```
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 (3).csv
```

```
df.describe()
```

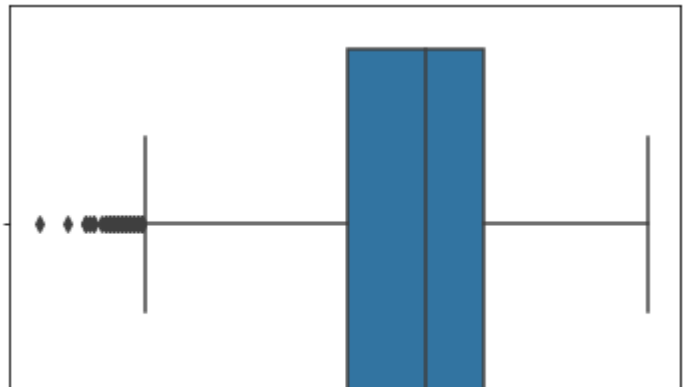
	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	
count	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4
mean	0.523992	0.407881	0.139516	0.828742	0.359367	0.180594	
std	0.120093	0.099240	0.041827	0.490389	0.221963	0.109614	
min	0.075000	0.055000	0.000000	0.002000	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	

```
df.head()
```

	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

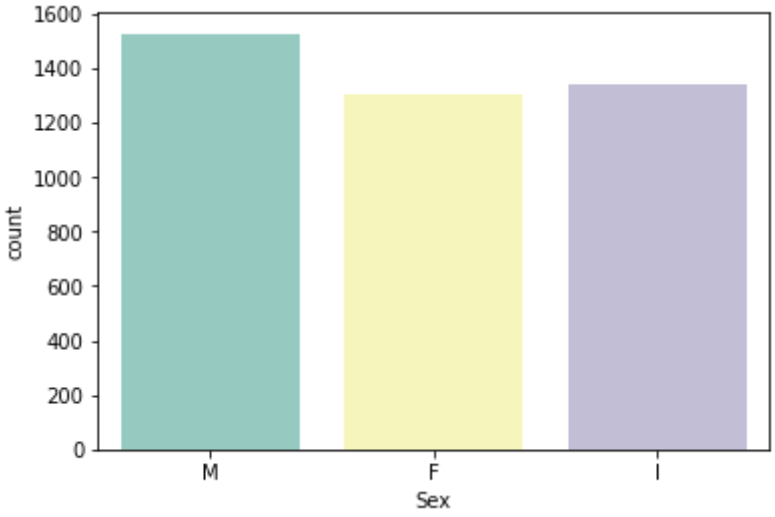
```
sns.boxplot(df.Length)
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pas
  FutureWarning
<matplotlib.axes._subplots.AxesSubplot at 0x7f21f6ea5d90>
```



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

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f21f6de5350>
```

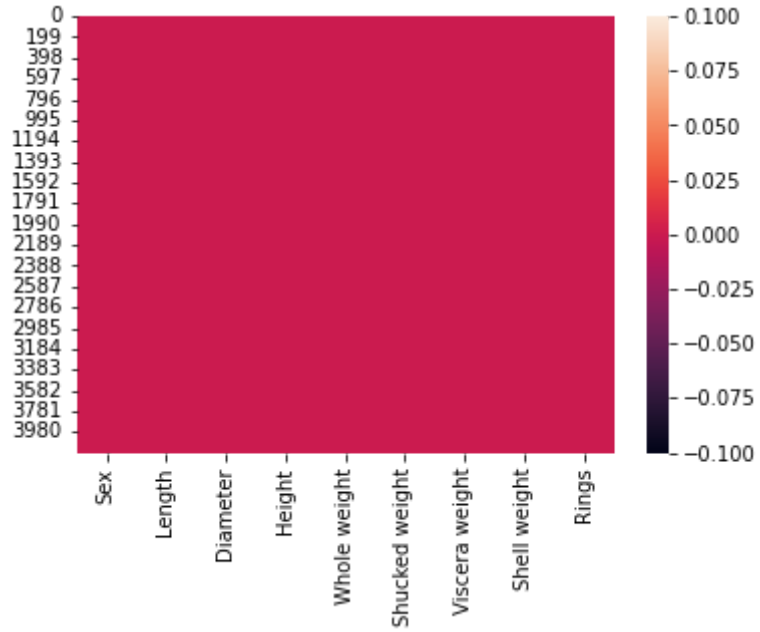



