ABALONE DATASET EDA & REGRESSION

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IMPORTING LIBRARIES

[4]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn import preprocessing
```

IMPORT DATA

[5]:
```
df=pd.read_csv('/Users/harshkumawat/Desktop/GDSC TASK/data.csv')
df
```

[5]:

	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	0.1500	15
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.0700	7
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.2100	9
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.1550	10
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.0550	7
…	..	…	…	…	…	…	…	…	…
4172	F	0.565	0.450	0.165	0.8870	0.3700	0.2390	0.2490	11
4173	M	0.590	0.440	0.135	0.9660	0.4390	0.2145	0.2605	10
4174	M	0.600	0.475	0.205	1.1760	0.5255	0.2875	0.3080	9
4175	F	0.625	0.485	0.150	1.0945	0.5310	0.2610	0.2960	10
4176	M	0.710	0.555	0.195	1.9485	0.9455	0.3765	0.4950	12

[4177 rows x 9 columns]

EXPLORATORY DATA ANALYSIS (EDA)

[6]:
```
df.describe()
```

[6]:
```
            Length     Diameter       Height  Whole weight  Shucked weight  \
count  4177.000000  4177.000000  4177.000000   4177.000000     4177.000000
mean      0.523992     0.407881     0.139516      0.828742        0.359367
std       0.120093     0.099240     0.041827      0.490389        0.221963
min       0.075000     0.055000     0.000000      0.002000        0.001000
25%       0.450000     0.350000     0.115000      0.441500        0.186000
50%       0.545000     0.425000     0.140000      0.799500        0.336000
75%       0.615000     0.480000     0.165000      1.153000        0.502000
max       0.815000     0.650000     1.130000      2.825500        1.488000

