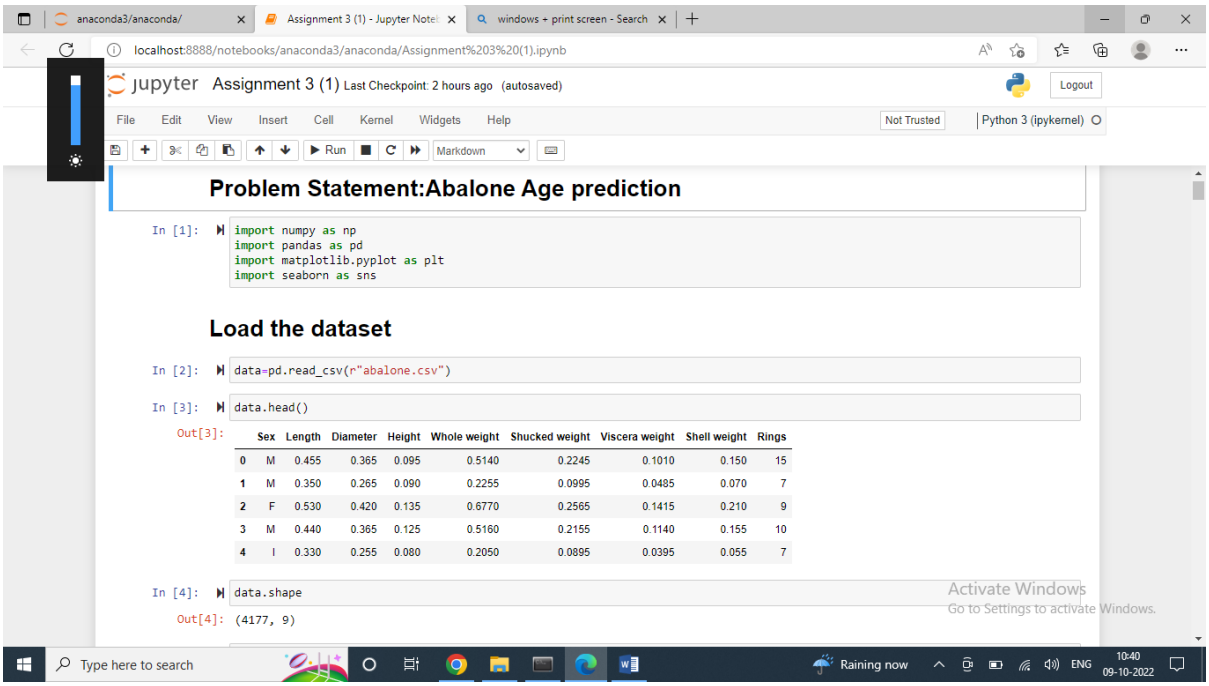
ASSIGNMENT-3

Applied Data Science

ASSIGNMENT DATE	30 September 2022
STUDENT NAME	Ms.Navaneetha Krishnaveni
STUDENT REG. NO	721719104056
MAXIMUM MARKS	2 Marks



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Run Markdown

In [5]:
```
data.size
```
Out[5]: 37593

In [6]:
```
data.info()
```
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4177 entries, 0 to 4176
Data columns (total 9 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Sex             4177 non-null   object
 1   Length          4177 non-null   float64
 2   Diameter        4177 non-null   float64
 3   Height          4177 non-null   float64
 4   Whole weight    4177 non-null   float64
 5   Shucked weight  4177 non-null   float64
 6   Viscera weight  4177 non-null   float64
 7   Shell weight    4177 non-null   float64
 8   Rings           4177 non-null   int64
dtypes: float64(7), int64(1), object(1)
memory usage: 293.8+ KB
```

Data Analysis & Visualization

Univariate Analysis

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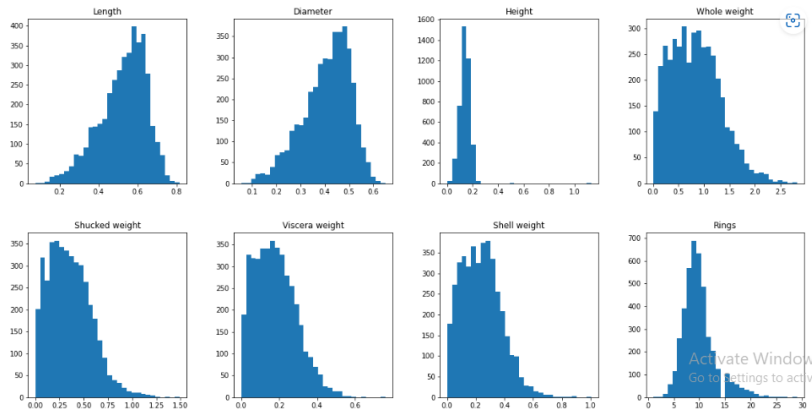
Run Code

In [7]:
```
data.hist(figsize=(20,10), grid=False, layout=(2,4), bins=30)
plt.show()
```



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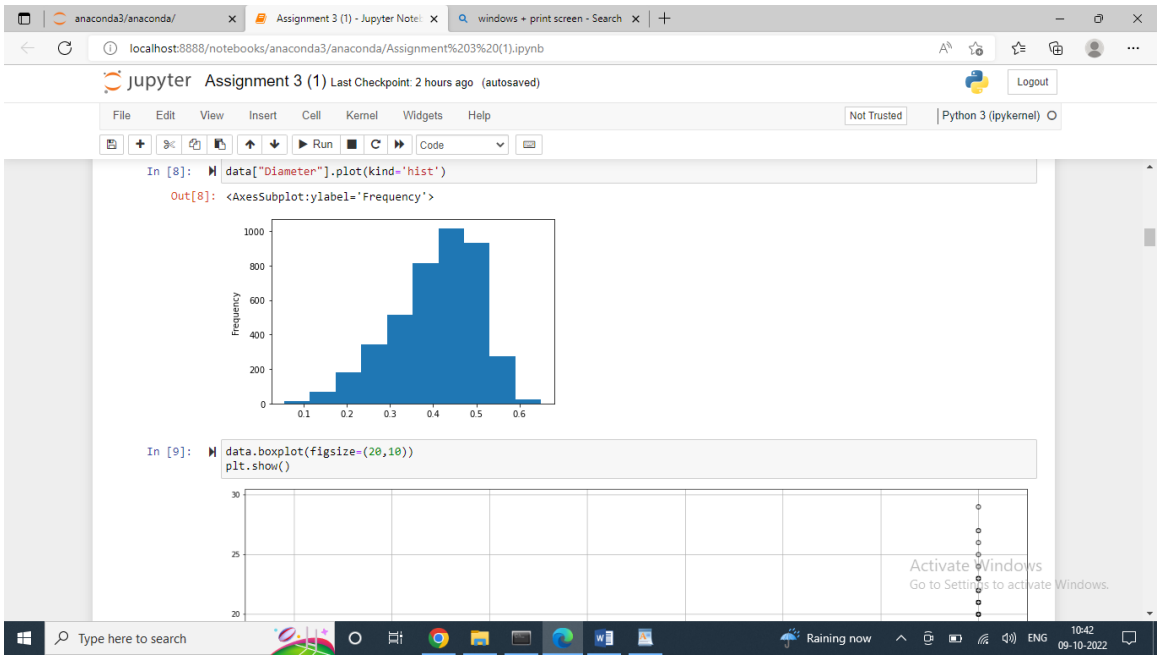
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Not Trusted
Python 3 (ipykernel)
Run
Code
In [8]:
data["Diameter"].plot(kind='hist')
Out[8]:
<AxesSubplot:ylabel='Frequency'>
Frequency
In [9]:
data.boxplot(figsize=(20,10))
plt.show()
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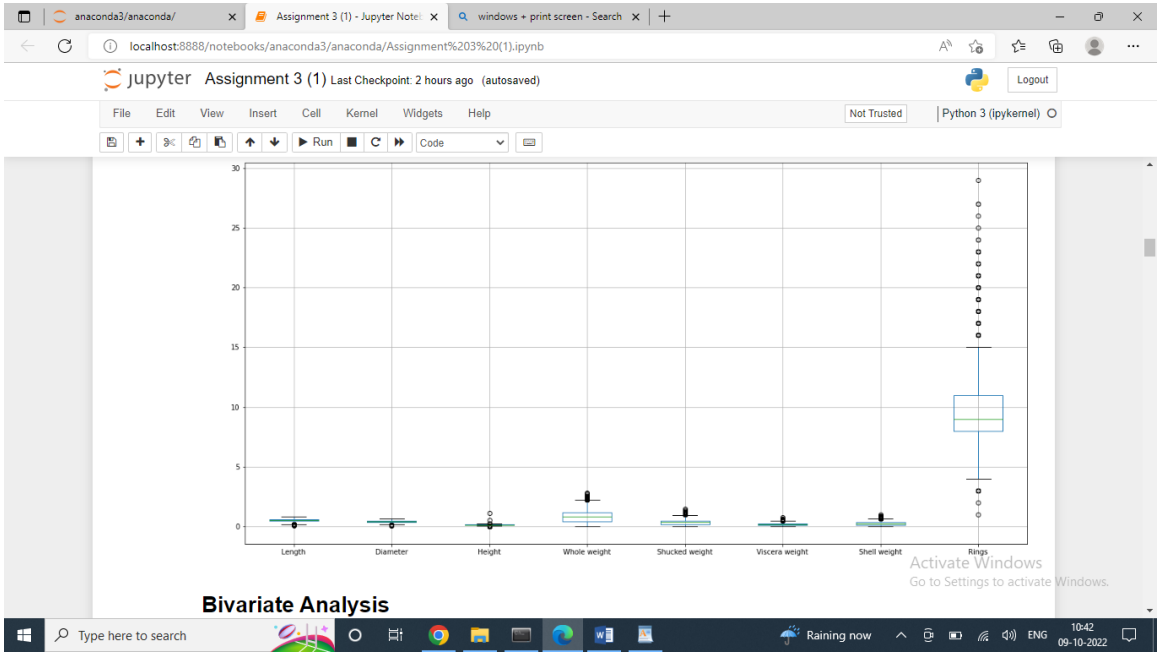
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Not Trusted
Python 3 (ipykernel)
Run
Code
Length
Diameter
Height
Whole weight
Shucked weight
Viscera weight
Shell weight
Rings
Activate Windows
Go to Settings to activate Windows.