```
df.isnull()
```

Sex	Length	Diameter	Height	Whole	Shucked	Viscera	Shell	Rings

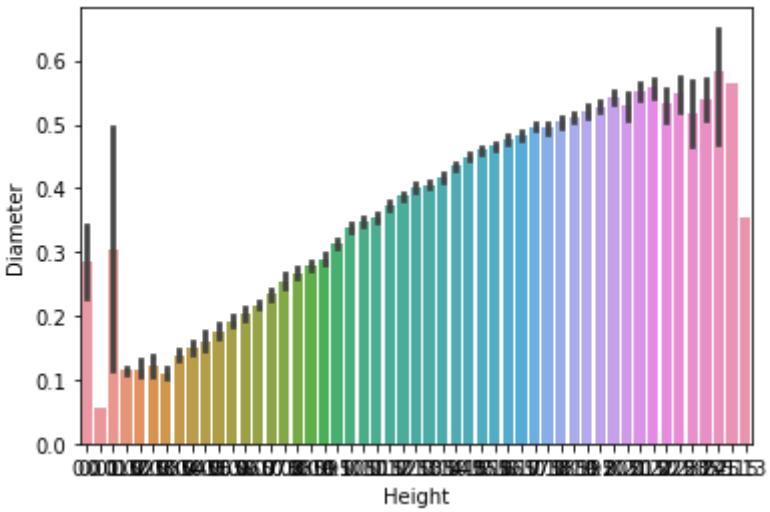
```
sns.heatmap(df.isnull())
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f21f4021d50>
```




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

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f21f3e0bcd0>
```

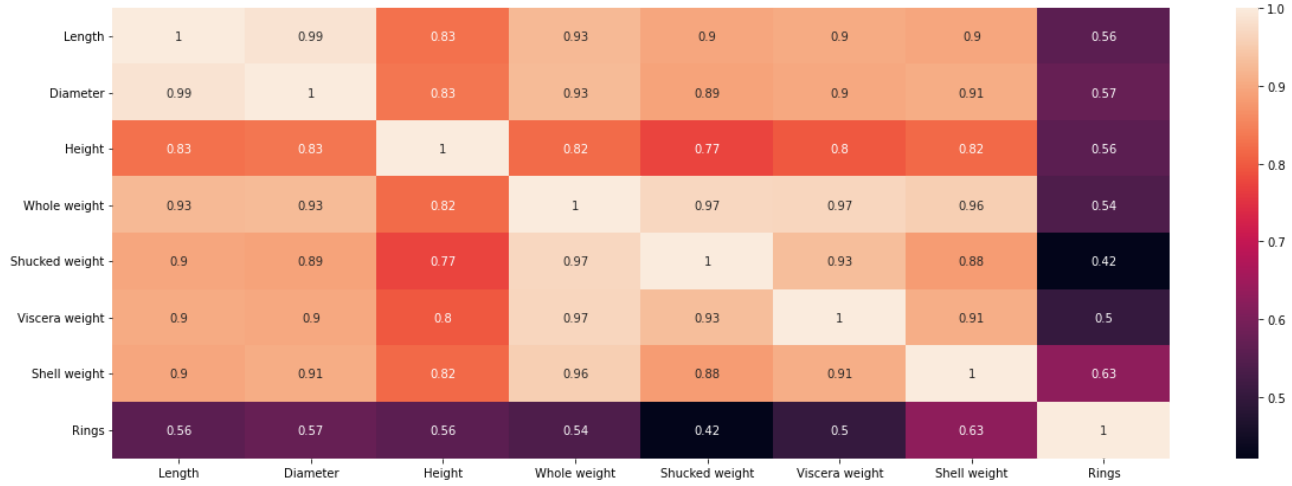



```
numerical_features = df.select_dtypes(include = [np.number]).columns
categorical_features = df.select_dtypes(include = [np.object]).columns
```

```
/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/r
```

