135      6.195325        5.859112
3       2   0.440     0.365   0.125      5.910218        5.721251
4       1   0.330     0.255   0.080      5.359483        5.297579
...   ...     ...       ...     ...           ...             ...
4172    0   0.565     0.450   0.165      6.567204        6.240753
4173    2   0.590     0.440   0.135      6.707101        6.472764
4174    2   0.600     0.475   0.205      7.078980        6.763618
4175    0   0.625     0.485   0.150      6.934656        6.782112
4176    2   0.710     0.555   0.195      8.446963        8.175857

      Viscera weight  Shell weight  Rings
0             0.1010        0.1500     15
1             0.0485        0.0700      7
2             0.1415        0.2100      9
3             0.1140        0.1550     10
4             0.0395        0.0550      7
...              ...           ...    ...
4172          0.2390        0.2490     11
4173          0.2145        0.2605     10
4174          0.2875        0.3080      9
4175          0.2610        0.2960     10
4176          0.3765        0.4950     12

[4177 rows x 9 columns]
```

10.**Split the data into training and testing**

```
from sklearn.model_selection import train_test_split

x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.33)

x_train.shape
```

```
(2798, 8)
```

```
x_test.shape
```

```
(1379, 8)
```

1. **Build the Model**

```
from sklearn.ensemble import RandomForestRegressor
reg=RandomForestRegressor()
```

1. **Train the Model**

```
reg.fit(x_train,y_train)
```

```
RandomForestRegressor()
```

13. Test the Model

```
y_pred=reg.predict(x_test)
```

```
print(y_pred)
```

```
[ 9.28  7.07 10.19 ...  8.58 11.18  6.61]
```

14. Measure the performance using Metrics.

```
from sklearn.metrics import mean_squared_error
import math
print(math.sqrt(mean_squared_error(y_test,y_pred)))
```

```
2.179257695735751
```