```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
```

```
from google.colab import files
upload=files.upload()
df = pd.read_csv('abalone.csv')
```

Choose Files abalone.csv

- **abalone.csv**(text/csv) - 191962 bytes, last modified: 10/29/2022 - 100% done

```
Saving abalone.csv to abalone (1).csv
```

```
df.describe()
```

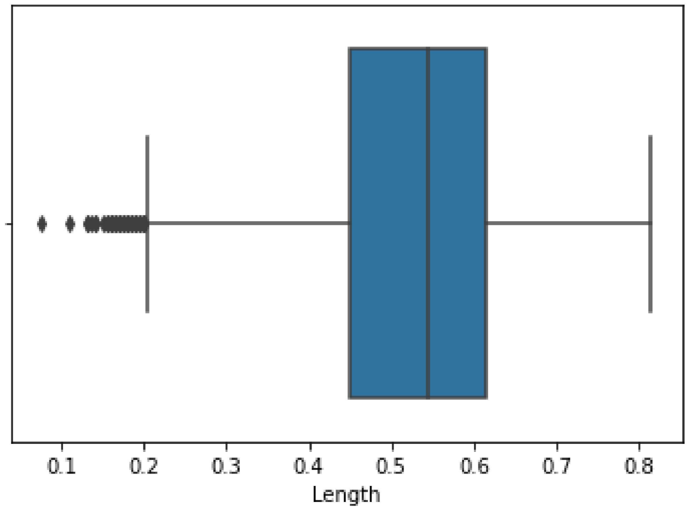
	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	
count	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177
mean	0.523992	0.407881	0.139516	0.828742	0.359367	0.180594	0
std	0.120093	0.099240	0.041827	0.490389	0.221963	0.109614	0
min	0.075000	0.055000	0.000000	0.002000	0.001000	0.000500	0
25%	0.450000	0.350000	0.115000	0.441500	0.186000	0.093500	0
50%	0.545000	0.425000	0.140000	0.799500	0.336000	0.171000	0
75%	0.615000	0.480000	0.165000	1.153000	0.502000	0.253000	0
max	0.815000	0.650000	1.130000	2.825500	1.488000	0.760000	1

```
df.head()
```

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell w
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	

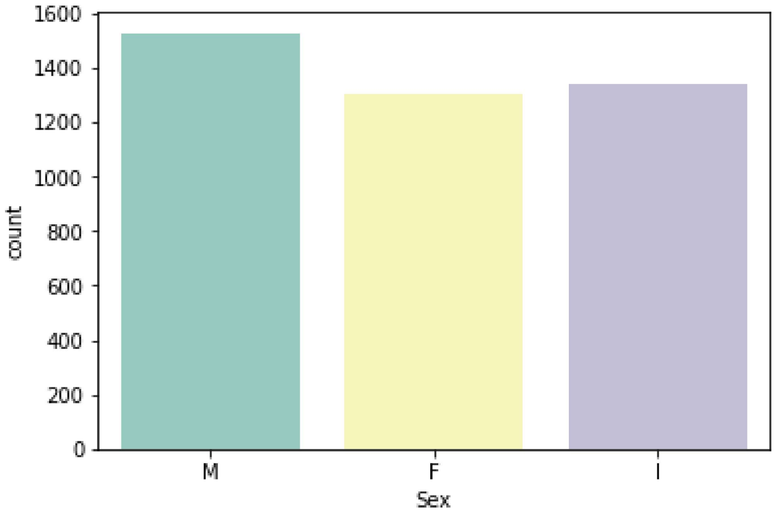
```
sns.boxplot(df.Length)
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass t
  FutureWarning
<matplotlib.axes._subplots.AxesSubplot at 0x7ff5877a5350>
```



```
sns.countplot(x = 'Sex', data = df, palette = 'Set3')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7ff586e42c10>
```