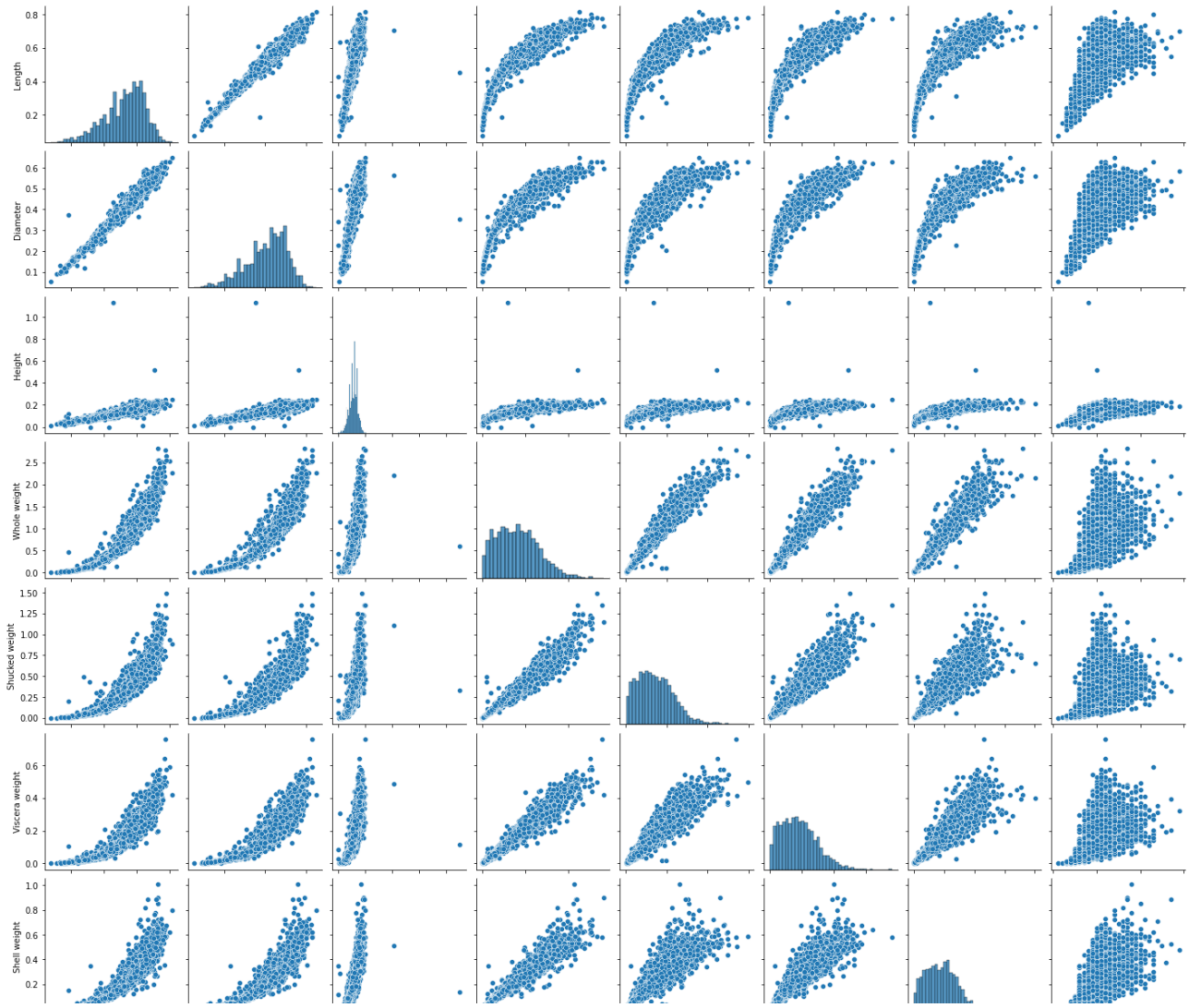
```
plt.figure(figsize = (20,7))
sns.heatmap(df[numerical_features].corr(),annot = True)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f21f3b6c810>
```




```
sns.pairplot(df)
```

```
<seaborn.axisgrid.PairGrid at 0x7f21f3ab8690>
```




```
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['Height'].mean()
```

```
0.13951639932966242
```

```
df.max()
```

```
Sex                 M
Length          0.815
Diameter         0.65
Height           1.13
Whole weight   2.8255
Shucked weight  1.488
```

```
Viscera weight      0.76
Shell weight       1.005
Rings                 29
dtype: object
```

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

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

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

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
1257	I	0.430	0.34	0.0	0.428	0.2065	0.0860	0.1150	8
3996	I	0.315	0.23	0.0	0.134	0.0575	0.0285	0.3505	6

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

```
0.5951236783694207
```

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

```
0.425
```

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

```
0.7190979217612694
```

```
df.isna().any()
```

```
Sex               False
Length            False
Diameter          False
Height            False
Whole weight      False
Shucked weight    False
Viscera weight    False
Shell weight      False
Rings             False
dtype: bool
```

```
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

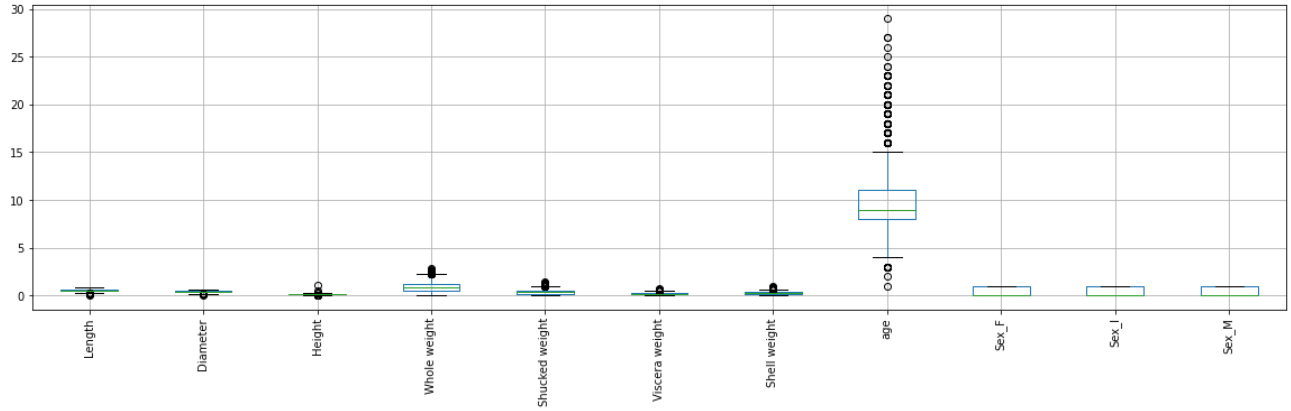
```
q1=df.Rings.quantile(0.25)
q2=df.Rings.quantile(0.75)
iqr=q2-q1
```

```
print(iqr)
```

```
3.0
```

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

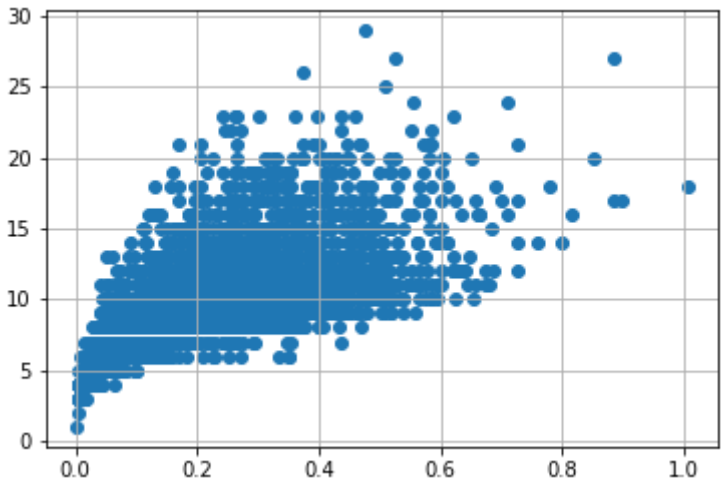
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f21f024ca50>
```




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

```
---------------------------------------------------------------------------
KeyError                                  Traceback (most recent call last)
/usr/local/lib/python3.7/dist-packages/pandas/core/indexes/base.py in get_loc(self, key, method, tolerance)
   3360             try:
-> 3361                 return self._engine.get_loc(casted_key)
   3362             except KeyError as err:

                                 4 frames
pandas/_libs/hashtable_class_helper.pxi in pandas._libs.hashtable.PyObjectHashTable.get_item()

pandas/_libs/hashtable_class_helper.pxi in pandas._libs.hashtable.PyObjectHashTable.get_item()

KeyError: 'Rings'

The above exception was the direct cause of the following exception:

KeyError                                  Traceback (most recent call last)
/usr/local/lib/python3.7/dist-packages/pandas/core/indexes/base.py in get_loc(self, key, method, tolerance)
   3361                 return self._engine.get_loc(casted_key)
   3362             except KeyError as err:
-> 3363                 raise KeyError(key) from err
```

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

```
numerical_features
categorical_features
```

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

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

```
abalone_numeric.head()
```

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	age	Sex_F	Sex_I	Se
0	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150	15	0	0	
1	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	7	0	0	
2	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	9	1	0	
3	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	10	0	0	

```
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: 4177, 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: 4177, 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([[0.51 , 0.395, 0.145, ..., 0.   , 0.   , 1.   ],
       [0.325, 0.25 , 0.055, ..., 0.   , 1.   , 0.   ],
       [0.585, 0.46 , 0.145, ..., 0.   , 1.   , 0.   ],
       ...,
       [0.455, 0.375, 0.125, ..., 0.   , 1.   , 0.   ],
       [0.355, 0.255, 0.08 , ..., 0.   , 1.   , 0.   ],
       [0.65 , 0.52 , 0.19 , ..., 0.   , 0.   , 1.   ]])
```

```
y_train
```

```
2255    12
2110     5
2775    10
786      9
3532     7
        ..
```

```
1889     7
1294     9
3251     8
2718     7
142     16
Name: age, Length: 3132, 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: 0.5393848892306752
```

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

```
array([11.59375 ,  6.09375 , 11.109375, ...,  9.      ,  6.65625 ,
       13.984375])
```

```
X_train
```

```
array([[0.51 , 0.395, 0.145, ..., 0.   , 0.   , 1.   ],
       [0.325, 0.25 , 0.055, ..., 0.   , 1.   , 0.   ],
       [0.585, 0.46 , 0.145, ..., 0.   , 1.   , 0.   ],
       ...,
       [0.455, 0.375, 0.125, ..., 0.   , 1.   , 0.   ],
       [0.355, 0.255, 0.08 , ..., 0.   , 1.   , 0.   ],
       [0.65 , 0.52 , 0.19 , ..., 0.   , 0.   , 1.   ]])
```

```
y_train
```

```
2255    12
2110     5
2775    10
786      9
3532     7
        ..
1889     7
1294     9
3251     8
2718     7
142     16
Name: age, Length: 3132, 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 :4.789464
```

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

```
y_test_pred
```

```
X_test
```

```
array([[0.48 , 0.37 , 0.135, ..., 0.   , 0.   , 1.   ],
       [0.58 , 0.47 , 0.165, ..., 0.   , 0.   , 1.   ],
       [0.67 , 0.54 , 0.2  , ..., 1.   , 0.   , 0.   ],
       ...,
       [0.605, 0.455, 0.16 , ..., 0.   , 0.   , 1.   ],
       [0.39 , 0.3  , 0.1  , ..., 0.   , 1.   , 0.   ],
       [0.36 , 0.275, 0.11 , ..., 0.   , 1.   , 0.   ]])
```

```
y_test
```

```
2517     7
2190    11
3705     9
959      7
3999     6
        ..
2457     5
511     10
866      9
3012     7
440     10
Name: age, Length: 1045, 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 :4.854448
```

```
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
```

```
from sklearn.metrics import r2_score
p = r2_score(y_test, y_test_pred)
print('R2 Score of testing set:%.2f'%p)
```

```
R2 Score of testing set:0.53
```

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✓ 0s completed at 2:13 PM