       Viscera weight  Shell weight        Rings
count     4177.000000   4177.000000  4177.000000
mean         0.180594      0.238831     9.933684
std          0.109614      0.139203     3.224169
min          0.000500      0.001500     1.000000
25%          0.093500      0.130000     8.000000
50%          0.171000      0.234000     9.000000
75%          0.253000      0.329000    11.000000
max          0.760000      1.005000    29.000000
```

[7]:
```
df.shape
```

[7]:
```
(4177, 9)
```

[8]:
```
df.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
```

[9]:
```
df.isnull().sum()
```

[9]:
```
Sex               0
Length            0
Diameter          0
Height            0
Whole weight      0
Shucked weight    0
Viscera weight    0
Shell weight      0
Rings             0
dtype: int64
```

[10]:
```
df["Sex"].value_counts()
```

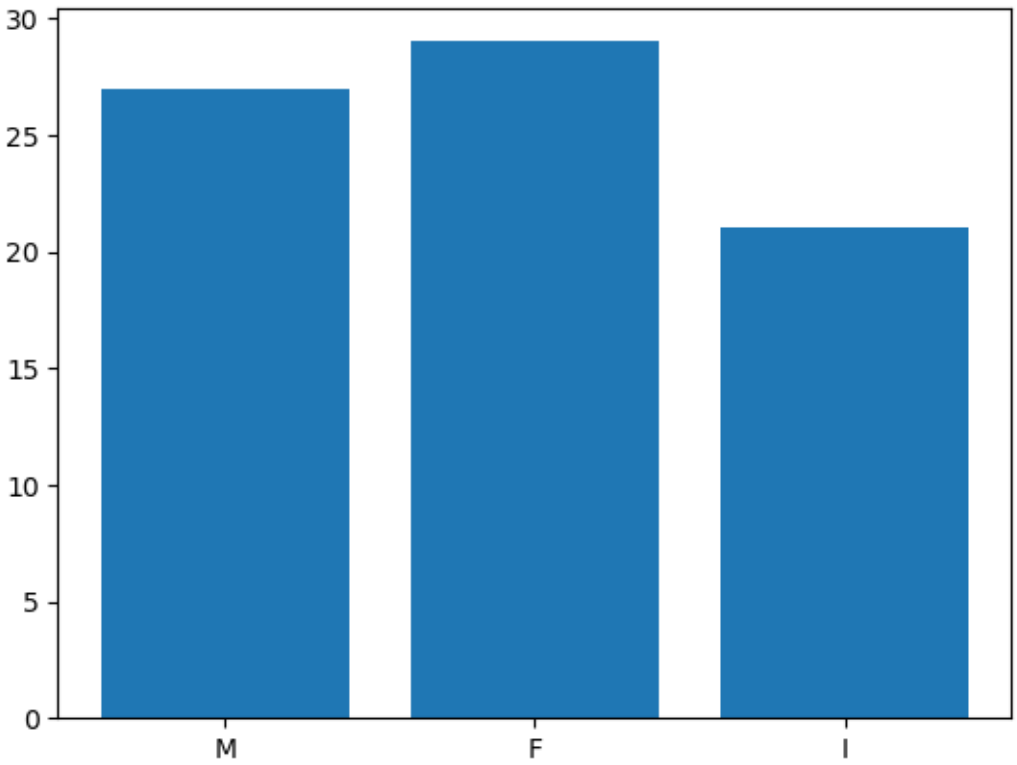
[10]:
```
M    1528
I    1342
F    1307
Name: Sex, dtype: int64
```

Graphical Analysis

1. Sex & Rings

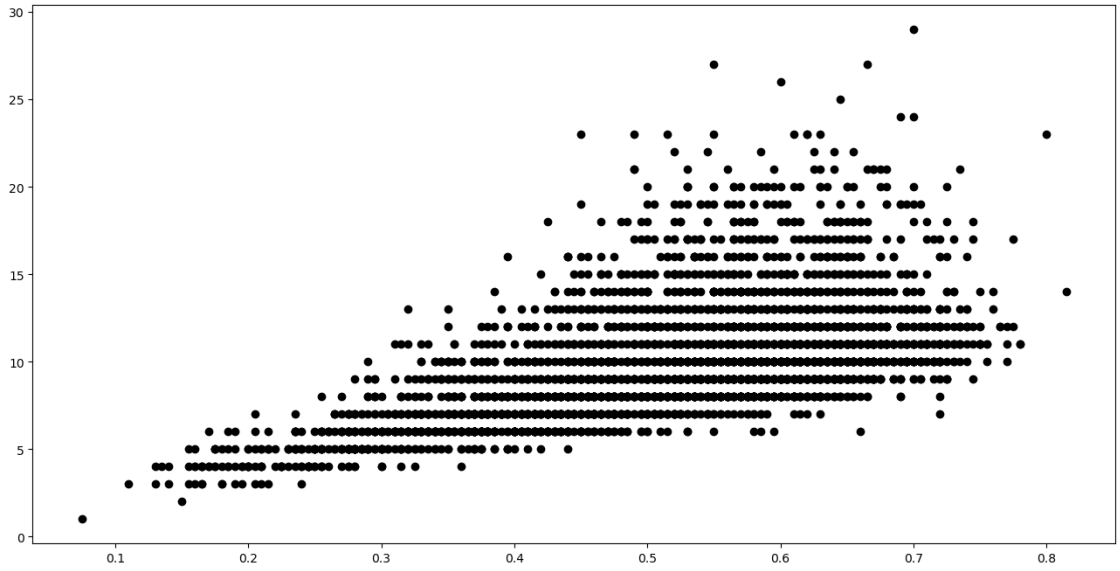
[11]:
```
print(df['Sex'].unique())
plt.bar(df['Sex'], df['Rings'])
plt.show()
```