Bivariate Analysis
Type here to search
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Run | Code

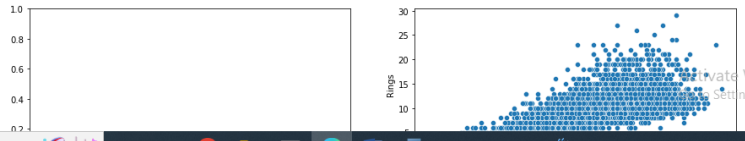
Bivariate Analysis

In [10]:
```
data.head()
```

Out[10]:

	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

In [11]:
```
fig, axes = plt.subplots(4,2, figsize=(15,15))
axes = axes.flatten()
for i in range(1,len(data.columns)-1):
    sns.scatterplot(x=data.iloc[:,i], y=data['Rings'], ax=axes[i])
plt.show()
```



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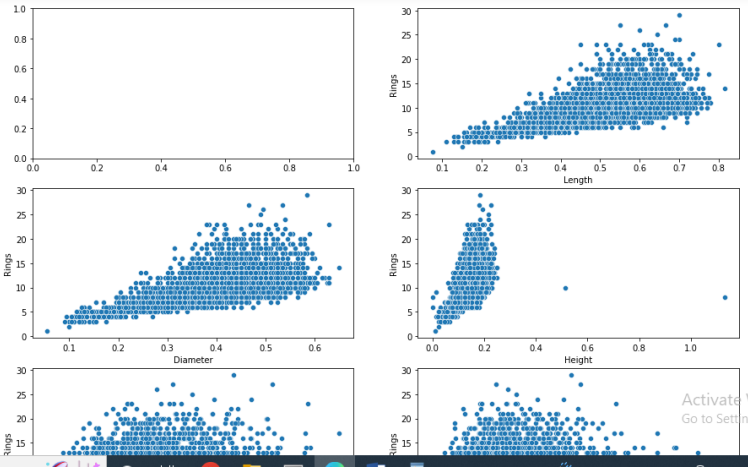

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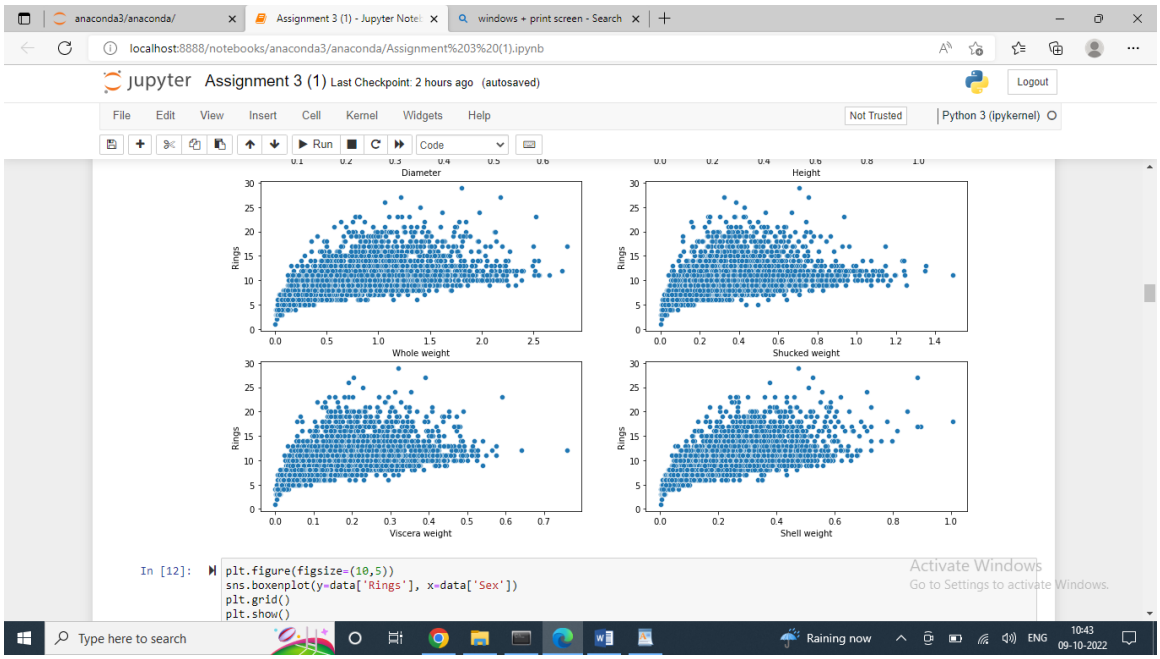
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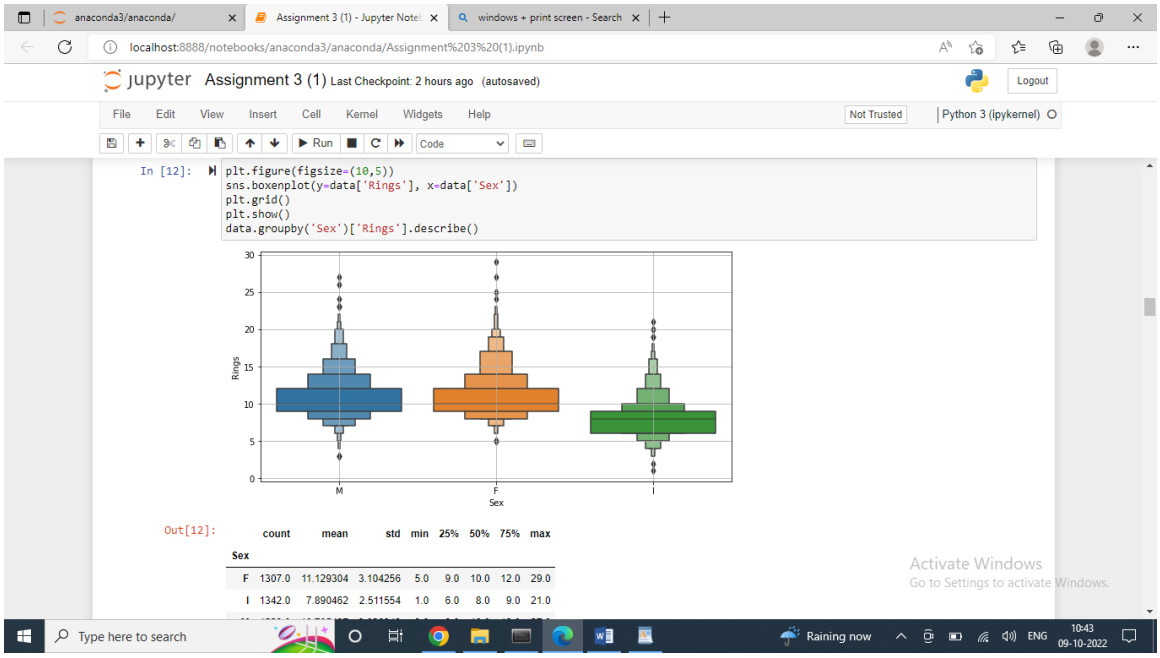
jupyter Assignment 3 (1) Last Checkpoint: 2 hours ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Not Trusted
Python 3 (ipykernel)
Run
Code
Diameter
Height
Whole weight
Shucked weight
Viscera weight
Shell weight
Rings
In [12]:
plt.figure(figsize=(10,5))
sns.boxenplot(y=data['Rings'], x=data['Sex'])
plt.grid()
plt.show()
Activate Windows
Go to Settings to activate Windows.
Type here to search
Raining now
ENG
10:43
09-10-2022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Logout
File Edit View Insert Cell Kernel Widgets Help
Not Trusted
Python 3 (ipykernel)
Run
Code
In [12]:
plt.figure(figsize=(10,5))
sns.boxenplot(y=data['Rings'], x=data['Sex'])
plt.grid()
plt.show()
data.groupby('Sex')['Rings'].describe()
Rings
M
F
I
Sex
Out[12]:
count mean std min 25% 50% 75% max
Sex
F 1307.0 11.129304 3.104256 5.0 9.0 10.0 12.0 29.0
I 1342.0 7.890462 2.511554 1.0 6.0 8.0 9.0 21.0
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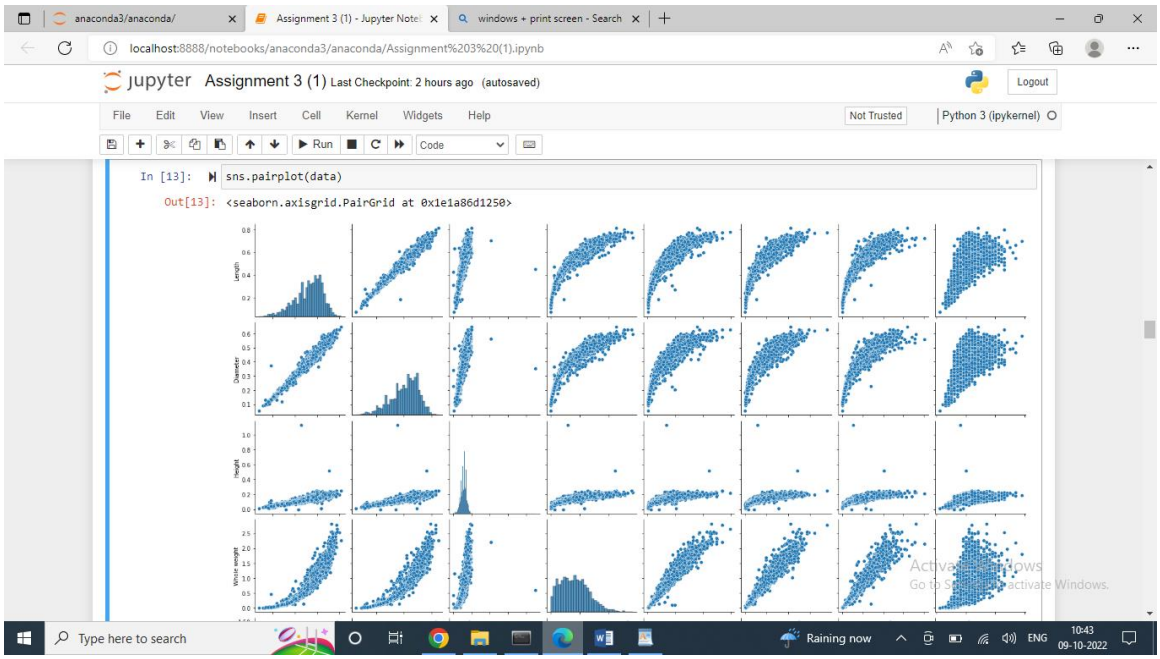
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Logout
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Not Trusted
Python 3 (ipykernel)
Run
Code
In [13]: sns.pairplot(data)
Out[13]: <seaborn.axisgrid.PairGrid at 0x1e1a86d1250>
Length
Diameter
Height
Whole weight
Activate Windows
Go to Settings to activate Windows.
Type here to search
Raining now
ENG
10:43
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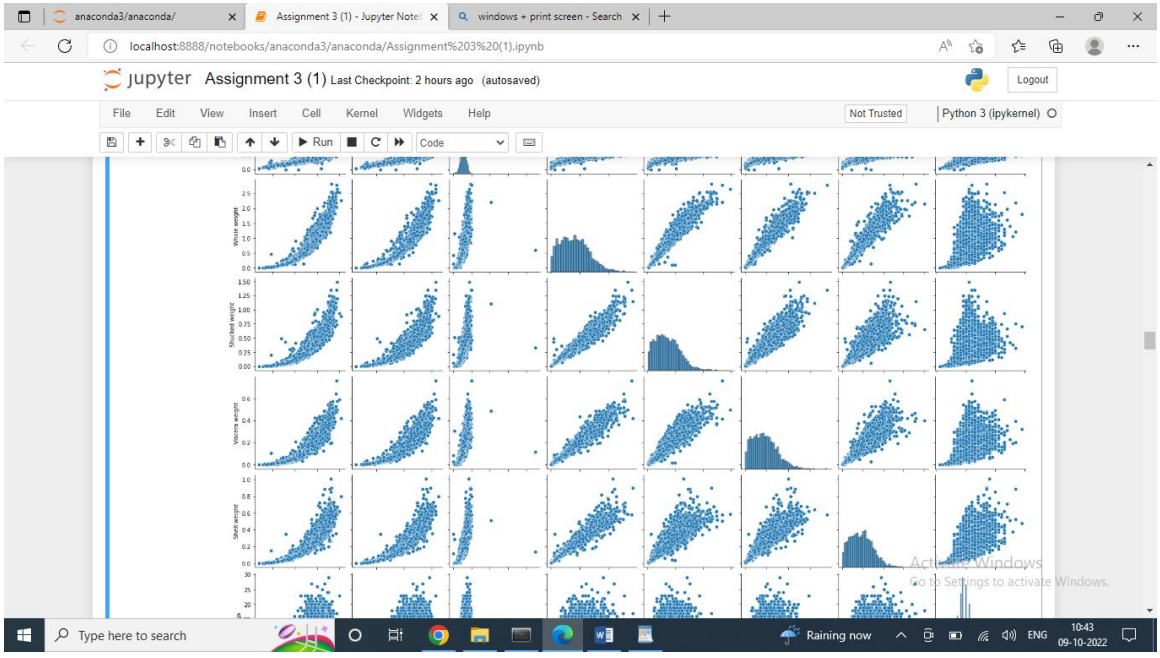
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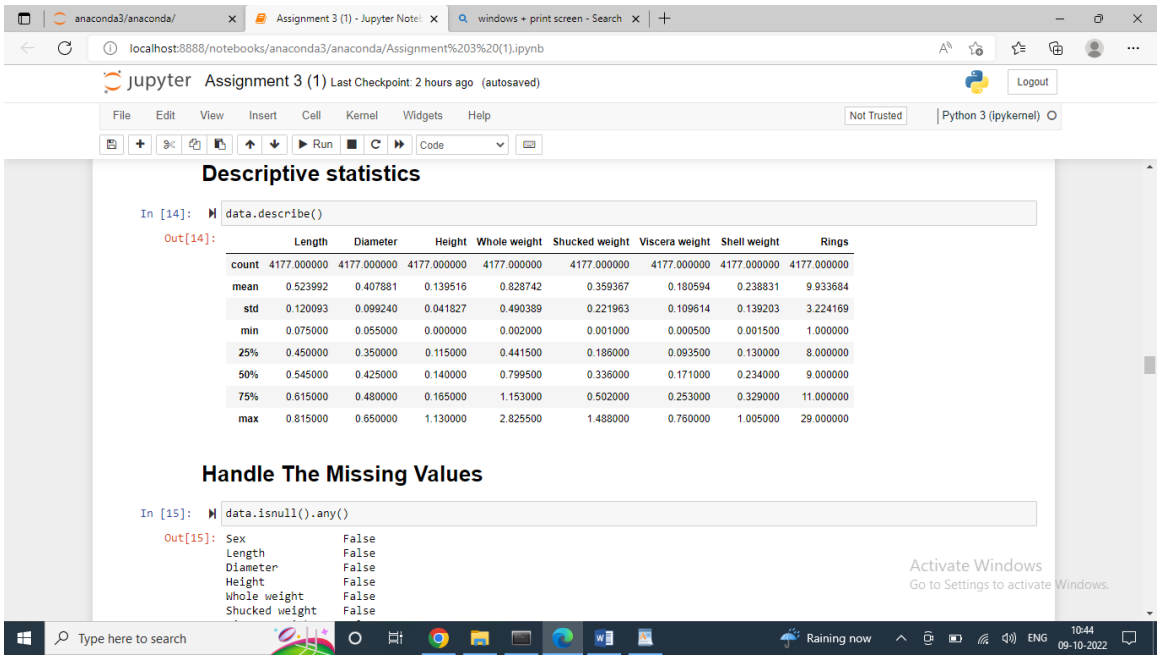
File Edit View Insert Cell Kernel Widgets Help
Not Trusted
Python 3 (ipykernel)
Run
Code
Whole weight
Shucked weight
Viscera weight
Shell weight
Activate Windows
Go to Settings to activate Windows.
