Library Import

In [ ]:
```python
import pandas as pd
import numpy as np

import matplotlib.pyplot as plt
import seaborn as sns
```

SK-Learn Library Import

In [ ]:
```python
''' SK-Learn Library Import'''
from sklearn.preprocessing import LabelEncoder, OneHotEncoder
from sklearn.linear_model import LogisticRegression
from sklearn.linear_model import RandomizedLasso,LassoLarsCV
from sklearn.exceptions import ConvergenceWarning
from sklearn.model_selection import train_test_split
from sklearn.metrics import make_scorer, accuracy_score, confusion_matrix
import sklearn.datasets
```

In [ ]:
```python
'Scipy, Stats Library'''
from scipy.stats import skew
```

In [ ]:
```python
import warnings
warnings.filterwarnings('ignore')
```

In [ ]:
```python
sns.set()
%matplotlib inline
```

Display The head --> To Check if Data is Properly Imported

In [11]:
```python
df = pd.read_csv(r'https://raw.githubusercontent.com/dsrscientist/dataset1/master/abalone.csv')
df.head()
```

Out[11]:

	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

Feature Information of the DataSet

In [12]:
```python
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
```

According to the Infomation:

1)No-Null data 2)1 - Object Type 3)7 - Float Type 4)1 - Int Type

Feature Distirbution of data for Float and Int Data Type

In [13]:
```python
df.describe()
```

Out[13]:

	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

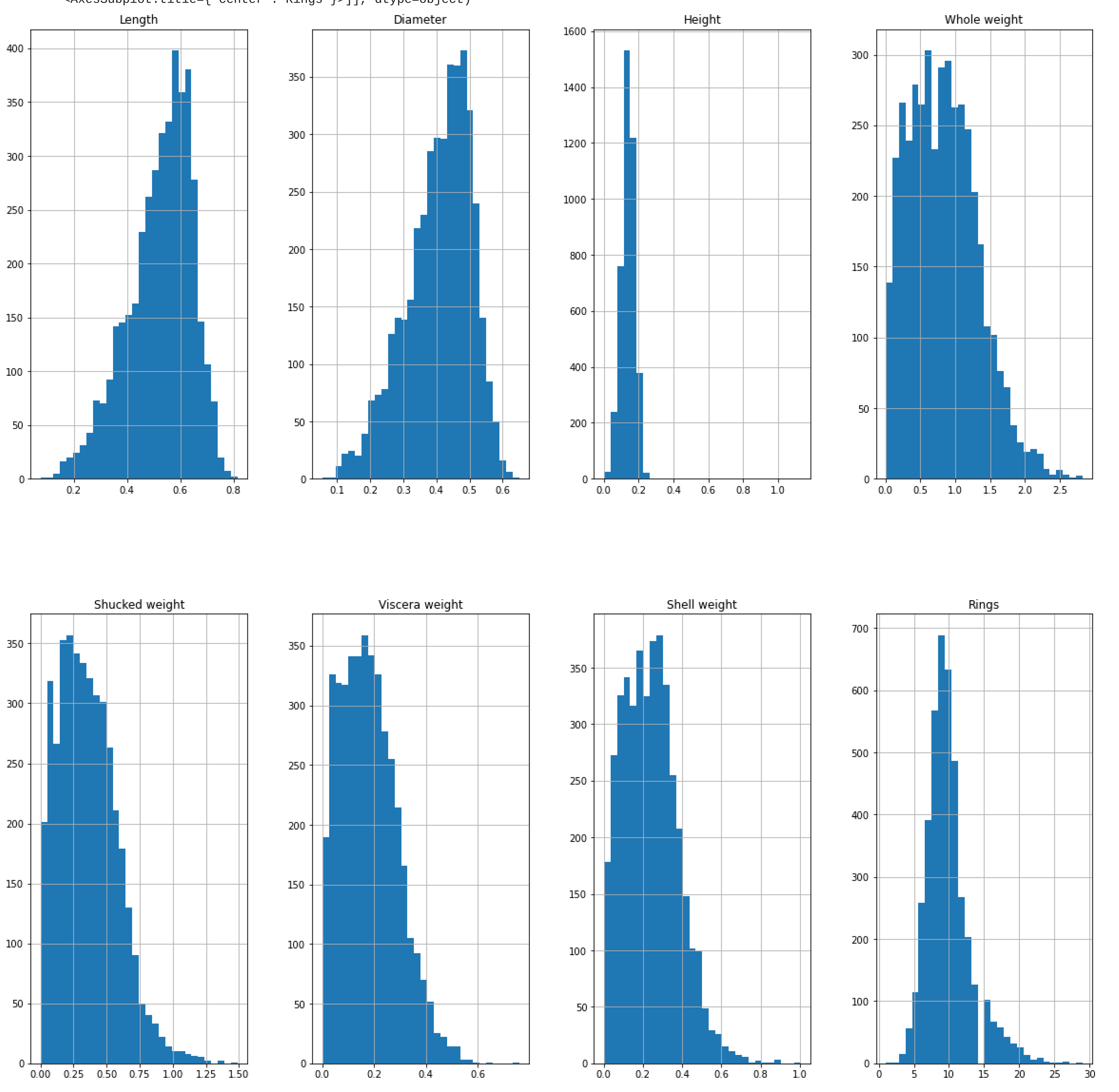
According to Described Information:

In [ ]:
```
1)No Feature has Minimum Value = 0, except Height
2)All Features are not Normally Distributed, ( Theortically if feature is normally distributed, Mean = Median = Mode ).
3)But Features are close to Normality
4)All numerical, Except Sex
5)Each Feature has Different Scale
```

In [ ]:
```python
nf = df.select_dtypes(include=[np.number]).columns
cf = df.select_dtypes(include=[np.object]).columns
```

In [15]:
```python
df.hist(figsize=(20,20), grid = True, layout = (2,4), bins = 30)
```

Out[15]:
```
array([[<AxesSubplot:title={'center':'Length'}>,
        <AxesSubplot:title={'center':'Diameter'}>,
        <AxesSubplot:title={'center':'Height'}>,
        <AxesSubplot:title={'center':'Whole weight'}>],
       [<AxesSubplot:title={'center':'Shucked weight'}>,
        <AxesSubplot:title={'center':'Viscera weight'}>,
        <AxesSubplot:title={'center':'Shell weight'}>,
        <AxesSubplot:title={'center':'Rings'}>]], dtype=object)
```



In [ ]:
```python
mv_df = df.isnull().sum().sort_values(ascending = False)
pmv_df = (mv_df/len(df)) * 100
missing_df = pd.concat([mv_df,pmv_df], axis = 1, keys = ['Missing Values','% Missing'])
```

In [24]:
```python
print("Value Count of Rings Column")
print(df.Rings.value_counts())
print("\nPercentage of Rings Column")
print(df.Rings.value_counts(normalize = True))
```

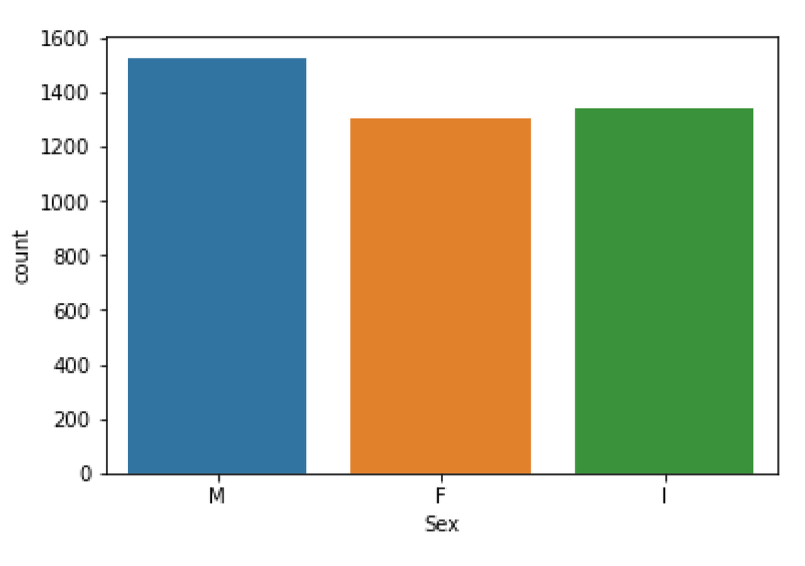
```
Value Count of Rings Column
9     689
10    634
8     568
11    487
7     391
12    267
6     259
13    203
14    126
5     115
15    103
16     67
17     58
4      57
18     42
19     32
20     26
3      15
21     14
23      9
22      6
27      2
24      2
1       1
26      1
29      1
2       1
25      1
Name: Rings, dtype: int64

Percentage of Rings Column
9     0.164951
10    0.151784
8     0.135983
11    0.116591
7     0.093608
12    0.063921
6     0.062006
13    0.048599
14    0.030165
5     0.027532
15    0.024659
16    0.016040
17    0.013886
4     0.013646
18    0.010055
19    0.007661
20    0.006225
3     0.003591
21    0.003352
23    0.002155
22    0.001436
27    0.000479
24    0.000479
1     0.000239
26    0.000239
29    0.000239
2     0.000239
25    0.000239
Name: Rings, dtype: float64
```