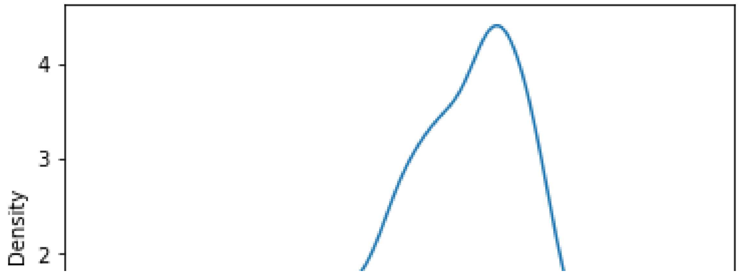


```
a = pd.read_csv('abalone.csv')
```

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

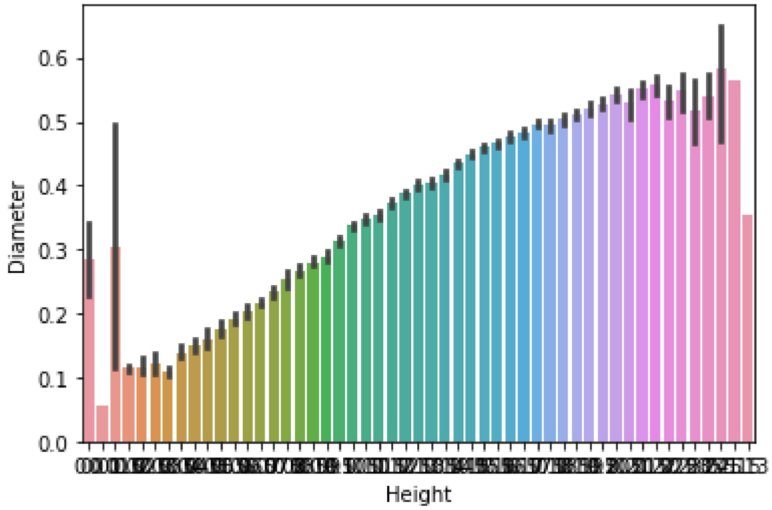
```
sns.kdeplot(a['Diameter'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7ff586d84350>
```



```
sns.barplot(x=df.Height,y=df.Diameter)
```

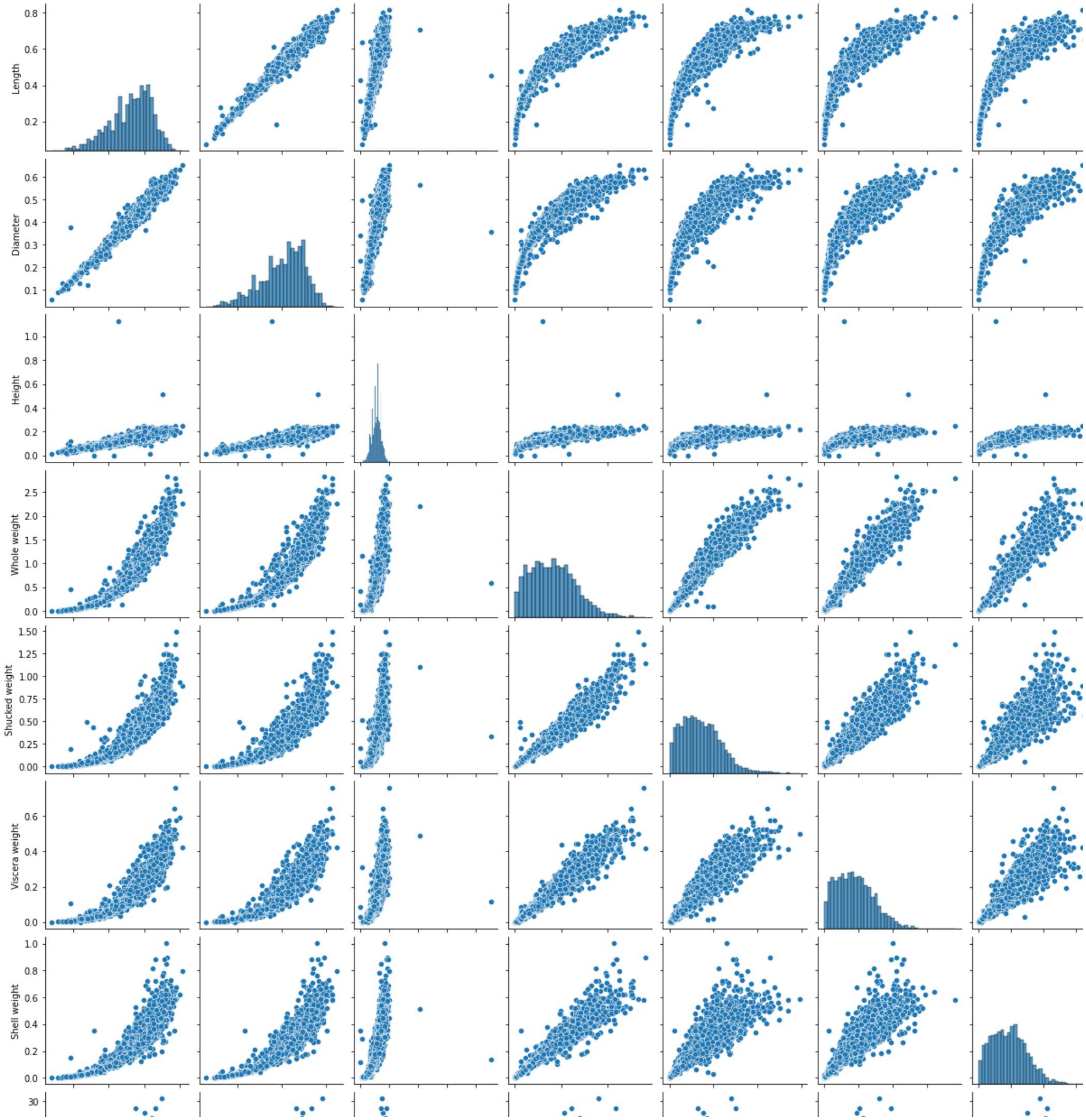
```
<matplotlib.axes._subplots.AxesSubplot at 0x7ff5868893d0>
```



```
sns.pairplot(a)
```

...

```
<seaborn.axisgrid.PairGrid at 0x7ff5865d74d0>
```



```
a.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   age             4177 non-null   float64
dtypes: float64(8), object(1)
memory usage: 293.8+ KB
```

```
a['Diameter'].describe()
```

```
count    4177.000000
mean        0.407881
std         0.099240
min         0.055000
25%         0.350000
50%         0.425000
75%         0.480000
max         0.650000
Name: Diameter, dtype: float64
```

```
a['Sex'].value_counts()
```

```
M    1528
I    1342
F    1307
Name: Sex, dtype: int64
```

```
df['Height'].describe()
```

```
count    4177.000000
mean        0.139516
std         0.041827
min         0.000000
25%         0.115000
50%         0.140000
75%         0.165000
max         1.130000
Name: Height, dtype: float64
```

```
df[df.Height == 0]
```

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight
1257	I	0.430	0.34	0.0	0.428	0.2065	0.0860
3996	I	0.315	0.23	0.0	0.134	0.0575	0.0285

```
df['Diameter'].median()
```

```
0.425
```

```
df['Shucked weight'].skew()
```

```
0.7190979217612694
```

```
missing_values = df.isnull().sum().sort_values(ascending = False)
percentage_missing_values = (missing_values/len(df))*100
pd.concat([missing_values, percentage_missing_values], axis = 1, keys= ['Missing values', '%
```