Type here to search
Raining now
ENG
10:43
09-10-2022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Not Trusted
Python 3 (ipykernel)
Run
Code
Descriptive statistics
In [14]:
data.describe()
Out[14]:
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
Handle The Missing Values
In [15]:
data.isnull().any()
Out[15]:
Sex False
Length False
Diameter False
Height False
Whole weight False
Shucked weight False
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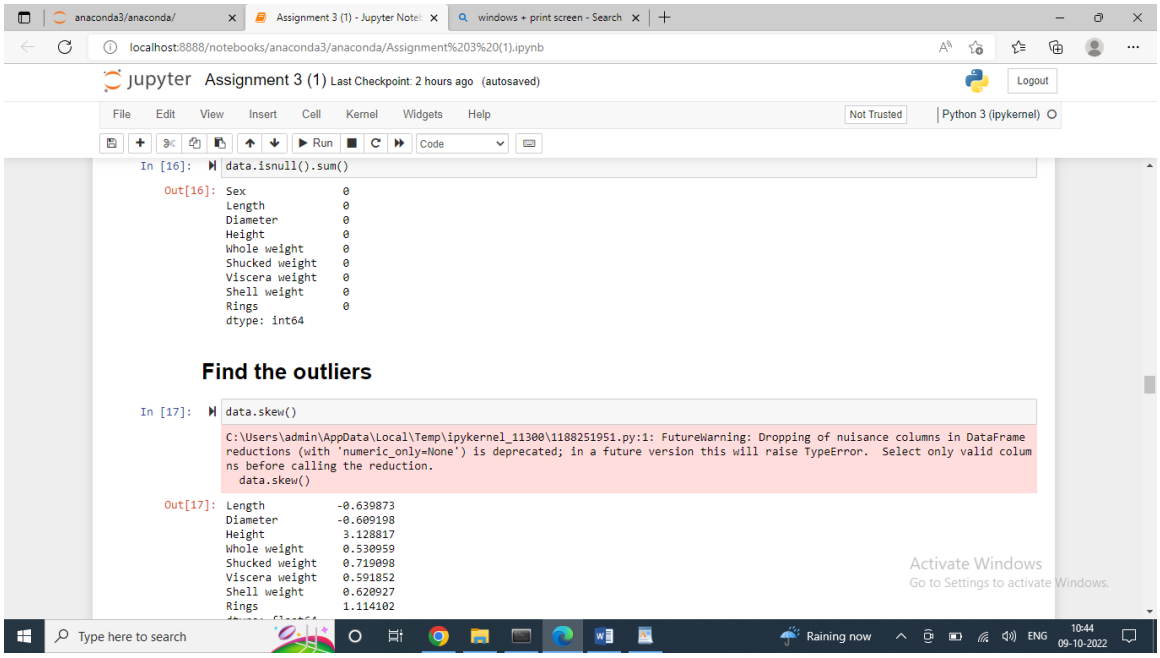
Go to Settings to activate Windows.
Type here to search
Raining now
ENG
10:44
09-10-2022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Not Trusted
Python 3 (ipykernel)
Run
Code
In [16]:
data.isnull().sum()
Out[16]:
Sex 0
Length 0
Diameter 0
Height 0
Whole weight 0
Shucked weight 0
Viscera weight 0
Shell weight 0
Rings 0
dtype: int64
Find the outliers
In [17]:
data.skew()
C:\Users\admin\AppData\Local\Temp\ipykernel_11300\1188251951.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.
data.skew()
Out[17]:
Length -0.639873
Diameter -0.609198
Height 3.128817
Whole weight 0.530959
Shucked weight 0.719098
Viscera weight 0.591852
Shell weight 0.620927
Rings 1.114102
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Raining now
ENG
10:44
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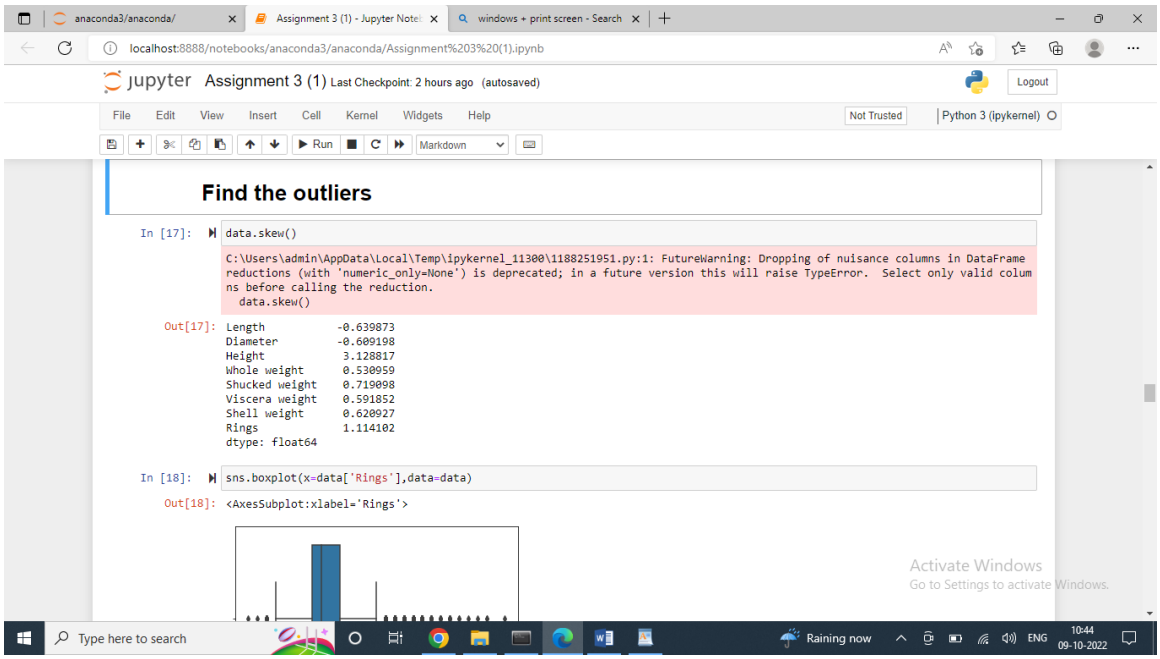
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Not Trusted
Python 3 (ipykernel)
Run
Markdown
Find the outliers
In [17]:
data.skew()
C:\Users\admin\AppData\Local\Temp\ipykernel_11300\1188251951.py:1: FutureWarning: Dropping of nuisance columns in DataFrame reductions (with 'numeric_only=None') is deprecated; in a future version this will raise TypeError. Select only valid columns before calling the reduction.
data.skew()
Out[17]:
Length -0.639873
Diameter -0.609198
Height 3.128817
Whole weight 0.530959
Shucked weight 0.719098
Viscera weight 0.591852
Shell weight 0.620927
Rings 1.114102
dtype: float64
In [18]:
sns.boxplot(x=data['Rings'],data=data)
Out[18]:
<AxesSubplot:xlabel='Rings'>
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Go to Settings to activate Windows.
Type here to search
Raining now
ENG
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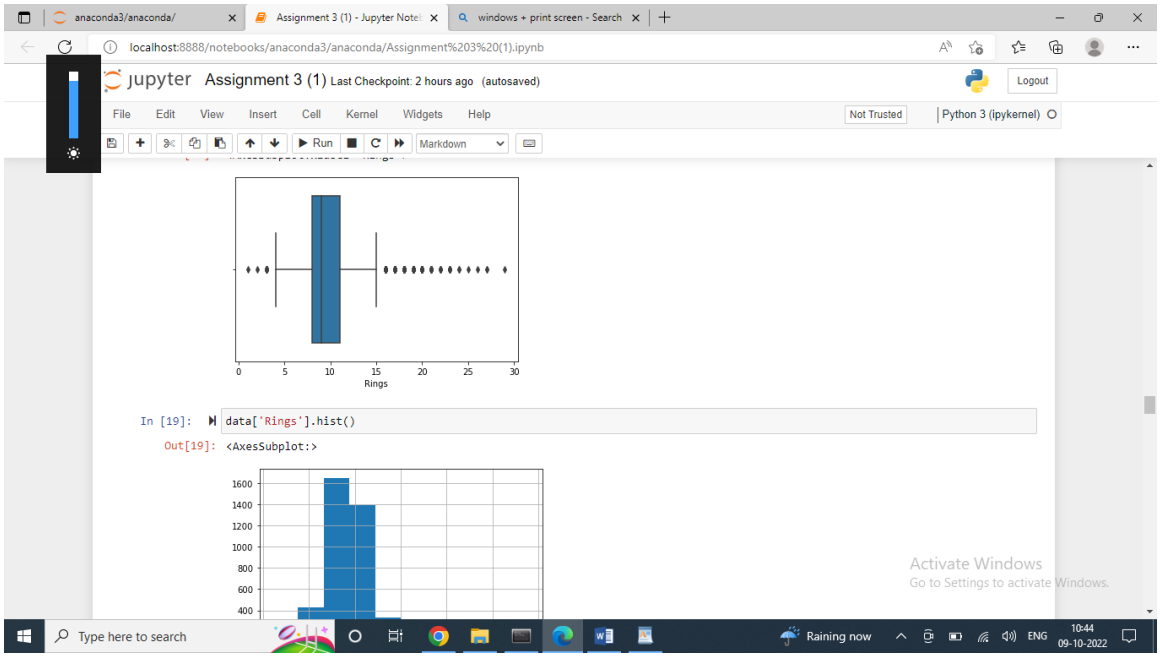
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Not Trusted
Python 3 (ipykernel)
Run
Markdown
0 5 10 15 20 25 30
Rings
In [19]:
data['Rings'].hist()
Out[19]:
<AxesSubplot:>
1600
1400
1200
1000
800
600
400
Activate Windows
Go to Settings to activate Windows.
Type here to search
Raining now
ENG
10:44
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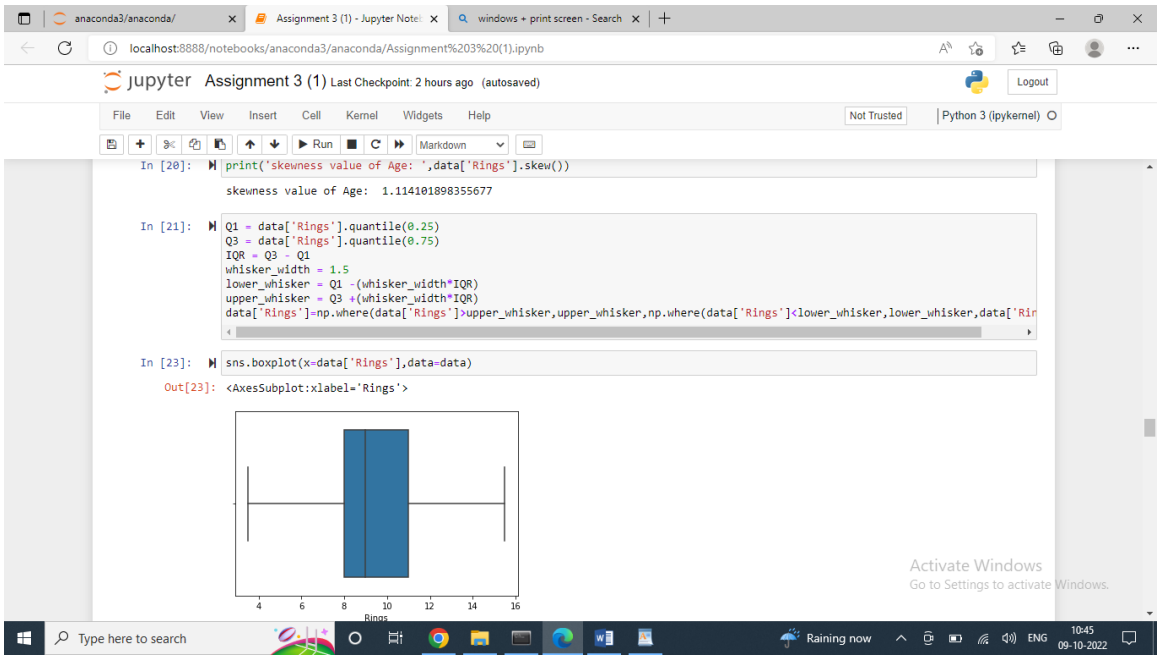
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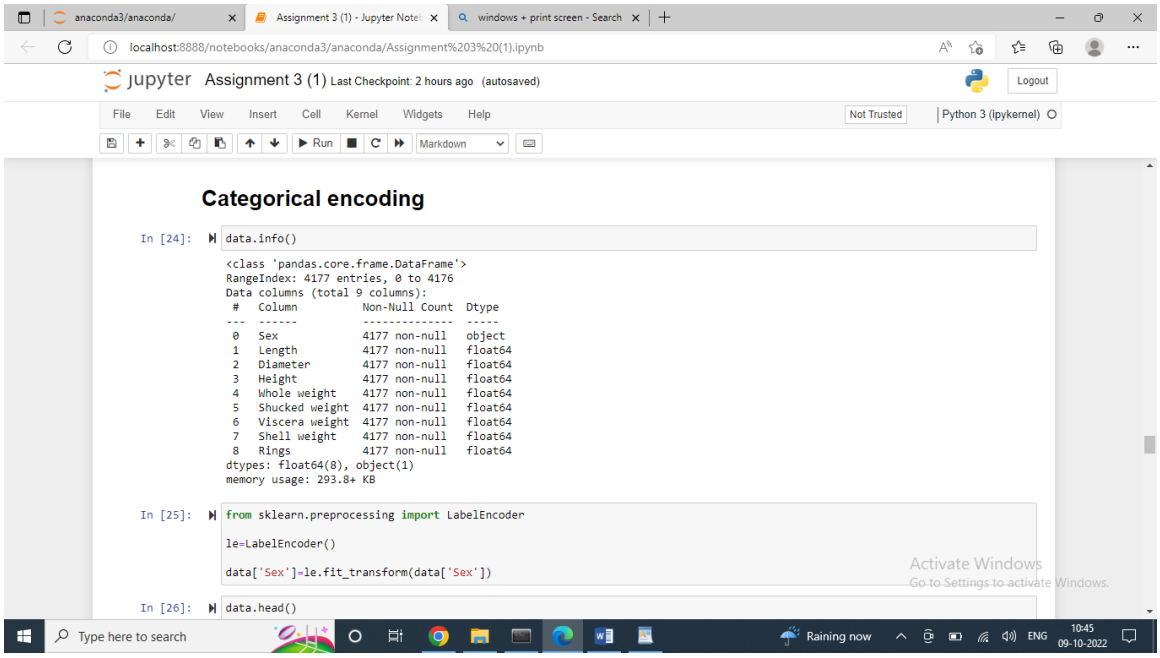
Not Trusted
Python 3 (ipykernel)
Run
Markdown
In [20]:
print('skewness value of Age: ',data['Rings'].skew())
skewness value of Age: 1.114101898355677
In [21]:
Q1 = data['Rings'].quantile(0.25)
Q3 = data['Rings'].quantile(0.75)
IQR = Q3 - Q1
whisker_width = 1.5
lower_whisker = Q1 -(whisker_width*IQR)
upper_whisker = Q3 +(whisker_width*IQR)
data['Rings']=np.where(data['Rings']>upper_whisker,upper_whisker,np.where(data['Rings']<lower_whisker,lower_whisker,data['Rin
In [23]:
sns.boxplot(x=data['Rings'],data=data)
Out[23]:
<AxesSubplot:xlabel='Rings'>
4
6
8
10
12
14
16
Rings
Activate Windows
Go to Settings to activate Windows.
Type here to search
Raining now
ENG
10:45
09-10-2022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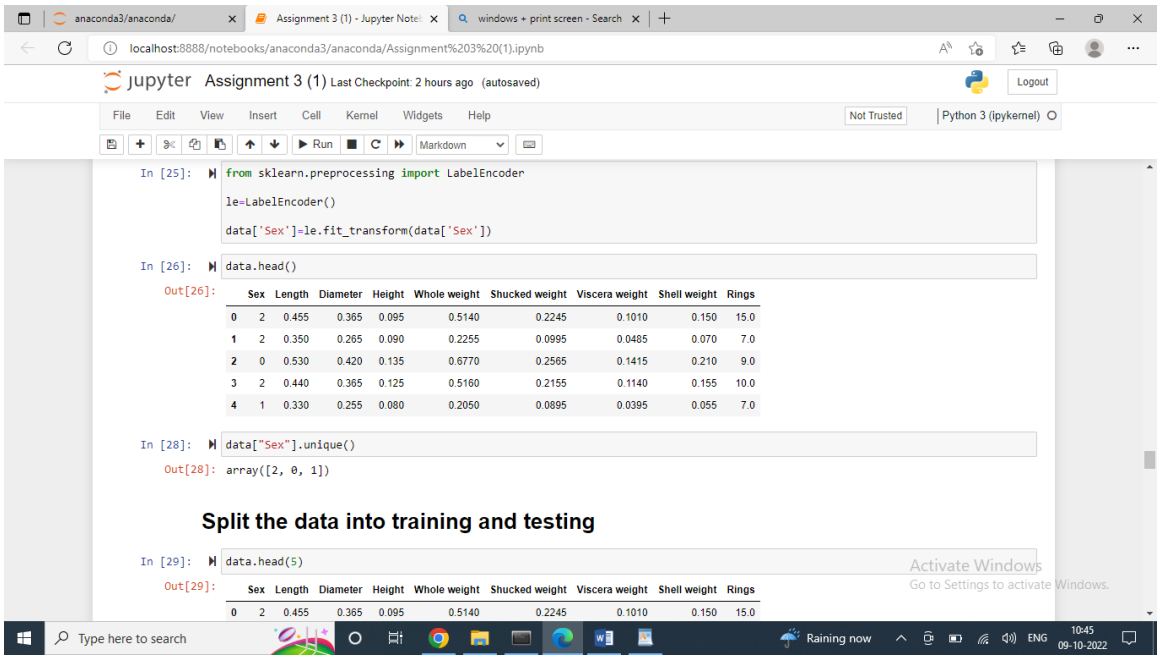
Logout
File Edit View Insert Cell Kernel Widgets Help
Not Trusted
Python 3 (ipykernel)
Run
Markdown
Categorical encoding
In [24]:
data.info()
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4177 entries, 0 to 4176
Data columns (total 9 columns):
Column Non-Null Count Dtype
--- ------ -------------- -----
0 Sex 4177 non-null object
1 Length 4177 non-null float64
2 Diameter 4177 non-null float64
3 Height 4177 non-null float64
4 Whole weight 4177 non-null float64
5 Shucked weight 4177 non-null float64
6 Viscera weight 4177 non-null float64
7 Shell weight 4177 non-null float64
8 Rings 4177 non-null float64
dtypes: float64(8), object(1)
memory usage: 293.8+ KB
In [25]:
from sklearn.preprocessing import LabelEncoder
le=LabelEncoder()
data['Sex']=le.fit_transform(data['Sex'])
In [26]:
data.head()
Activate Windows
Go to Settings to activate Windows.
Type here to search
Raining now
ENG
10:45
09-10-2022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Not Trusted
Python 3 (ipykernel)
Run
Markdown
In [25]:
from sklearn.preprocessing import LabelEncoder
le=LabelEncoder()
data['Sex']=le.fit_transform(data['Sex'])
In [26]:
data.head()
Out[26]:
Sex Length Diameter Height Whole weight Shucked weight Viscera weight Shell weight Rings
0 2 0.455 0.365 0.095 0.5140 0.2245 0.1010 0.150 15.0
1 2 0.350 0.265 0.090 0.2255 0.0995 0.0485 0.070 7.0
2 0 0.530 0.420 0.135 0.6770 0.2565 0.1415 0.210 9.0
3 2 0.440 0.365 0.125 0.5160 0.2155 0.1140 0.155 10.0
4 1 0.330 0.255 0.080 0.2050 0.0895 0.0395 0.055 7.0
In [28]:
data["Sex"].unique()
Out[28]:
array([2, 0, 1])
Split the data into training and testing
In [29]:
data.head(5)
Out[29]:
Sex Length Diameter Height Whole weight Shucked weight Viscera weight Shell weight Rings
0 2 0.455 0.365 0.095 0.5140 0.2245 0.1010 0.150 15.0
Activate Windows
Go to Settings to activate Windows.
Type here to search
Raining now
ENG
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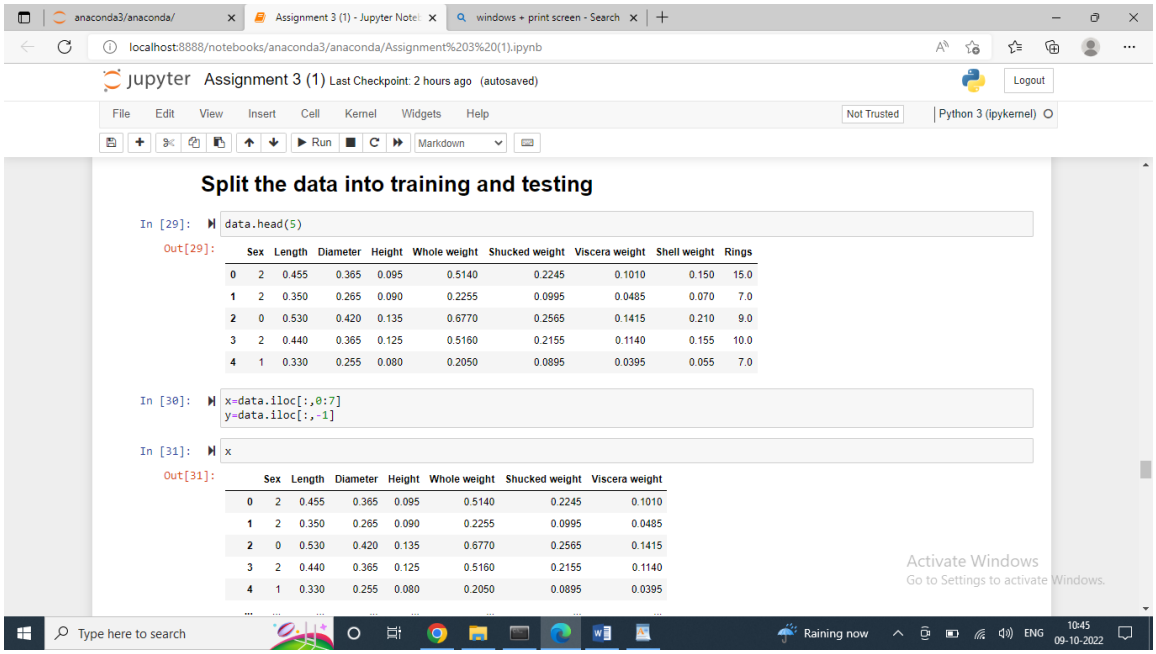
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Python 3 (ipykernel)
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Markdown
Split the data into training and testing
In [29]:
data.head(5)
Out[29]:
Sex Length Diameter Height Whole weight Shucked weight Viscera weight Shell weight Rings
0 2 0.455 0.365 0.095 0.5140 0.2245 0.1010 0.150 15.0
1 2 0.350 0.265 0.090 0.2255 0.0995 0.0485 0.070 7.0
2 0 0.530 0.420 0.135 0.6770 0.2565 0.1415 0.210 9.0
3 2 0.440 0.365 0.125 0.5160 0.2155 0.1140 0.155 10.0
4 1 0.330 0.255 0.080 0.2050 0.0895 0.0395 0.055 7.0
In [30]:
x=data.iloc[:,0:7]
y=data.iloc[:,-1]
In [31]:
x
Out[31]:
Sex Length Diameter Height Whole weight Shucked weight Viscera weight
0 2 0.455 0.365 0.095 0.5140 0.2245 0.1010
1 2 0.350 0.265 0.090 0.2255 0.0995 0.0485
2 0 0.530 0.420 0.135 0.6770 0.2565 0.1415
3 2 0.440 0.365 0.125 0.5160 0.2155 0.1140
4 1 0.330 0.255 0.080 0.2050 0.0895 0.0395
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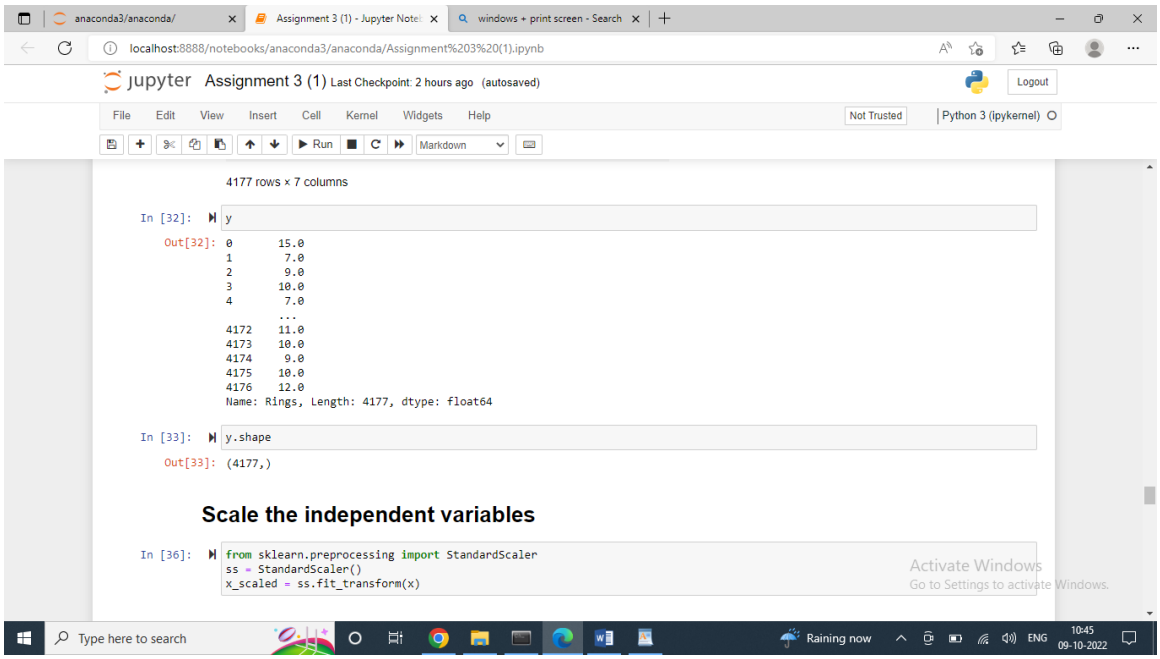
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Python 3 (ipykernel)
Run
Markdown
4177 rows × 7 columns
In [32]:
y
Out[32]:
0 15.0
1 7.0
2 9.0
3 10.0
4 7.0
...
4172 11.0
4173 10.0
4174 9.0
4175 10.0
4176 12.0
Name: Rings, Length: 4177, dtype: float64
In [33]:
y.shape
Out[33]:
(4177,)
Scale the independent variables
In [36]:
from sklearn.preprocessing import StandardScaler
ss = StandardScaler()
x_scaled = ss.fit_transform(x)
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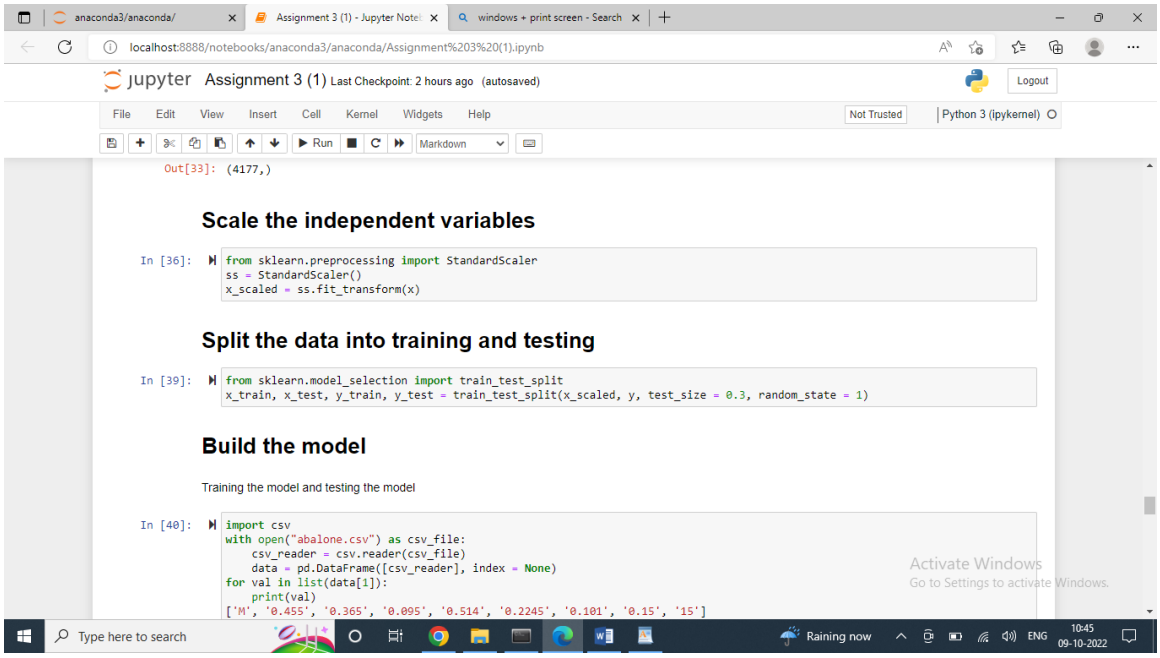
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Python 3 (ipykernel)
Run
Markdown
Out[33]:
(4177,)
Scale the independent variables
In [36]:
from sklearn.preprocessing import StandardScaler
ss = StandardScaler()
x_scaled = ss.fit_transform(x)
Split the data into training and testing
In [39]:
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test = train_test_split(x_scaled, y, test_size = 0.3, random_state = 1)
Build the model
Training the model and testing the model
In [40]:
import csv
with open("abalone.csv") as csv_file:
csv_reader = csv.reader(csv_file)
data = pd.DataFrame([csv_reader], index = None)
for val in list(data[1]):
print(val)
['M', '0.455', '0.365', '0.095', '0.514', '0.2245', '0.101', '0.15', '15']
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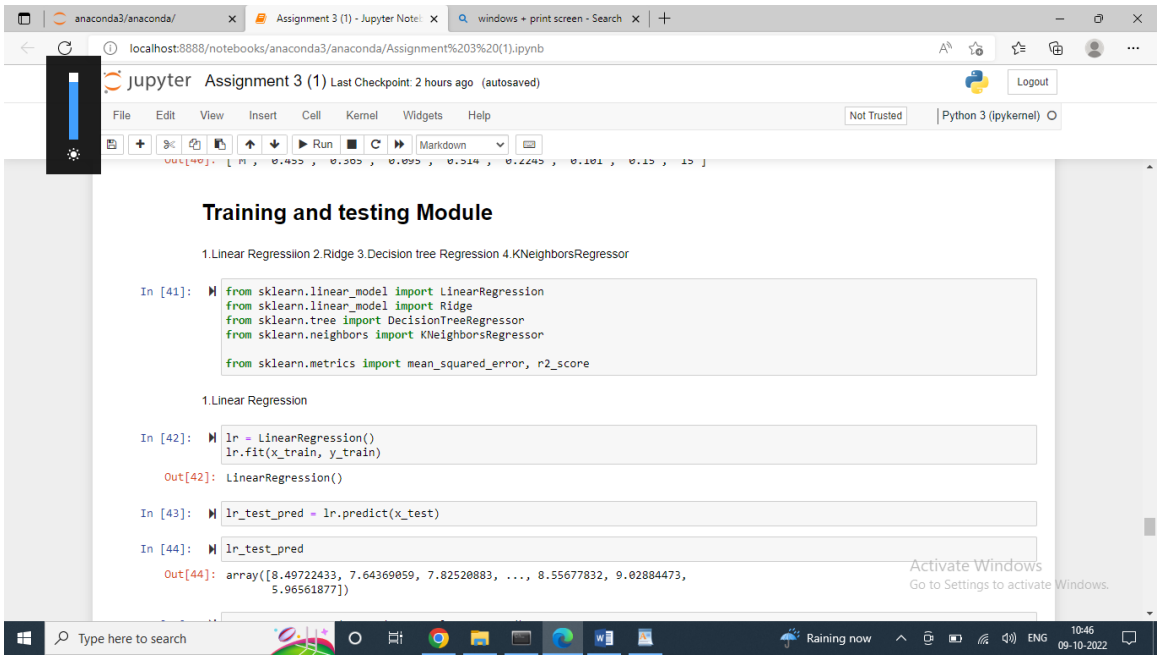
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Python 3 (ipykernel)
Run
Markdown
Training and testing Module
1.Linear Regressilon 2.Ridge 3.Decision tree Regression 4.KNeighborsRegressor
In [41]:
from sklearn.linear_model import LinearRegression
from sklearn.linear_model import Ridge
from sklearn.tree import DecisionTreeRegressor
from sklearn.neighbors import KNeighborsRegressor
from sklearn.metrics import mean_squared_error, r2_score
1.Linear Regression
In [42]:
lr = LinearRegression()
lr.fit(x_train, y_train)
Out[42]: LinearRegression()
In [43]:
lr_test_pred = lr.predict(x_test)
In [44]:
lr_test_pred
Out[44]: array([8.49722433, 7.64369059, 7.82520883, ..., 8.55677832, 9.02884473,
5.96561877])
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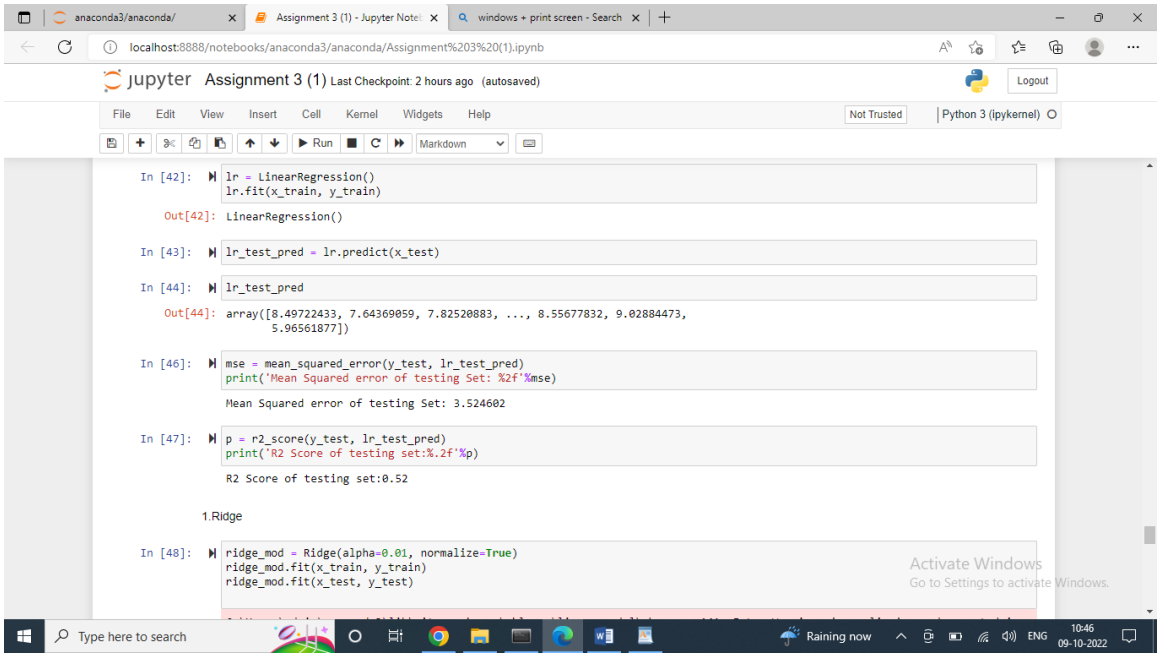
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Python 3 (ipykernel)
Run
Markdown
In [42]:
lr = LinearRegression()
lr.fit(x_train, y_train)
Out[42]: LinearRegression()
In [43]:
lr_test_pred = lr.predict(x_test)
In [44]:
lr_test_pred
Out[44]: array([8.49722433, 7.64369059, 7.82520883, ..., 8.55677832, 9.02884473,
5.96561877])
In [46]:
mse = mean_squared_error(y_test, lr_test_pred)
print('Mean Squared error of testing Set: %2f'%mse)
Mean Squared error of testing Set: 3.524602
In [47]:
p = r2_score(y_test, lr_test_pred)
print('R2 Score of testing set:%.2f'%p)
R2 Score of testing set:0.52
1.Ridge
In [48]:
ridge_mod = Ridge(alpha=0.01, normalize=True)
ridge_mod.fit(x_train, y_train)
ridge_mod.fit(x_test, y_test)
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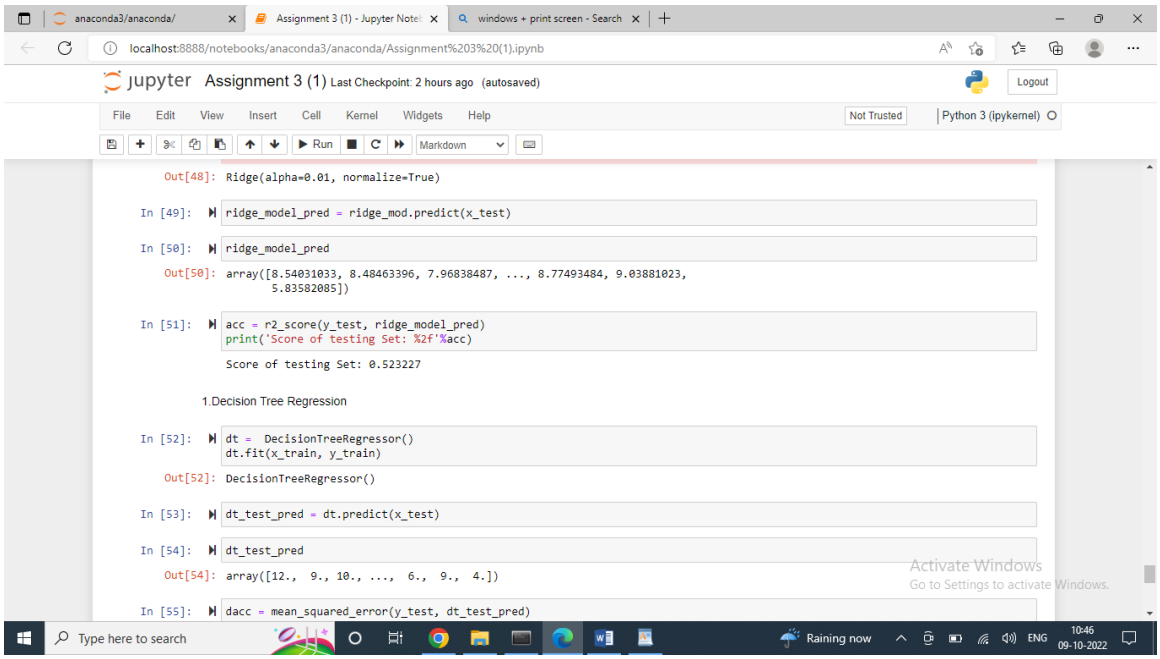
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Python 3 (ipykernel)
Run
Markdown
Out[48]: Ridge(alpha=0.01, normalize=True)
In [49]: ridge_model_pred = ridge_mod.predict(x_test)
In [50]: ridge_model_pred
Out[50]: array([8.54031033, 8.48463396, 7.96838487, ..., 8.77493484, 9.03881023,
5.83582085])
In [51]: acc = r2_score(y_test, ridge_model_pred)
print('Score of testing Set: %2f'%acc)
Score of testing Set: 0.523227
1.Decision Tree Regression
In [52]: dt = DecisionTreeRegressor()
dt.fit(x_train, y_train)
Out[52]: DecisionTreeRegressor()
In [53]: dt_test_pred = dt.predict(x_test)
In [54]: dt_test_pred
Out[54]: array([12., 9., 10., ..., 6., 9., 4.])
In [55]: dacc = mean_squared_error(y_test, dt_test_pred)
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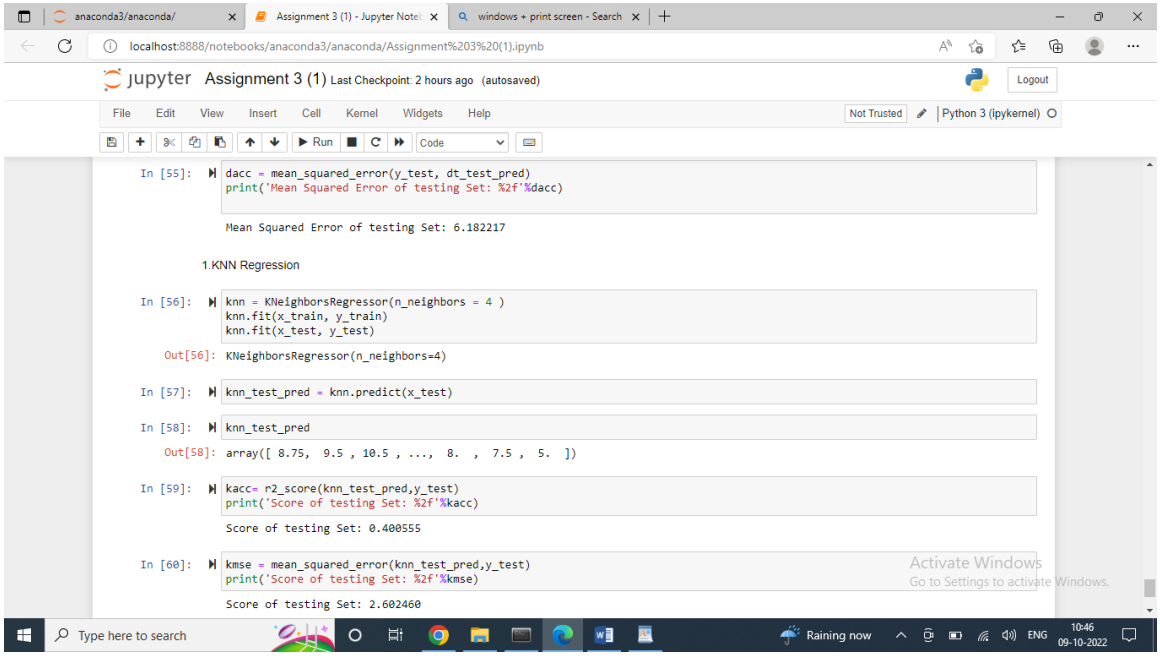
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Python 3 (ipykernel)
Run
Code
In [55]: dacc = mean_squared_error(y_test, dt_test_pred)
print('Mean Squared Error of testing Set: %2f'%dacc)
Mean Squared Error of testing Set: 6.182217
1.KNN Regression
In [56]: knn = KNeighborsRegressor(n_neighbors = 4)
knn.fit(x_train, y_train)
knn.fit(x_test, y_test)
Out[56]: KNeighborsRegressor(n_neighbors=4)
In [57]: knn_test_pred = knn.predict(x_test)
In [58]: knn_test_pred
Out[58]: array([8.75, 9.5 , 10.5 , ..., 8. , 7.5 , 5.])
In [59]: kacc= r2_score(knn_test_pred,y_test)
print('Score of testing Set: %2f'%kacc)
Score of testing Set: 0.400555
In [60]: kmse = mean_squared_error(knn_test_pred,y_test)
print('Score of testing Set: %2f'%kmse)
Score of testing Set: 2.602460
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