```
['M' 'F' 'I']
```



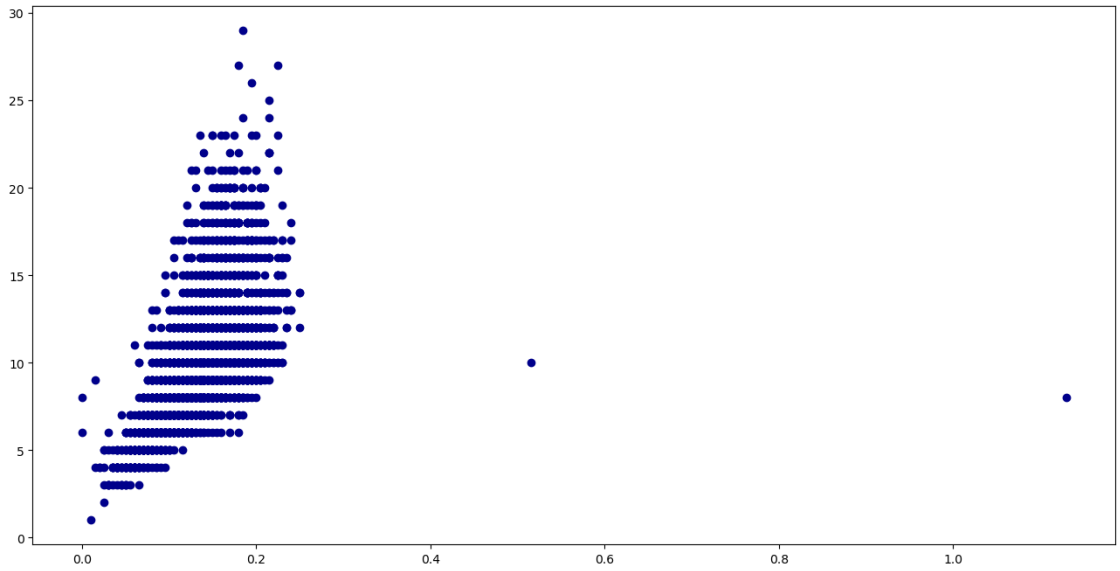
2. Length & Rings

[12]:
```
plt.figure (figsize= (16, 8))
plt.scatter (df['Length'], df['Rings'], c='black')
plt.show ()
```



3. Height & Rings

[13]:
```
plt.figure (figsize= (16, 8))
plt.scatter (df['Height'], df['Rings'], c='darkblue')
plt.show ()
```



3.1 Removing Outliers from Height

[14]:
```
max_thresold = df['Height'].quantile(0.9996)
max_thresold
```

[14]:
```
0.3373440000000073
```

[15]:
```
df[df['Height']>max_thresold]
```

[15]:
```
      Sex  Length  Diameter  Height  Whole weight  Shucked weight  \
1417   M   0.705     0.565   0.515         2.210          1.1075
2051   F   0.455     0.355   1.130         0.594          0.3320

      Viscera weight  Shell weight  Rings
1417          0.4865        0.5120     10
2051          0.1160        0.1335      8
```

[16]:
```
df= df.drop(df.index[[1417,2051]])
```

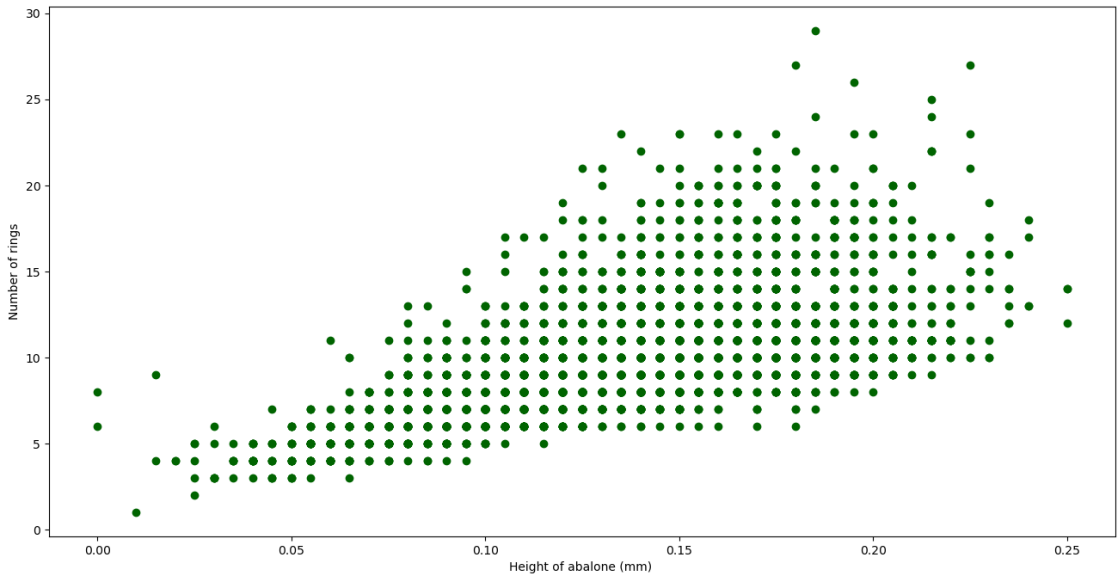
[17]:
```
df.index[1417]
```

[17]: 1418

[18]:
```
new_df = df. loc[(df['Height'] < max_thresold)]
print( 'Size of new data:' ,len (new_df))
```

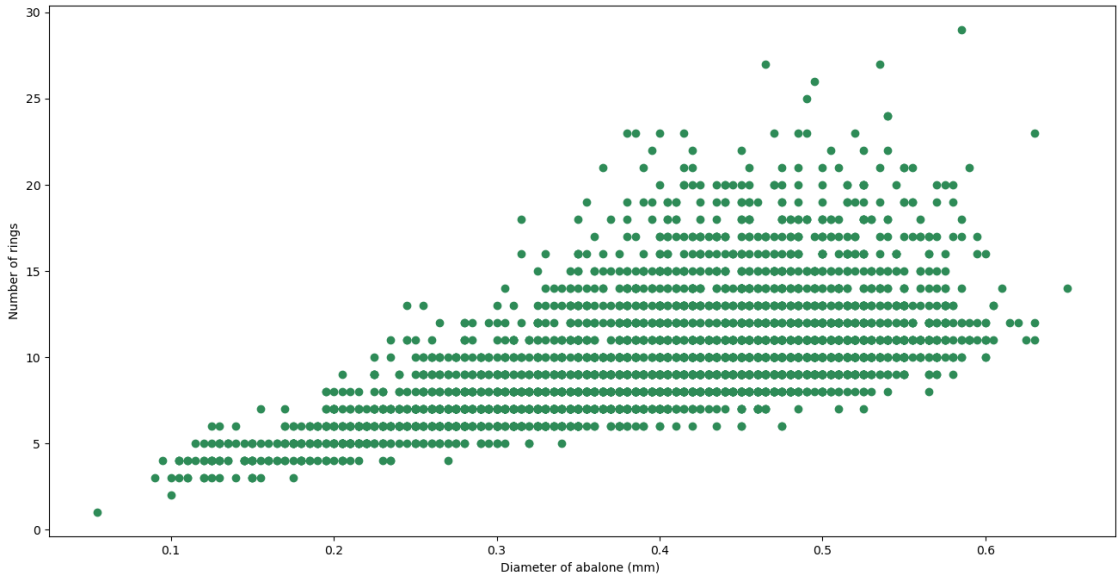
```
Size of new data: 4175
```

[19]:
```
plt.figure (figsize= (16, 8))
plt.scatter (df['Height'], df['Rings'], c='darkgreen')
plt.xlabel ('Height of abalone (mm) ')
plt.ylabel ("Number of rings")
plt.show ()
```



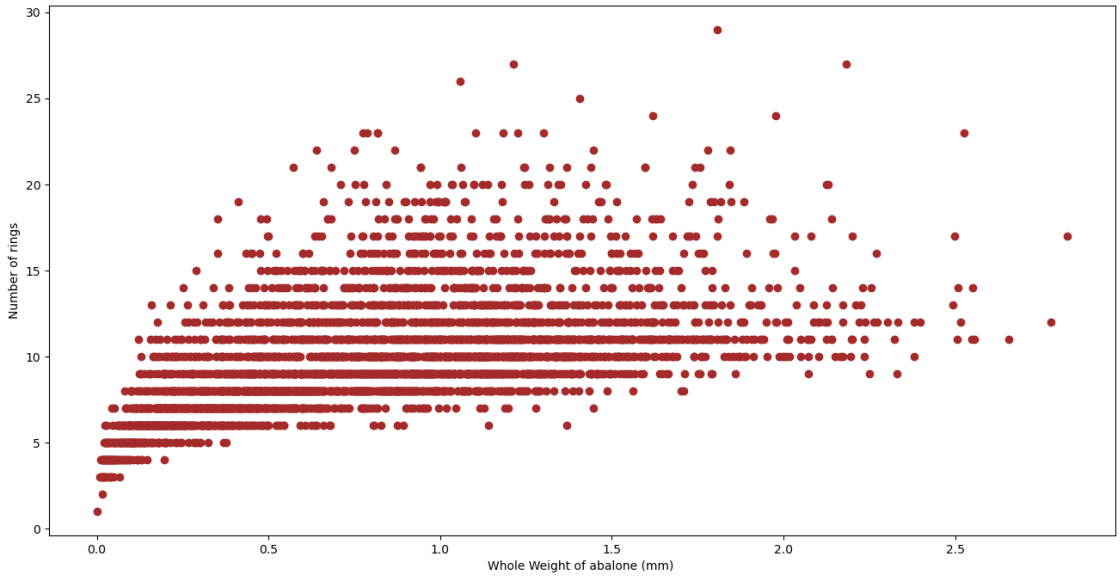
4. Diameter & Rings

[20]:
```
plt.figure (figsize= (16, 8))
plt.scatter (df['Diameter'], df['Rings'], c='seagreen')
plt.xlabel ('Diameter of abalone (mm) ')
plt.ylabel ("Number of rings")
plt.show ()
```



5. Whole Weight & Rings

[21]:
```
plt.figure (figsize= (16, 8))
plt.scatter (df['Whole weight'], df['Rings'], c='brown')
plt.xlabel ('Whole Weight of abalone (mm) ')
plt.ylabel ("Number of rings")
plt.show ()
```



LABEL ENCODING ON SEX

[22]:
```
label = preprocessing.LabelEncoder()
df['Sex']= label.fit_transform(df['Sex'])
print(df['Sex'].unique())
df['age'] = df['Rings'] + 1.5
df
```

```
[2 0 1]
```

[22]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	\
0	2	0.455	0.365	0.095	0.5140	0.2245	
1	2	0.350	0.265	0.090	0.2255	0.0995	
2	0	0.530	0.420	0.135	0.6770	0.2565	
3	2	0.440	0.365	0.125	0.5160	0.2155	
4	1	0.330	0.255	0.080	0.2050	0.0895	
…	…	…	…	…	…	…	
4172	0	0.565	0.450	0.165	0.8870	0.3700	
4173	2	0.590	0.440	0.135	0.9660	0.4390	
4174	2	0.600	0.475	0.205	1.1760	0.5255	
4175	0	0.625	0.485	0.150	1.0945	0.5310	
4176	2	0.710	0.555	0.195	1.9485	0.9455	

	Viscera weight	Shell weight	Rings	age
0	0.1010	0.1500	15	16.5
1	0.0485	0.0700	7	8.5
2	0.1415	0.2100	9	10.5
3	0.1140	0.1550	10	11.5
4	0.0395	0.0550	7	8.5
…	…	…	…	…
4172	0.2390	0.2490	11	12.5
4173	0.2145	0.2605	10	11.5
4174	0.2875	0.3080	9	10.5
4175	0.2610	0.2960	10	11.5
4176	0.3765	0.4950	12	13.5

```
[4175 rows x 10 columns]
```

DATA SPLITTING

[23]:
```
x= df.drop(columns=['age','Rings'], axis=1)
y= df['age']
```

[24]:
```
x
```

[24]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	\
0	2	0.455	0.365	0.095	0.5140	0.2245	
1	2	0.350	0.265	0.090	0.2255	0.0995	
2	0	0.530	0.420	0.135	0.6770	0.2565	
3	2	0.440	0.365	0.125	0.5160	0.2155	

```
4       1   0.330     0.255   0.080         0.2050          0.0895
…   …     …       …       …           …               …
4172    0   0.565     0.450   0.165         0.8870          0.3700
4173    2   0.590     0.440   0.135         0.9660          0.4390
4174    2   0.600     0.475   0.205         1.1760          0.5255
4175    0   0.625     0.485   0.150         1.0945          0.5310
4176    2   0.710     0.555   0.195         1.9485          0.9455

      Viscera weight  Shell weight
0             0.1010        0.1500
1             0.0485        0.0700
2             0.1415        0.2100
3             0.1140        0.1550
4             0.0395        0.0550
…                …             …
4172          0.2390        0.2490
4173          0.2145        0.2605
4174          0.2875        0.3080
4175          0.2610        0.2960
4176          0.3765        0.4950

[4175 rows x 8 columns]
```

[25]:
```
y
```

[25]:
```
0       16.5
1        8.5
2       10.5
3       11.5
4        8.5
        …
4172    12.5
4173    11.5
4174    10.5
4175    11.5
4176    13.5
Name: age, Length: 4175, dtype: float64
```

TRAIN-TEST SPLIT

[26]:
```
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.2,␣
 ↪random_state=0)

print("Shape of x_train :", x_train.shape)
print("Shape of x_test :", x_test.shape)
print("Shape of y_train :", y_train.shape)
```

```
print("Shape of y_test :", y_test.shape)
```

```
Shape of x_train : (3340, 8)
Shape of x_test : (835, 8)
Shape of y_train : (3340,)
Shape of y_test : (835,)
```

[27]:
```
x_train
```

[27]:
```
      Sex  Length  Diameter  Height  Whole weight  Shucked weight  \
188     0   0.630     0.480   0.160        1.1990          0.5265
2326    2   0.430     0.345   0.115        0.3045          0.0925
219     0   0.415     0.305   0.130        0.3200          0.1305
380     2   0.605     0.470   0.180        1.1405          0.3755
218     2   0.470     0.360   0.135        0.5010          0.1665
…     …     …         …       …            …               …
1033    2   0.650     0.525   0.185        1.6220          0.6645
3266    0   0.495     0.385   0.135        0.6625          0.3005
1654    1   0.595     0.460   0.150        0.8335          0.3770
2609    0   0.630     0.495   0.200        1.4255          0.6590
2734    1   0.420     0.325   0.115        0.3140          0.1295

      Viscera weight  Shell weight
188           0.3350         0.315
2326          0.0550         0.120
219           0.0755         0.105
380           0.2805         0.385
218           0.1150         0.165
…              …            …
1033          0.3225         0.477
3266          0.1635         0.185
1654          0.1925         0.235
2609          0.3360         0.380
2734          0.0635         0.100

[3340 rows x 8 columns]
```

[28]:
```
y_train
```

[28]:
```
188     12.5
2326    12.5
219      9.5
380     16.5
218     11.5
       …
1033    11.5
3266    12.5
```

```
1654     9.5
2609    12.5
2734     9.5
Name: age, Length: 3340, dtype: float64
```

MULTIPLE LINEAR REGRESSION MODEL TRAINGING

[29]:
```
from sklearn.linear_model import LinearRegression
lr=LinearRegression()
lr.fit(x_train,y_train)
```

[29]:
```
LinearRegression()
```

DATA PREDICTION

[30]:
```
y_pred=lr.predict(x_test)
```

R2 SCORE CALCULATION

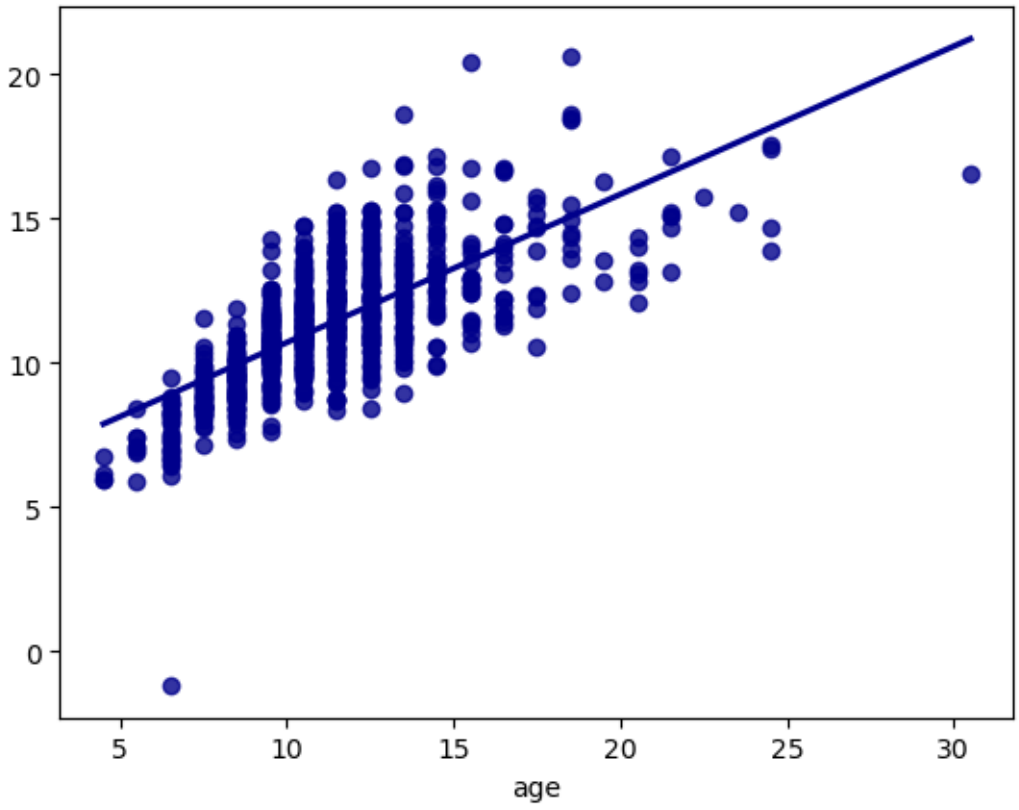
[31]:
```
from sklearn.metrics import r2_score,␣
 ↪explained_variance_score,max_error,mean_absolute_error
r2=r2_score(y_test,y_pred)
vs=explained_variance_score(y_test,y_pred)
r2=round(r2,3)
me=mean_absolute_error(y_test,y_pred)
me=round(me,2)
e=max_error(y_test,y_pred)
e=round(e,3)
print("The R2 and Variance Score of Model is: ", r2)
print("The Maximum Possible Error is: ",e,"%")
print("The Mean Absolute Error is: ",me)
print("The Accuracy of Model is: ", r2*100,"%")
```

```
The R2 and Variance Score of Model is:  0.512
The Maximum Possible Error is:  13.93 %
The Mean Absolute Error is:  1.61
The Accuracy of Model is:  51.2 %
```

GRAPHICAL PLOTTING

[33]:
```
import seaborn as sns
sns.regplot(x=y_test,y=y_pred,ci=None,color ='darkblue')
```

[33]:
```
<Axes: xlabel='age'>
```


20
15
10
5
0
5
10
15
20
25
30
age

[ ]: