```
import pandas as pd
import numpy as np
from matplotlib import pyplot as plt
import seaborn as sns
from sklearn.linear_model import LinearRegression
```

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

```
Mounted at /content/drive
```

```
df=pd.read_csv("/content/drive/MyDrive/abalone.csv")
```

```
df
```

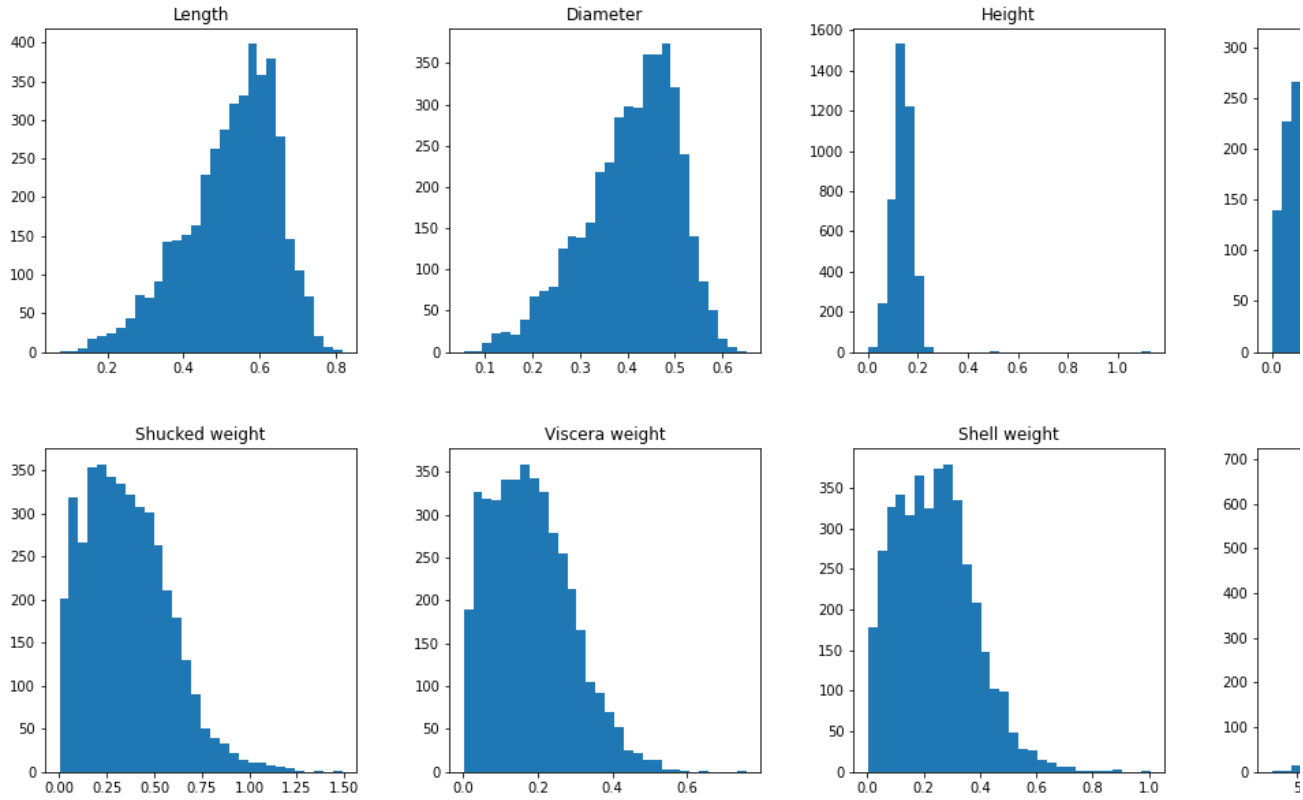
	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.1500	15
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.0700	7
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.2100	9
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.1550	10
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.0550	7
...	...	...	...	...	...	...	...	...	...
4172	F	0.565	0.450	0.165	0.8870	0.3700	0.2390	0.2490	11
4173	M	0.590	0.440	0.135	0.9660	0.4390	0.2145	0.2605	10
4174	M	0.600	0.475	0.205	1.1760	0.5255	0.2875	0.3080	9
4175	F	0.625	0.485	0.150	1.0945	0.5310	0.2610	0.2960	10
4176	M	0.710	0.555	0.195	1.9485	0.9455	0.3765	0.4950	12

4177 rows × 9 columns

```
df['age'] = df['Rings']+1.5
df = df.drop('Rings', axis = 1)
```

```
df.hist(figsize=(20,10), grid=False, layout=(2, 4), bins = 30)
```

```
array([[<matplotlib.axes._subplots.AxesSubplot object at 0x7fb713862c50>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7fb71272eb90>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7fb7126751d0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7fb7126aa7d0>],
       [<matplotlib.axes._subplots.AxesSubplot object at 0x7fb712661dd0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7fb712625410>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7fb7125dba90>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7fb712592fd0>]],
      dtype=object)
```

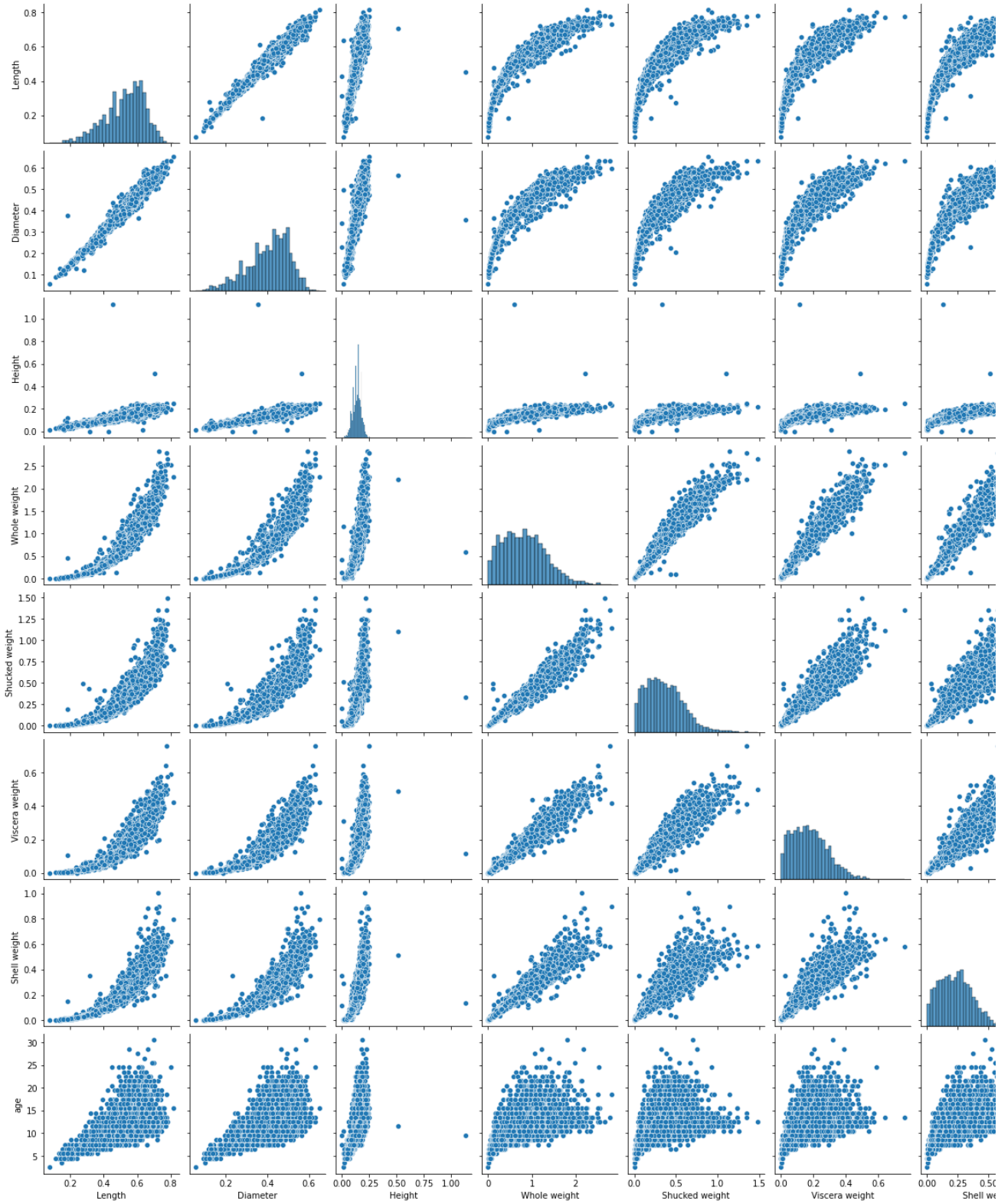



```
df.groupby('Sex')[['Length', 'Diameter', 'Height', 'Whole weight', 'Shucked weight',
       'Viscera weight', 'Shell weight', 'age']].mean().sort_values('age')
```

Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	
I	0.427746	0.326494	0.107996	0.431363	0.191035	0.092010	0
M	0.561391	0.439287	0.151381	0.991459	0.432946	0.215545	0
F	0.579093	0.454732	0.158011	1.046532	0.446188	0.230689	0

```
numerical_features = df.select_dtypes(include = [np.number]).columns
sns.pairplot(df[numerical_features])
```

```
<seaborn.axisgrid.PairGrid at 0x7fb7122b9c10>
```



```
df.describe()
```

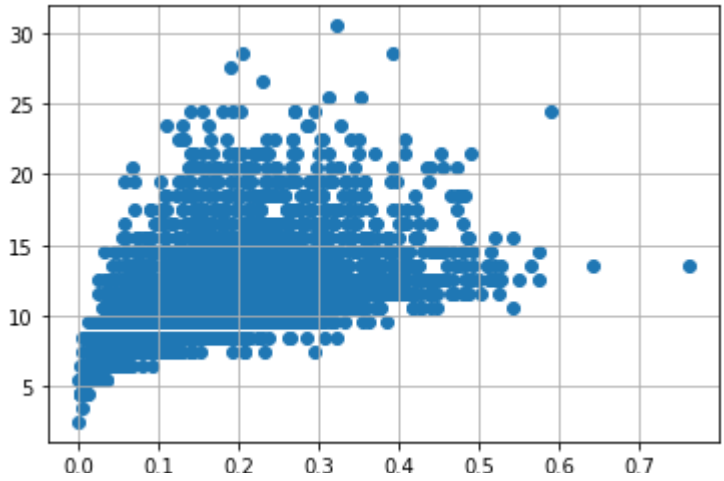
	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	
count	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	41
mean	0.523992	0.407881	0.139516	0.828742	0.359367	0.180594	
std	0.120093	0.099240	0.041827	0.490389	0.221963	0.109614	
min	0.075000	0.055000	0.000000	0.002000	0.001000	0.000500	
25%	0.450000	0.350000	0.115000	0.441500	0.186000	0.093500	
50%	0.545000	0.425000	0.140000	0.799500	0.336000	0.171000	
75%	0.615000	0.480000	0.165000	1.153000	0.502000	0.253000	
max	0.815000	0.650000	1.130000	2.825500	1.488000	0.760000	

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

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

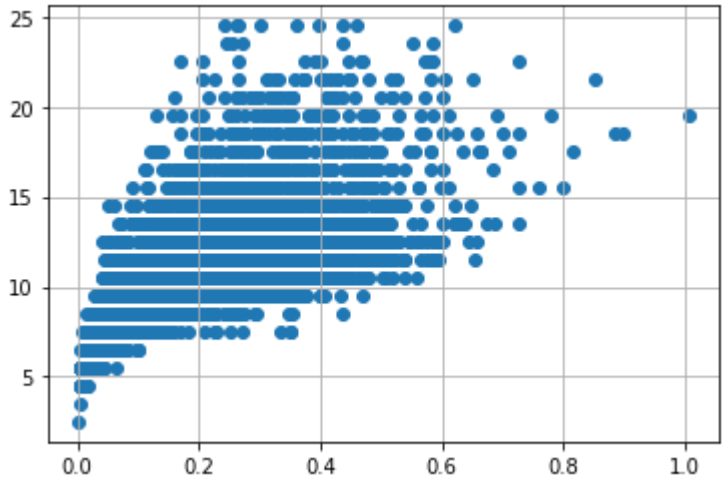
```
df = pd.get_dummies(df)
dummy_data = df.copy()
```

```
var = 'Viscera weight'
plt.scatter(x = df[var], y = df['age'],)
plt.grid(True)
```

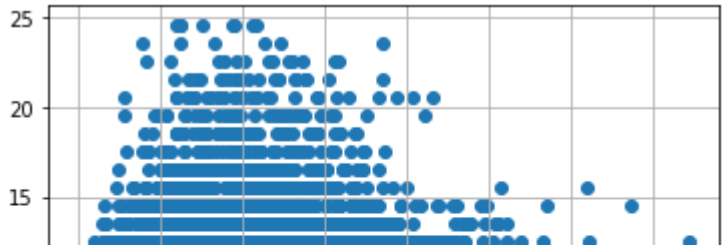



```
df.drop(df[(df['Viscera weight']> 0.5) & (df['age'] < 20)].index, inplace=True)
df.drop(df[(df['Viscera weight']<0.5) & (df['age'] > 25)].index, inplace=True)
```

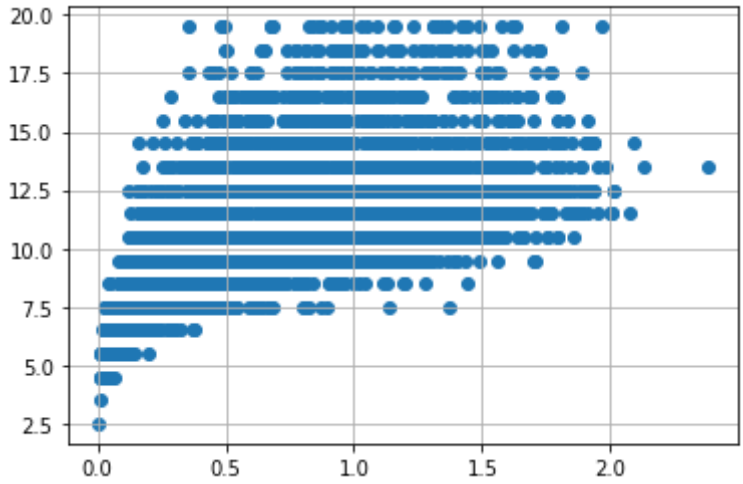
```
var = 'Shell weight'
plt.scatter(x = df[var], y = df['age'],)
plt.grid(True)
#Outliers removal
df.drop(df[(df['Shell weight']> 0.6) & (df['age'] < 25)].index, inplace=True)
df.drop(df[(df['Shell weight']<0.8) & (df['age'] > 25)].index, inplace=True)
```




```
var = 'Shucked weight'
plt.scatter(x = df[var], y = df['age'],)
plt.grid(True)

#Outlier removal
df.drop(df[(df['Shucked weight']>= 1) & (df['age'] < 20)].index, inplace=True)
df.drop(df[(df['Shucked weight']<1) & (df['age'] > 20)].index, inplace=True)
```

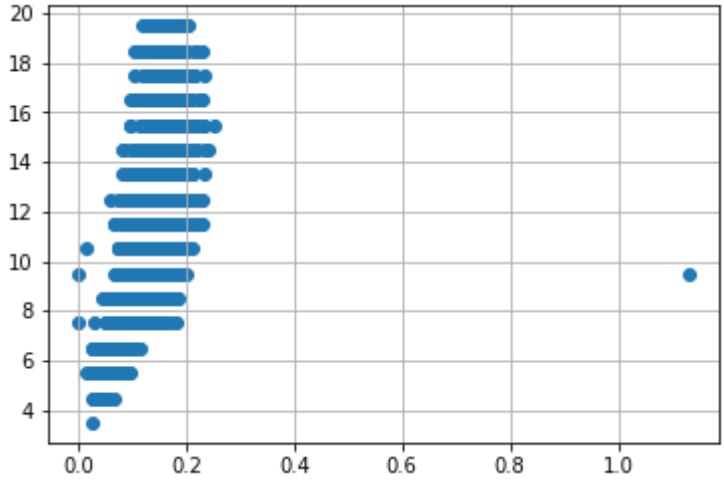



```
var = 'Whole weight'
plt.scatter(x = df[var], y = df['age'])
plt.grid(True)

df.drop(df[(df['Whole weight'] >= 2.5) &
          (df['age'] < 25)].index, inplace = True)
df.drop(df[(df['Whole weight']<2.5) & (
df['age'] > 25)].index, inplace = True)
```

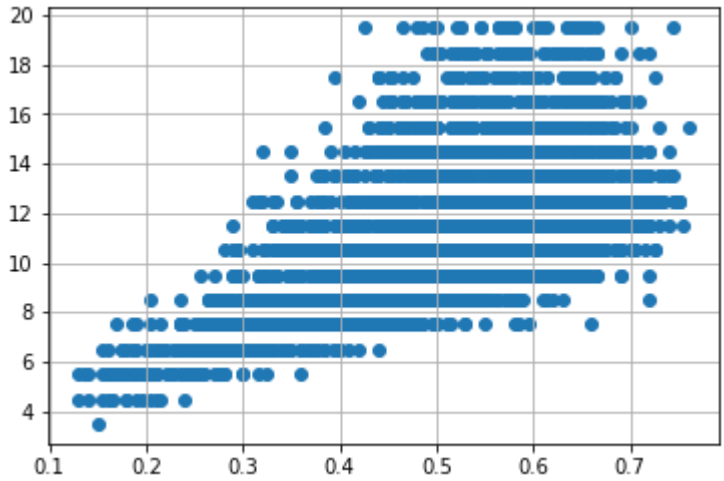



```
var = 'Diameter'
plt.scatter(x = df[var], y = df['age'])
plt.grid(True)

df.drop(df[(df['Diameter'] <0.1) &
          (df['age'] < 5)].index, inplace = True)
df.drop(df[(df['Diameter']<0.6) & (
df['age'] > 25)].index, inplace = True)
df.drop(df[(df['Diameter']>=0.6) & (
df['age'] < 25)].index, inplace = True)
```


```
var = 'Height'
plt.scatter(x = df[var], y = df['age'])
plt.grid(True)
df.drop(df[(df['Height'] > 0.4) &
          (df['age'] < 15)].index, inplace = True)
df.drop(df[(df['Height']<0.4) & (
df['age'] > 25)].index, inplace = True)
```




```
var = 'Length'
plt.scatter(x = df[var], y = df['age'])
plt.grid(True)

df.drop(df[(df['Length'] <0.1) &
          (df['age'] < 5)].index, inplace = True)
df.drop(df[(df['Length']<0.8) & (
df['age'] > 25)].index, inplace = True)
df.drop(df[(df['Length']>=0.8) & (
df['age'] < 25)].index, inplace = True)
```




```
numerical_features = df.select_dtypes(include = [np.number]).columns
categorical_features = df.select_dtypes(include = [np.object]).columns
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:2: DeprecationWarning: `
```

```
Deprecated in NumPy 1.20; for more details and guidance: https://numpy.org/devdocs/re
```

```
numerical_features
```

```
Index(['Length', 'Diameter', 'Height', 'Whole weight', 'Shucked weight',
       'Viscera weight', 'Shell weight', 'age', 'Sex_F', 'Sex_I', 'Sex_M'],
      dtype='object')
```

```
categorical_features
```

```
Index([], dtype='object')
```

```
from sklearn.preprocessing import LabelEncoder
le=LabelEncoder()
print(df.Length.value_counts())
```

```
0.575    93
0.625    91
0.580    89
0.550    89
0.620    83
         ..
0.220     2
0.150     1
0.755     1
0.135     1
0.760     1
Name: Length, Length: 126, dtype: int64
```

```
x=df.iloc[:,:5]
x
```

	Length	Diameter	Height	Whole weight	Shucked weight

```
y=df.iloc[:,5:]
y
```

	Viscera weight	Shell weight	age	Sex_F	Sex_I	Sex_M
0	0.1010	0.1500	16.5	0	0	1
1	0.0485	0.0700	8.5	0	0	1
2	0.1415	0.2100	10.5	1	0	0
3	0.1140	0.1550	11.5	0	0	1
4	0.0395	0.0550	8.5	0	1	0
...	...	...	...	...	...	...
4172	0.2390	0.2490	12.5	1	0	0
4173	0.2145	0.2605	11.5	0	0	1
4174	0.2875	0.3080	10.5	0	0	1
4175	0.2610	0.2960	11.5	1	0	0
4176	0.3765	0.4950	13.5	0	0	1

3995 rows × 6 columns

```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2)
```

```
from sklearn.linear_model import LinearRegression
mlr=LinearRegression()
mlr.fit(x_train,y_train)
```

```
LinearRegression()
```

```
x_test[0:5]
```

	Length	Diameter	Height	Whole weight	Shucked weight
1809	0.640	0.475	0.140	1.0725	0.4895
2506	0.375	0.300	0.075	0.1440	0.0590
2369	0.560	0.440	0.170	0.9445	0.3545
3577	0.600	0.475	0.230	1.1570	0.5220
2869	0.370	0.280	0.085	0.1980	0.0805

```
y_test[0:5]
```

	Viscera weight	Shell weight	age	Sex_F	Sex_I	Sex_M
1809	0.2295	0.310	9.5	1	0	0
2506	0.0300	0.044	8.5	0	1	0
2369	0.2175	0.300	13.5	0	1	0
3577	0.2235	0.360	12.5	0	0	1
2869	0.0455	0.058	6.5	0	1	0

```
from sklearn.preprocessing import StandardScaler
ss=StandardScaler()
x_train=ss.fit_transform(x_train)
```

```
mlrpred=mlr.predict(x_test[0:9])
```

```
mlrpred
```

```
array([[ 0.23724206,  0.28762719, 11.33779331,  0.32597418,  0.263786  ,
         0.41023982],
       [ 0.02800235,  0.05602483,  8.95920642,  0.09936378,  0.71899922,
         0.18163701],
       [ 0.21233191,  0.29619422, 13.23170802,  0.44369084,  0.14988261,
         0.40642655],
       [ 0.25581777,  0.34225978, 13.56715107,  0.52538667, -0.04653311,
         0.52114644],
       [ 0.04284146,  0.06607175,  8.9115833 ,  0.09880874,  0.70608811,
         0.19510315],
       [ 0.12993526,  0.18904414, 11.3359012 ,  0.29656264,  0.38645424,
         0.31698312],
       [ 0.24608307,  0.3097537 , 11.87958685,  0.38981072,  0.16508757,
         0.44510171],
       [ 0.33539203,  0.41945829, 13.66126541,  0.54167171, -0.10682847,
         0.56515676],
       [ 0.16836738,  0.22441874, 11.35510508,  0.30963623,  0.33582888,
         0.35453489]])
```

```
from sklearn.metrics import r2_score
r2_score(mlr.predict(x_test),y_test)
```

```
-3.2397564414374376
```

Colab paid products - Cancel contracts here

✓ 0s completed at 22:36