Visualization

In [28]:
```python
import seaborn as sns
sns.countplot(x='Sex', data = df)
```

Out[28]:
```
<AxesSubplot:xlabel='Sex', ylabel='count'>
```



Sex Ratio in Abalone

In [29]:
```python
print("\nSex Count in Percentage")
print(df.Sex.value_counts(normalize = True))
print("\nSex Count in Numbers")
print(df.Sex.value_counts())
```

```
Sex Count in Percentage
M    0.365813
I    0.321283
F    0.312904
Name: Sex, dtype: float64

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

Small Feature Engineering, Deriving Age from Rings Column, Age = Rings + 1.5'''

In [30]:
```python
df['Age'] = df['Rings'] + 1.5
df['Age'].head(5)
```

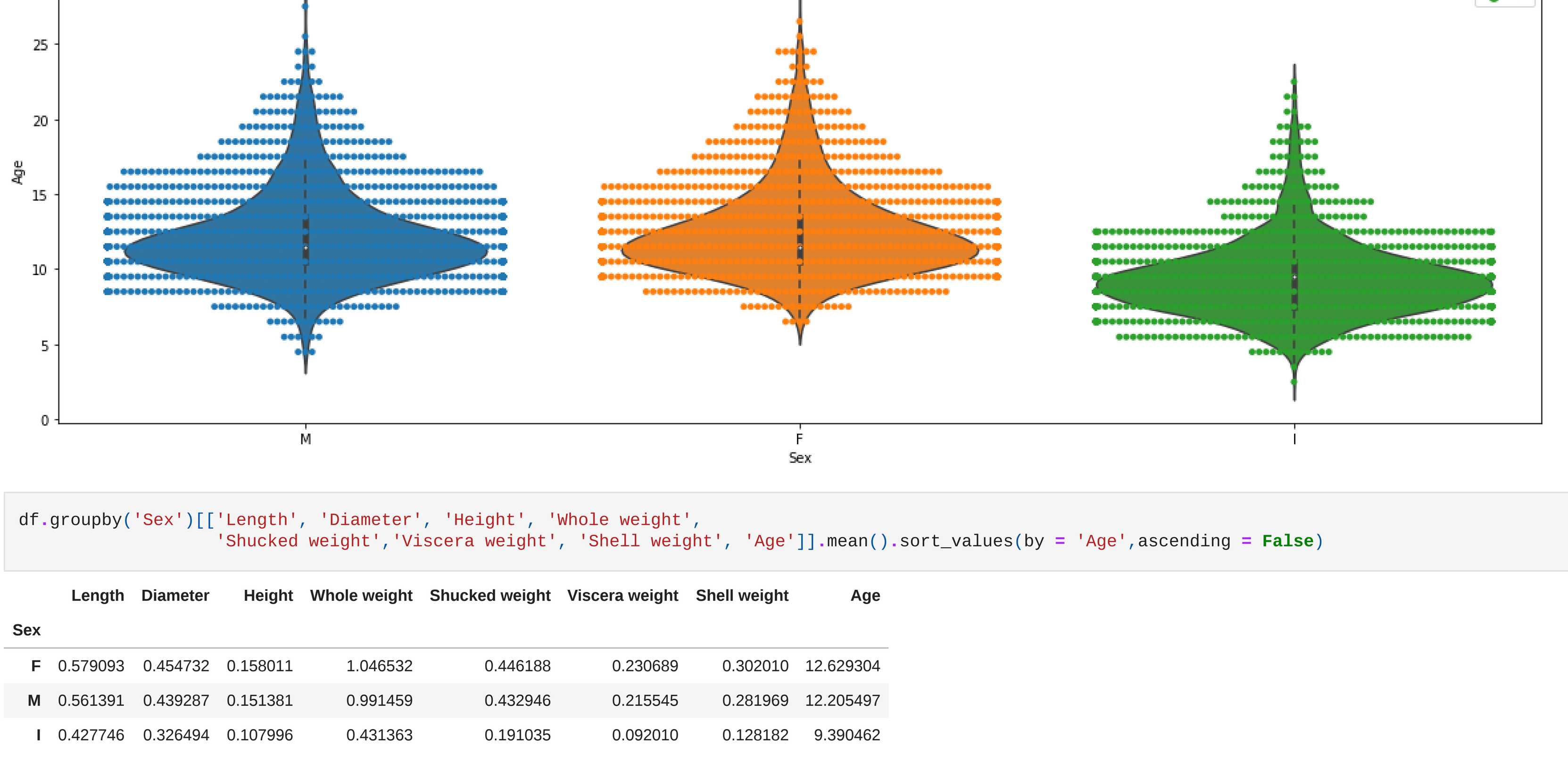
Out[30]:
```
0    16.5
1     8.5
2    10.5
3    11.5
4     8.5
Name: Age, dtype: float64
```

'Sex and Age Visulization'''

In [32]:
```python
import seaborn as sns
plt.figure(figsize = (20,7))
sns.swarmplot(x = 'Sex', y = 'Age', data = df, hue = 'Sex')
sns.violinplot(x = 'Sex', y = 'Age', data = df)
```

