Assignment -4

Assignment Date	**17 November 2022**
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Student Roll Number	**111619104164**
Maximum Marks	**4 Marks**

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

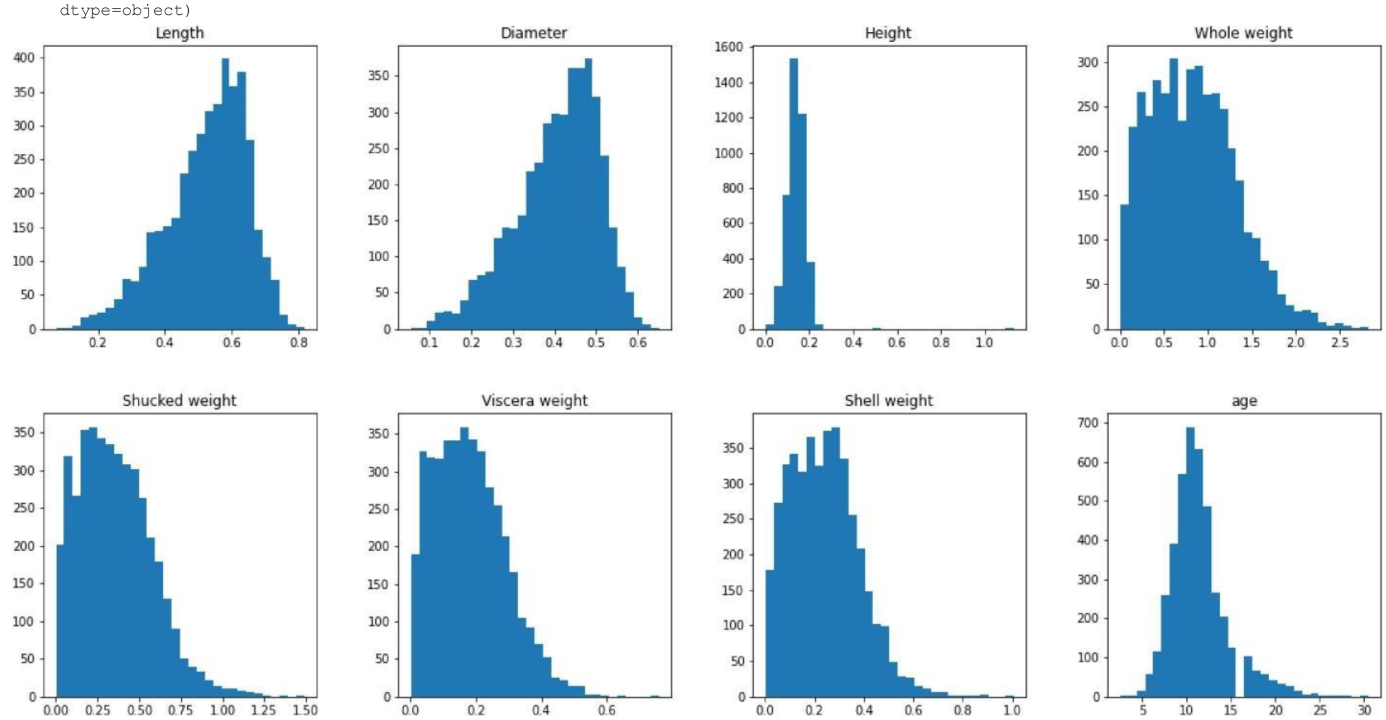
```
df=pd.read_csv("/content/drive/NyDrive/Colab Notebooks/abalone.csv”)
```

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

Univariate Analysis

```
df.hist(figsize=(20,10), grid=False, layout=(2, 4), bins = 3B)
```

```
[    array([[<matplotlib.axes._subplots.AxesSubplot object at 8x7f3d1b8fb698>,
          <matplotlib.axes._subplots.AxesSubplot object at 0x7f3d1ade4d98>,
          <matplotlib.axes._subplots.AxesSubplot object at 0x7f3dladaa398>,
         <matplotlib.axes._subplots.AxesSubplot object at Bx7f3d1ad60998>],
        [<matplotlib.axes._subplots.AxesSubplot object at 0x7f3dladl6f98>,
         <matplotlib.axes._subplots.AxesSubplot object at Bx7f3d1acda5d8>,
         <matplotlib.axes._subplots.AxesSubplot object at Bx7f3d1ac8fc58>,
         <matplotlib.axes._subplots.AxesSubplot object at 8x7f3d1ac531d8>]],
       dtype=object)
```




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

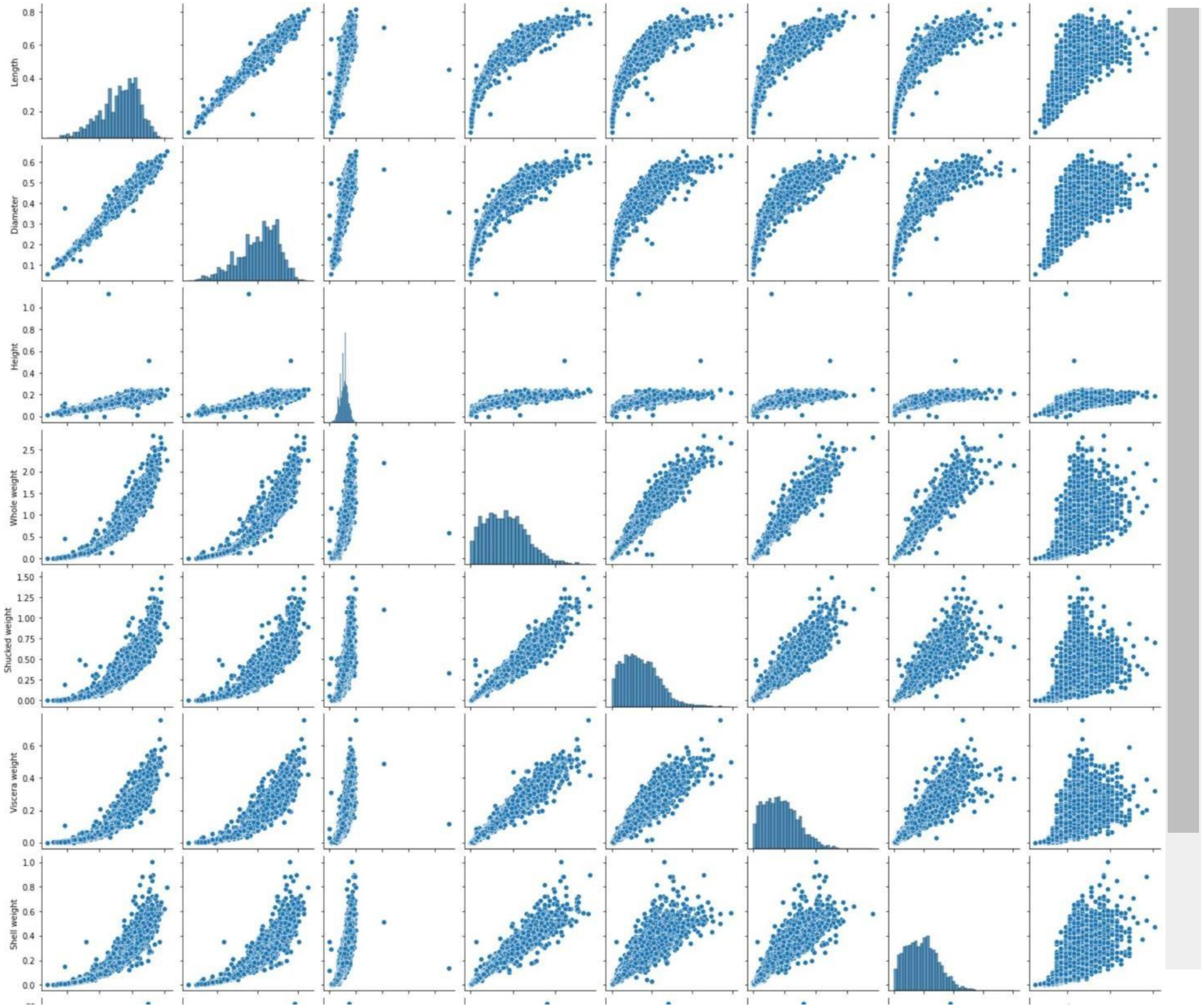
Sex	Length	Diameter	Height	whole weight	Shucked weight	Viscera weight	Shell weight	age
	0.427746	0.326494	0.107996	0.431363	0.191035	0.092010	0.128182	9.390462
M	0.561391	0.439287	0.151381	0.991459	0.432946	0.215545	0.281969	12.205497

F	0.579093	0.454732	0.158011	1.046532	0.446188	0.230689	0.302010	12.629304

Bivariate Analysis

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

<seaborn.axisgrid.PairGrid at 0x7f3d1a345650>



Descriptive statistics

```
df.describe()
```

	Length	Diameter	Height	whole weight	Shucked weight	viscera weight	Shell weight	age
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	11.433684
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	2.500000
25%	0.450000	0.350000	0.115000	0.441500	0.186000	0.093500	0.130000	9.500000
50%	0.545000	0.425000	0.140000	0.799500	0.336000	0.171000	0.234000	10.500000
75%	0.615000	0.480000	0.165000	1.153000	0.502000	0.253000	0.329000	12.500000
max	0.815000	0.650000	1.130000	2.825500	1.488000	0.760000	1.005000	30.500000

Check for missing values

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

Outlier handling

```
df - pd.get_dummies(df)
dummy_da ta = df . copy( )
var = 'Viscera weight'
plt.scatter(x = df[var], y = df['age'],)
plt.grid(True)
```

```
# outliers removal
d-F. drop(df[ (d-F[ ' VI scera weight ' ] › 0. 5) & (df-[ ' age ' ] ‹ 20) ] . Index, inp1ace=True)
df.drop(df[(df['Uiscera  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']‹8.8) 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']  <  28)].index,  inplace=True)
df.drop(df[(df['Shucked weight’]<1) & (df['age’]  >  28)].iudex,  inplace=True)
```

```
var = ' Nhole weight ’
pit . scatter (x = df-[var] , y = df[ ' age ' ] )
p1t . grid(True)

df.drop(df[(df['Whole weight’]  ›= 2.5)  &
          (df[’age'] ‹ 25)].index, inplace = True)
df.  drop(df-[ (df[ 'Nhole  weight ’ ]‹2. 5)  &  (
d-F[ ’ age ' ]   ›  25) ] . Index,  1nplace  = True)
```

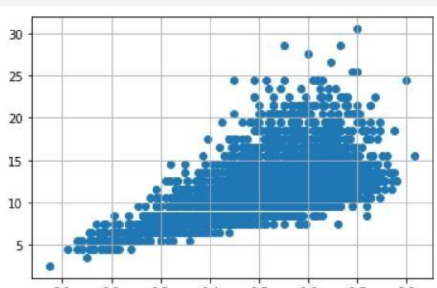
```
var = ' Diameter '
pit . scatter (x = df-[var] , y = df[ ' age ' ] )
p1t . grid(True)

df.drop (df-[(df['Diazeten'] ‹8. 1)  &
          (df[’age'] ‹ 5)].index, inplace = True)
df. drop(df-[ (df[ ' Diameter ' ] ‹0. 6) & (
d-F[ ’ age ' ] › 25) ] . Index, 1nplace = True)
d-F- . drop(df-[ (d1°[ ' Diameter ' ] ›=0. 6) & (
df-[ ’ age ' ] ‹ 25) ] . Index, 1nplace = True)
```

```
var  =  ' Height '
p1t . scatter (x - df[var] , y - df[ ' age ' ] )
p1t . grid(True)
d-F. drop(d-I- [ (df-[ ' Height ' ] › 6 . 4) &
          (df[ ’ age ' ] ‹ 15) ] . Index, Inplace = True)
d-F. drop(df-[ (d-F[ ' Height ' ] ‹0. 4) & (
d-I°[ ’ age ' ] › 25) ] . index, 1nplace = True)
```

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

df.drop(df[(df['Leugth’] ‹8.1)&
          (df['age'] < 5)].index, inplace = True)
dfdropd[df['Leugth]‹0.8) & (
df['age'] › 25)].index, inplace = True)
df.dropd[df['Length]>=8.8) & (
df[’age'] ‹ 25)].iudex, inplace = True)
```



Categorical columns

```
numerical_features = df.select_dtypes(include = [np.number]).columns
categorica1_features = df.select_dtypes(include = [np.object]).columns
```

/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:2: Deprecationwarning: 'up.object' is a deprecated alias for the builtin 'object' To siler
Deprecated in NumPy 1.20; for more details and guidance: https://numpy.org/devdocs/release/1.20.8-notes.html#deprecations

```
numerical_features
```

```
Index( [ ' Length ', ' DI ameter', ' Height ', ' Mhole weight ' , ' Shucked weight ' ,
         'Uiscera weight', 'Shell weight', 'age'],
       dtype='object')
```

```
categonica l_featunes
```

```
Index( [ ' Sex ' ] , dtype= ' obj ect ' )
```

ENCODING

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

```
M     1525
1     1341
F     1301
Name: Sex, dtype: int64
```

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

	Sex	Length	Diameter	HeIght	Nhole we1ght
0	M	0.455	0.365	0.095	0.5140
1	M	0.350	0.265	0.090	0.2255
2	F	0.530	0.420	0.135	0.6770
3	M	0.440	0.365	0.125	0.5160
4		0.330	0.255	0.080	0.2050
4172	F	0.565	0.450	0.165	0.8870
4173	M	0.590	0.440	0.135	0.9660
4174	M	0.600	0.475	0.205	1.1760
4175	F	0.625	0.485	0.150	1.0945
4176	M	0.710	0.555	0.195	1.9485

4167 rows • 5 columns

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

	Shucked weight	VIscera weight	Shell weight	age
0	0.2245	0.1010	0.1500	[redacted]
1	0.0995	0.0485	0.0700	8.5
2	0.2565	0.1415	0.2100	[redacted]
3	0.2155	0.1140	0.1550	11.5
4	0.0895	0.0395	0.0550	[redacted]
4172	0.3700	0.2390	0.2490	[redacted]
4173	0.4390	0.2145	0.2605	11.5
4174	0.5255	0.2875	0.3080	[redacted]
4175	0.5310	0.2610	0.2960	11.5
4176	0.9455	0.3765	0.4950	[redacted]

4167 rows 4 columns

Train, Test, Split

```
from sk1earn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2)
```

Model Building

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

Train and Test model

```
x_test [6 : 5 ]
```

	Sex	Length	Diameter	Height	Nhole we1ght
661		0.535	0.450	0.170	0.781
370	F	0.650	0.545	0.165	1.566
2272	M	0.635	0.510	0.210	1.598
1003	M	0.595	0.455	0.150	1.044
1145	M	0.580	0.455	0.195	1.859

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

	Shucked we1ght	vlscera we1ght	Shell we1ght	age
661	0.3055	0.1555	0.295	[redacted]
370	0.6645	0.3455	0.415	17.5
2272	0.6535	0.2835	0.580	[redacted]
1003	0.5180	0.2205	0.270	10.5
1145	0.9450	0.4260	0.441	[redacted]

Feature Scaling

```
from sklearn.preprocessing import StandardScaler
ss=StandardScaler()
x_train=ss.fit_transform(x_train)
mlrpred=mlr.predict(x_test[B:9])
mlrpred
```

Performance measure

```
l-rom sklearn .metric s lmport r2_score
r2_s core(m1r . predict (x_test) , y_test )
```

0.5597133867640833