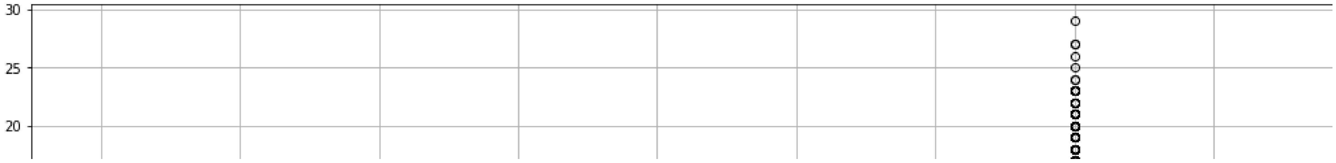
	Missing values	% Missing
Sex	0	0.0
Length	0	0.0
Diameter	0	0.0
Height	0	0.0
Whole weight	0	0.0
Shucked weight	0	0.0
Viscera weight	0	0.0
Shell weight	0	0.0
Rings	0	0.0

```
q1=df.Rings.quantile(0.25)
q2=df.Rings.quantile(0.75)
iqr=q2-q1
print(iqr)
```

```
3.0
```

```
df = pd.get_dummies(df)
dummy_df = df
df.boxplot( rot = 90, figsize=(20,5))
```

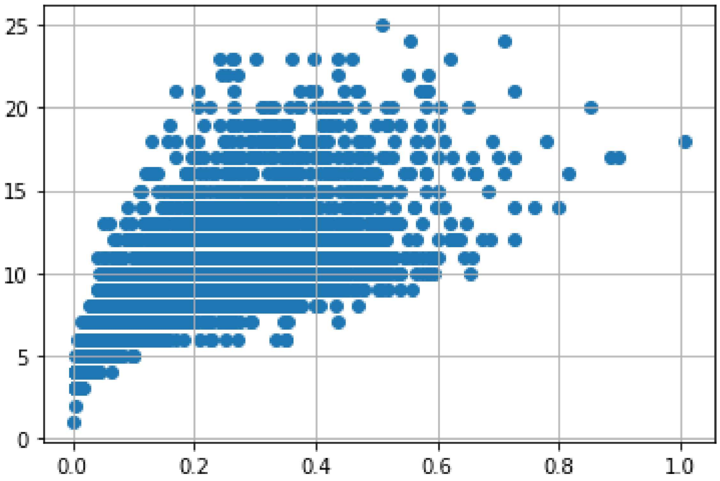
```
<matplotlib.axes._subplots.AxesSubplot at 0x7ff581e54fd0>
```



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

```
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)
```



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

```
abalone_numeric = df[['Length', 'Diameter', 'Height', 'Whole weight', 'Shucked weight','Visce
```

```
abalone_numeric.head()
```

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	age	Sex_
0	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150	15	(

```
x = df.iloc[:, 0:1].values
y = df.iloc[:, 1]
y
```

```
0       0.365
1       0.265
2       0.420
3       0.365
4       0.255
        ...
4172    0.450
4173    0.440
4174    0.475
4175    0.485
4176    0.555
Name: Diameter, Length: 4150, dtype: float64
```

```
print ("\n ORIGINAL VALUES: \n\n", x,y)
```

```
 ORIGINAL VALUES: 

 [[0.455]
 [0.35 ]
 [0.53 ]
 ...
 [0.6  ]
 [0.625]
 [0.71 ]] 0       0.365
1       0.265
2       0.420
3       0.365
4       0.255
        ...
4172    0.450
4173    0.440
4174    0.475
4175    0.485
4176    0.555
Name: Diameter, Length: 4150, dtype: float64
```

```
from sklearn import preprocessing
min_max_scaler = preprocessing.MinMaxScaler(feature_range =(0, 1))
new_y= min_max_scaler.fit_transform(x,y)
print ("\n VALUES AFTER MIN MAX SCALING: \n\n", new_y)
```

```
 VALUES AFTER MIN MAX SCALING:
      [[0.51351351]
      [0.37162162]
      [0.61486486]
      ...
      [0.70945946]
      [0.74324324]
      [0.85810811]]
```

```
X = df.drop('age', axis = 1)
y = df['age']
```

```
from sklearn.preprocessing import StandardScaler
from sklearn.model_selection import train_test_split, cross_val_score
from sklearn.feature_selection import SelectKBest
standardScale = StandardScaler()
standardScale.fit_transform(X)

selectkBest = SelectKBest()
X_new = selectkBest.fit_transform(X, y)

X_train, X_test, y_train, y_test = train_test_split(X_new, y, test_size = 0.25)
X_train
```

```
     array([[0.475, 0.355, 0.12 , ..., 0.   , 0.   , 1.   ],
            [0.5  , 0.365, 0.13 , ..., 0.   , 0.   , 1.   ],
            [0.58 , 0.43 , 0.125, ..., 0.   , 0.   , 1.   ],
            ...,
            [0.49 , 0.38 , 0.135, ..., 0.   , 0.   , 1.   ],
            [0.4  , 0.31 , 0.1  , ..., 0.   , 1.   , 0.   ],
            [0.5  , 0.37 , 0.115, ..., 0.   , 1.   , 0.   ]])
```

```
y_train
```

```
     65       8
     2826     9
     3100    10
     1753    10
     503     13
             ..
     1820    13
     1902    11
     12      11
     2127     7
     2980     7
     Name: age, Length: 3112, dtype: int64
```

```
from sklearn import linear_model as lm
from sklearn.linear_model import LinearRegression
```

```
model=lm.LinearRegression()
results=model.fit(X train,y train)
```

```
accuracy = model.score(X_train, y_train)
print('Accuracy of the model:', accuracy)
```

```
    Accuracy of the model: 0.5385553745257212
```

```
lm = LinearRegression()
lm.fit(X_train, y_train)
y_train_pred = lm.predict(X_train)
y_train_pred
```

```
    array([ 8.7821132 ,  8.69223506,  7.91346477, ..., 10.66419868,
            6.49661756,  7.32689668])
```

```
X_train
```

```
    array([[0.475, 0.355, 0.12 , ..., 0.   , 0.   , 1.   ],
           [0.5  , 0.365, 0.13 , ..., 0.   , 0.   , 1.   ],
           [0.58 , 0.43 , 0.125, ..., 0.   , 0.   , 1.   ],
           ...,
           [0.49 , 0.38 , 0.135, ..., 0.   , 0.   , 1.   ],
           [0.4  , 0.31 , 0.1  , ..., 0.   , 1.   , 0.   ],
           [0.5  , 0.37 , 0.115, ..., 0.   , 1.   , 0.   ]])
```

```
y_train
```

```
    65       8
    2826     9
    3100    10
    1753    10
    503     13
            ..
    1820    13
    1902    11
    12      11
    2127     7
    2980     7
    Name: age, Length: 3112, dtype: int64
```

```
from sklearn.metrics import mean_absolute_error, mean_squared_error
s = mean_squared_error(y_train, y_train_pred)
print('Mean Squared error of training set :%2f'%s)
```

```
    Mean Squared error of training set :4.638811
```

```
y_train_pred = lm.predict(X_train)
y_test_pred = lm.predict(X_test)
y_test_pred
```

```
     array([ 9.65587378,  5.56256054, 12.55940421, ...,  8.63884103,
             7.17360886,  9.97959562])
```

```
X_test
```

```
     array([[0.42 , 0.325, 0.115, ..., 0.   , 0.   , 1.   ],
            [0.31 , 0.225, 0.05 , ..., 0.   , 1.   , 0.   ],
            [0.52 , 0.415, 0.175, ..., 0.   , 0.   , 1.   ],
            ...,
            [0.385, 0.305, 0.105, ..., 1.   , 0.   , 0.   ],
            [0.635, 0.495, 0.015, ..., 1.   , 0.   , 0.   ],
            [0.55 , 0.43 , 0.145, ..., 0.   , 1.   , 0.   ]])
```

```
y_test
```

```
     542     15
     2116     6
     3223     8
     1974    10
     2554     7
             ..
     2525     9
     1956    11
     2287     7
     1174     9
     2760    10
     Name: age, Length: 1038, dtype: int64
```

```
p = mean_squared_error(y_test, y_test_pred)
print('Mean Squared error of testing set :%2f'%p)
```

```
     Mean Squared error of testing set :5.150781
```

```
from sklearn.metrics import r2_score
s = r2_score(y_train, y_train_pred)
print('R2 Score of training set:%.2f'%s)
```

```
     R2 Score of training set:0.54
```