```
D:\ANACONDA\lib\site-packages\seaborn\categorical.py:1296: UserWarning: 56.2% of the points cannot be placed; you may want to decrease the size of the markers or use stripplot.
  warnings.warn(msg, UserWarning)
D:\ANACONDA\lib\site-packages\seaborn\categorical.py:1296: UserWarning: 52.2% of the points cannot be placed; you may want to decrease the size of the markers or use stripplot.
  warnings.warn(msg, UserWarning)
D:\ANACONDA\lib\site-packages\seaborn\categorical.py:1296: UserWarning: 58.5% of the points cannot be placed; you may want to decrease the size of the markers or use stripplot.
  warnings.warn(msg, UserWarning)
```

Out[32]:
```
<AxesSubplot:xlabel='Sex', ylabel='Age'>
```



In [33]:
```python
df.groupby('Sex')[['Length', 'Diameter', 'Height', 'Whole weight',
                   'Shucked weight','Viscera weight', 'Shell weight', 'Age']].mean().sort_values(by = 'Age',ascending = False)
```

Out[33]:

Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Age
F	0.579093	0.454732	0.158011	1.046532	0.446188	0.230689	0.302010	12.629304
M	0.561391	0.439287	0.151381	0.991459	0.432946	0.215545	0.281969	12.205497
I	0.427746	0.326494	0.107996	0.431363	0.191035	0.092010	0.128182	9.390462

Preprocessing Data for the Model

In [ ]:
```python
df['Sex'] = LabelEncoder().fit_transform(df['Sex'].tolist())
```

In [ ]:
```python
transformed_sex_feature = OneHotEncoder().fit_transform(df['Sex'].values.reshape(-1,1)).toarray()
df_sex_encoded = pd.DataFrame(transformed_sex_feature, columns = ["Sex_"+str(int(i)) for i in range(transformed_sex_feature.shape[1])])
df = pd.concat([df, df_sex_encoded], axis=1)
```

In [34]:
```python
df.head()
```

Out[34]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings	Age
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150	15	16.5
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	7	8.5
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	9	10.5
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	10	11.5
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055	7	8.5

THANK YOU

In [ ]: