Assignment -4

Assignment Date	06 November 2022
Student Name	Mathan R
Student Roll Number	812719104022
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
```

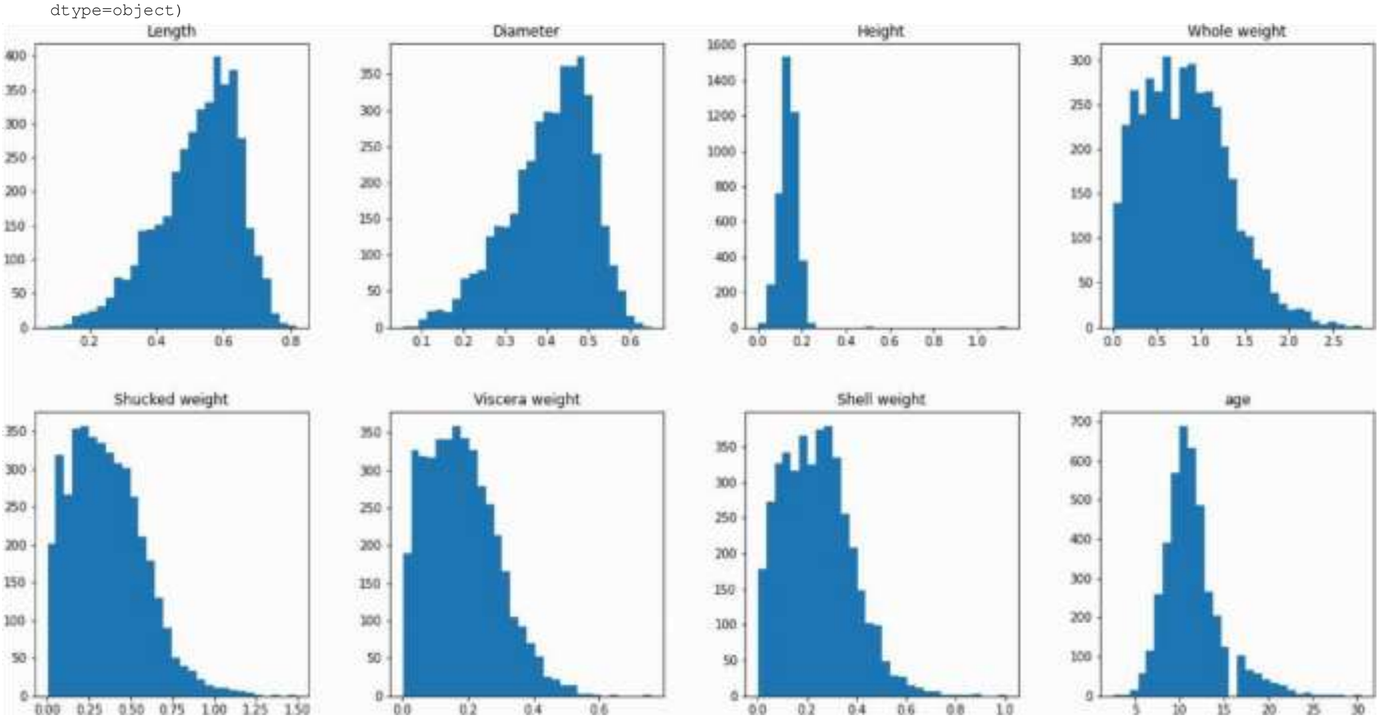
```
df=pd.read_csv("/content/drive/MyDrive/Colab Notebooks/abalone.csv")
```

```
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 = 38)
```

```
[   array([[<matplotlib.axes._subplots.AxesSubplot object at 8x7f3d1b8fb698>,
         <matplotlib.axes._subplots.AxesSubplot object at 0x7f3d1ade4d98>,
         <matplotlib.axes._subplots.AxesSubplot object at 0x7f3d1adaa398>,
         <matplotlib.axes._subplots.AxesSubplot object at Bx7f3d1ad60998>],
        [<matplotlib.axes._subplots.AxesSubplot object at 0x7f3d1ad16f98>,
         <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')
```

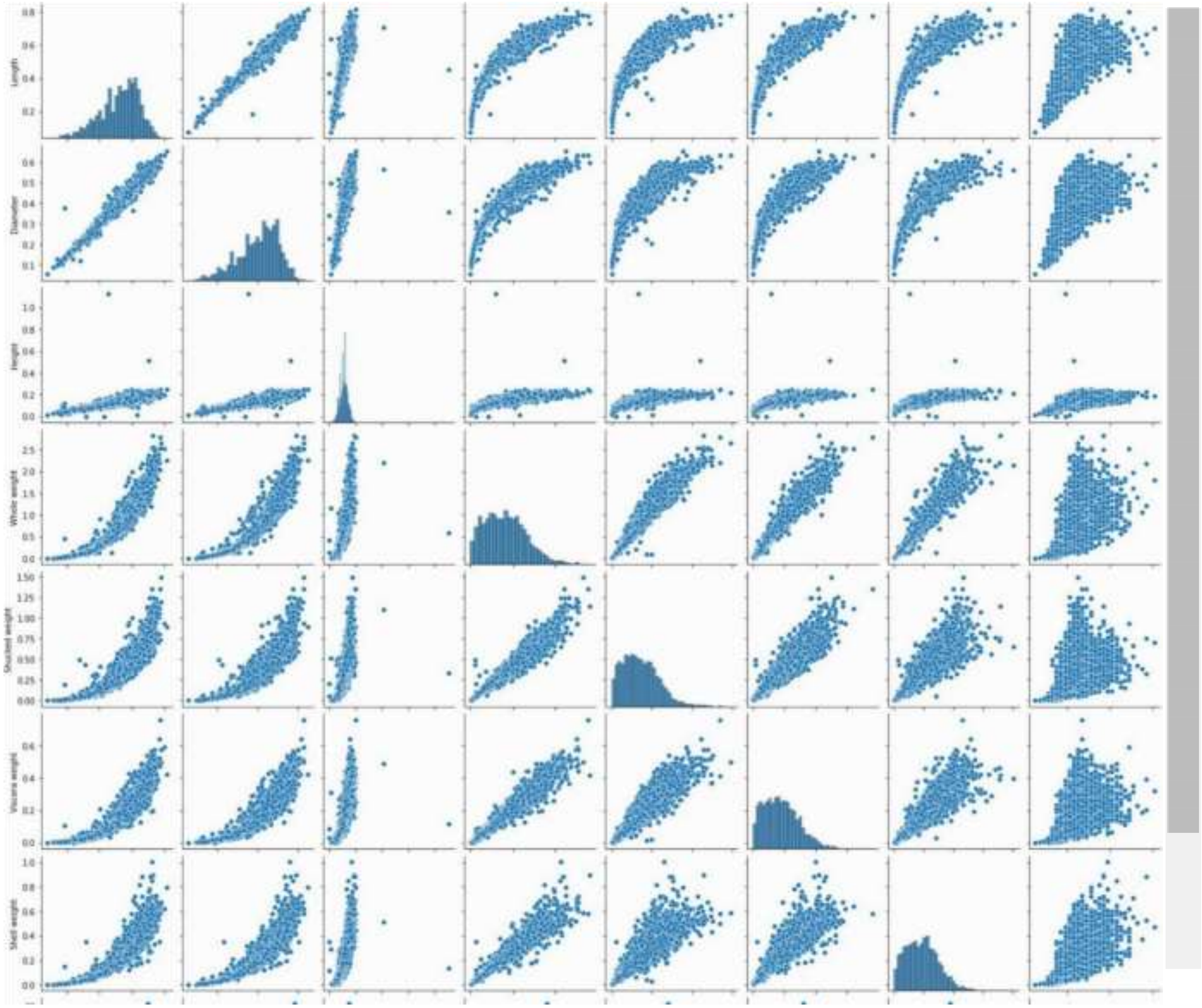
	Length	Diameter	Height	whole weight	Shucked weight	Viscera weight	Shell weight	age
Sex								
	0.427746	0.326494	0.107996	0.431363	0.191035	0.092010	0.128182	9.390462

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 0x 7f3d1a345650>



Descriptive statistics

```
df.describe()
```

	Length	Diameter	Height	whole weight	Shucked weight	viscera weight	Shell weight	age
count	417 7.000000	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 missin g values

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

Outlier handling

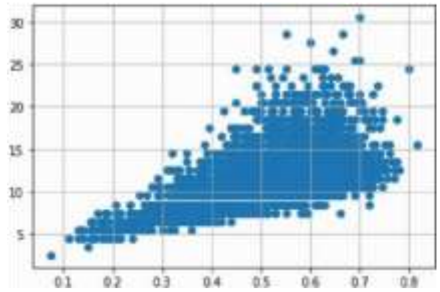
```
df    -    pd.get_dummies(df)
dummy_da ta = df . copy( )
var = 'Viscera weight' plt.scatter(x
=   df[var],   y   =   df['age'],)
plt.grid(True)
```

```
# 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 = ' 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 = ' 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  =  ' 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

```
categonica l_featunes
```

```
numerical_features
```

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

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
		0.565	0.450	0.165	
4172	F				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

Train, Test, Split

```
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

```
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

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

0.5597133867640833