In [1]:

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

In [2]:

```
df=pd.read_csv(r'C:\Users\user\Downloads\2_2015.csv')
df
```

Out[2]:

	Country	Region	Happiness Rank	Happiness Score	Standard Error	Economy (GDP per Capita)	Family	Health (Life Expectancy)
0	Switzerland	Western Europe	1	7.587	0.03411	1.39651	1.34951	0.94143
1	Iceland	Western Europe	2	7.561	0.04884	1.30232	1.40223	0.94784
2	Denmark	Western Europe	3	7.527	0.03328	1.32548	1.36058	0.87464
3	Norway	Western Europe	4	7.522	0.03880	1.45900	1.33095	0.88521
4	Canada	North America	5	7.427	0.03553	1.32629	1.32261	0.90563
...	...	...	...	...	...	...	...	...
153	Rwanda	Sub-Saharan Africa	154	3.465	0.03464	0.22208	0.77370	0.42864
154	Benin	Sub-Saharan Africa	155	3.340	0.03656	0.28665	0.35386	0.31910
155	Syria	Middle East and Northern Africa	156	3.006	0.05015	0.66320	0.47489	0.72193
156	Burundi	Sub-Saharan Africa	157	2.905	0.08658	0.01530	0.41587	0.22396
157	Togo	Sub-Saharan Africa	158	2.839	0.06727	0.20868	0.13995	0.28443

158 rows × 12 columns

In [3]:

```
df.head(10)
```

Out[3]:

	Country	Region	Happiness Rank	Happiness Score	Standard Error	Economy (GDP per Capita)	Family	Health (Life Expectancy)	F
0	Switzerland	Western Europe	1	7.587	0.03411	1.39651	1.34951	0.94143	
1	Iceland	Western Europe	2	7.561	0.04884	1.30232	1.40223	0.94784	
2	Denmark	Western Europe	3	7.527	0.03328	1.32548	1.36058	0.87464	
3	Norway	Western Europe	4	7.522	0.03880	1.45900	1.33095	0.88521	
4	Canada	North America	5	7.427	0.03553	1.32629	1.32261	0.90563	
5	Finland	Western Europe	6	7.406	0.03140	1.29025	1.31826	0.88911	
6	Netherlands	Western Europe	7	7.378	0.02799	1.32944	1.28017	0.89284	
7	Sweden	Western Europe	8	7.364	0.03157	1.33171	1.28907	0.91087	
8	New Zealand	Australia and New Zealand	9	7.286	0.03371	1.25018	1.31967	0.90837	
9	Australia	Australia and New Zealand	10	7.284	0.04083	1.33358	1.30923	0.93156	

In [4]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 158 entries, 0 to 157
Data columns (total 12 columns):
 #   Column                         Non-Null Count  Dtype  
---  ------                         --------------  -----  
 0   Country                        158 non-null    object 
 1   Region                         158 non-null    object 
 2   Happiness Rank                 158 non-null    int64  
 3   Happiness Score                158 non-null    float64
 4   Standard Error                 158 non-null    float64
 5   Economy (GDP per Capita)       158 non-null    float64
 6   Family                         158 non-null    float64
 7   Health (Life Expectancy)       158 non-null    float64
 8   Freedom                        158 non-null    float64
 9   Trust (Government Corruption)  158 non-null    float64
 10  Generosity                     158 non-null    float64
 11  Dystopia Residual              158 non-null    float64
dtypes: float64(9), int64(1), object(2)
memory usage: 14.9+ KB
```

In [5]:

```
df.describe()
```

Out[5]:

	Happiness Rank	Happiness Score	Standard Error	Economy (GDP per Capita)	Family	Health (Life Expectancy)	Freedom
count	158.000000	158.000000	158.000000	158.000000	158.000000	158.000000	158.000000
mean	79.493671	5.375734	0.047885	0.846137	0.991046	0.630259	0.428615
std	45.754363	1.145010	0.017146	0.403121	0.272369	0.247078	0.150693
min	1.000000	2.839000	0.018480	0.000000	0.000000	0.000000	0.000000
25%	40.250000	4.526000	0.037268	0.545808	0.856823	0.439185	0.328330
50%	79.500000	5.232500	0.043940	0.910245	1.029510	0.696705	0.435515
75%	118.750000	6.243750	0.052300	1.158448	1.214405	0.811013	0.549092
max	158.000000	7.587000	0.136930	1.690420	1.402230	1.025250	0.669730

In [6]:

```
df.columns
```

Out[6]:

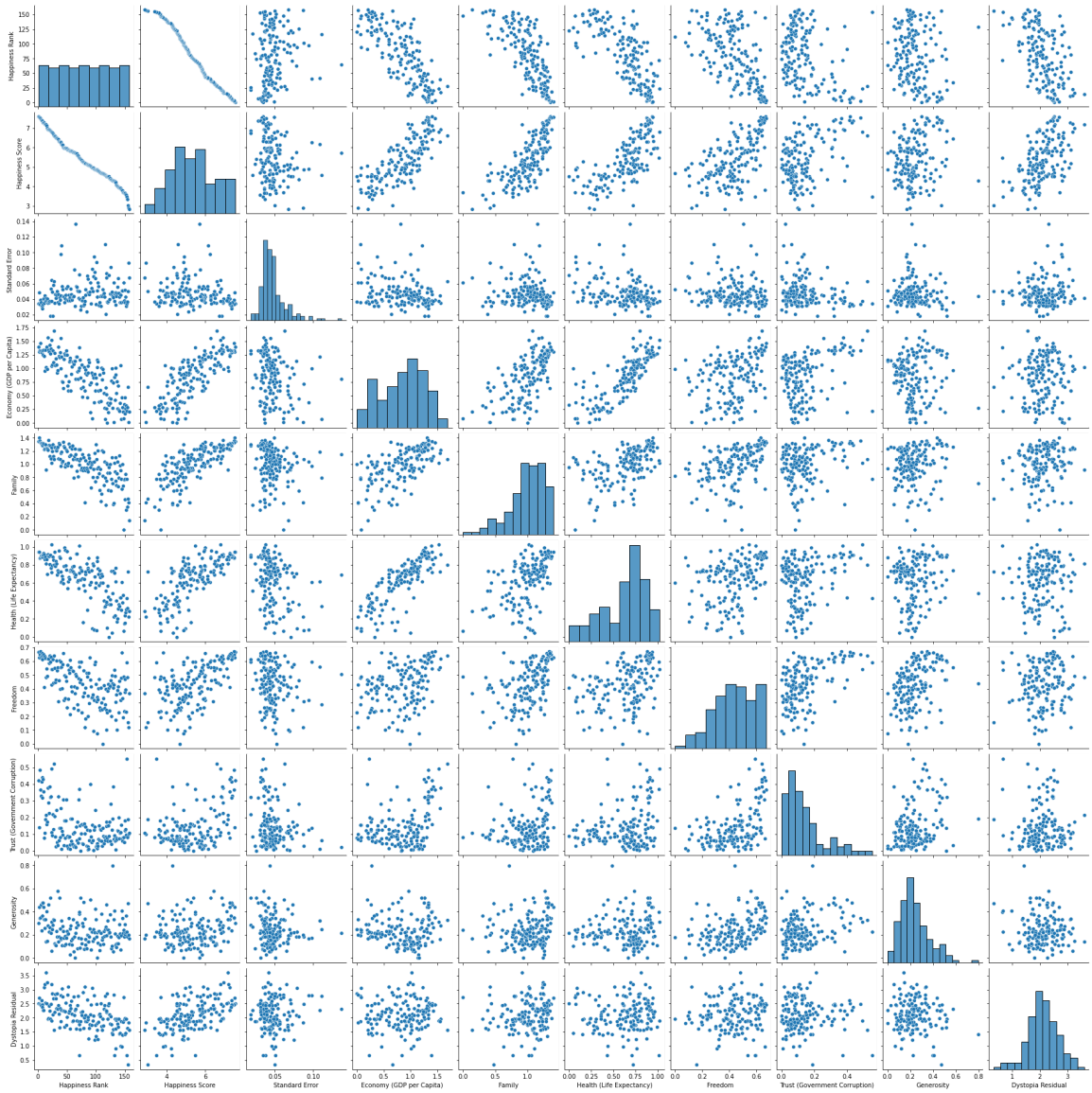
```
Index(['Country', 'Region', 'Happiness Rank', 'Happiness Score',
       'Standard Error', 'Economy (GDP per Capita)', 'Family',
       'Health (Life Expectancy)', 'Freedom', 'Trust (Government Corruptio
n)',
       'Generosity', 'Dystopia Residual'],
      dtype='object')
```

In [7]:

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

Out[7]:

```
<seaborn.axisgrid.PairGrid at 0x2c701fa3d90>
```



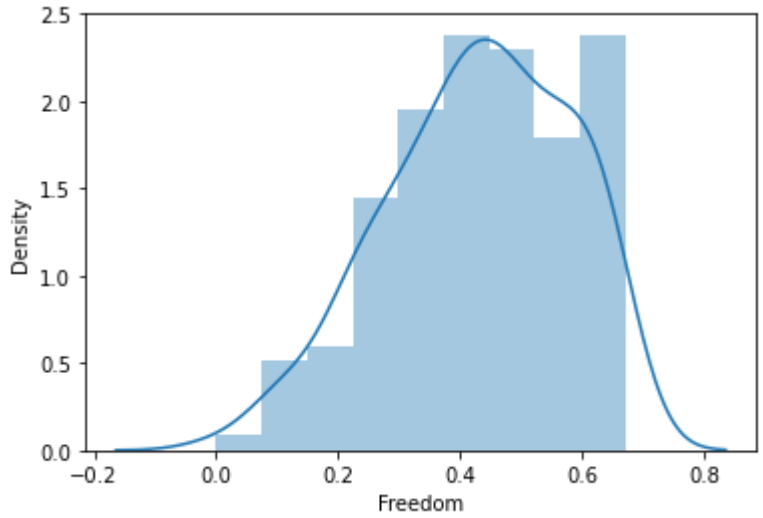
In [8]:

```
sns.distplot(df['Freedom'])
```

```
C:\ProgramData\Anaconda3\lib\site-packages\seaborn\distributions.py:2557:
FutureWarning: `distplot` is a deprecated function and will be removed in
a future version. Please adapt your code to use either `displot` (a figure
-level function with similar flexibility) or `histplot` (an axes-level fun
ction for histograms).
  warnings.warn(msg, FutureWarning)
```

Out[8]:

```
<AxesSubplot:xlabel='Freedom', ylabel='Density'>
```

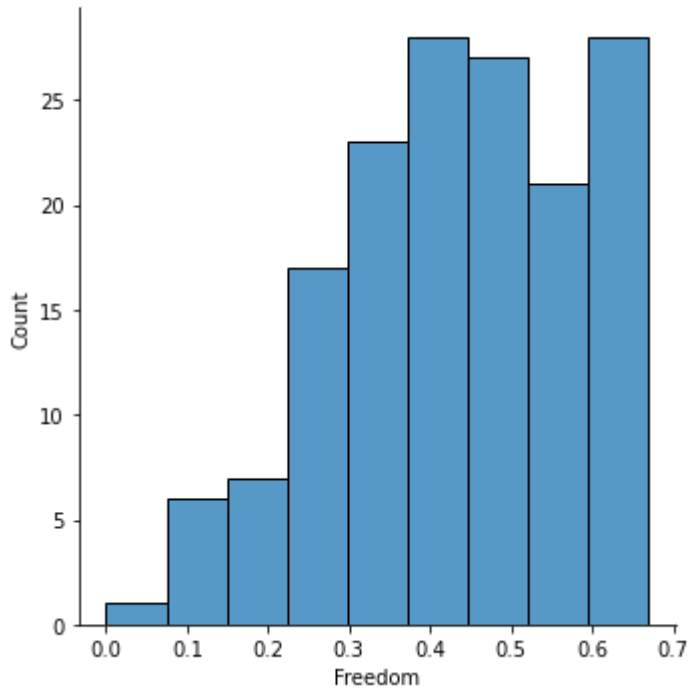


In [9]:

```
sns.displot(df["Freedom"])
```

Out[9]:

```
<seaborn.axisgrid.FacetGrid at 0x2c7071f7460>
```



In [10]:

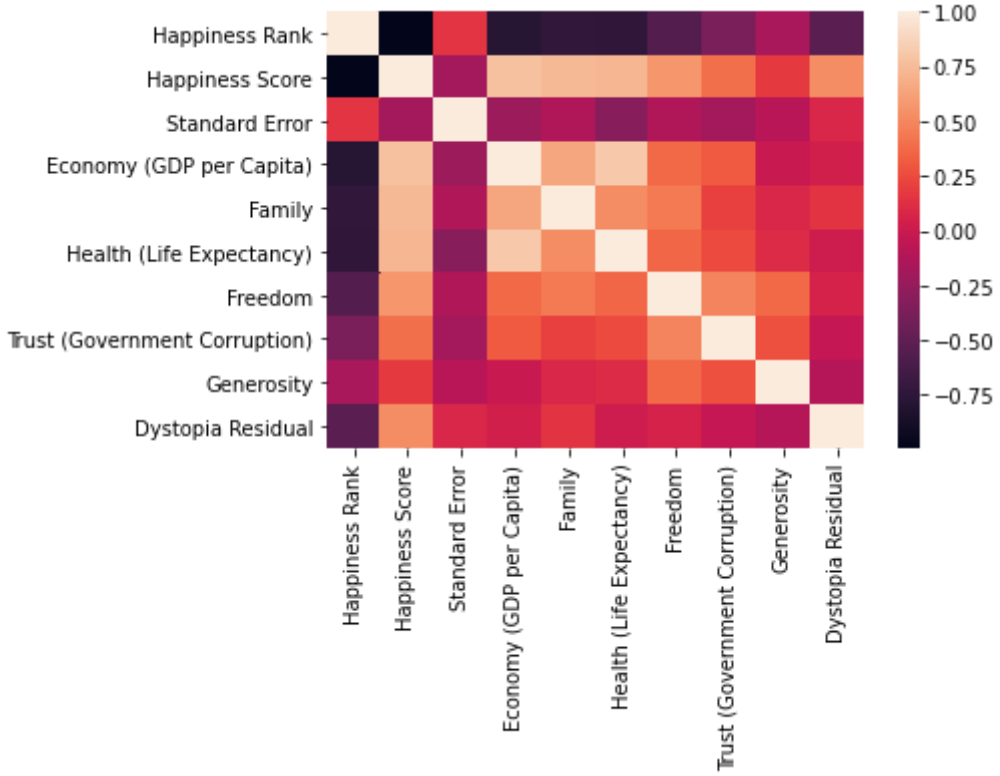
```
df1=df[['Country', 'Region', 'Happiness Rank', 'Happiness Score',
       'Standard Error', 'Economy (GDP per Capita)', 'Family',
       'Health (Life Expectancy)', 'Freedom', 'Trust (Government Corruption)',
       'Generosity', 'Dystopia Residual']]
```

In [11]:

```
sns.heatmap(df1.corr())
```

Out[11]:

<AxesSubplot:>



In [12]:

```
x=df1[[ 'Happiness Rank', 'Happiness Score',
       'Standard Error', 'Economy (GDP per Capita)', 'Family',
       'Health (Life Expectancy)', 'Trust (Government Corruption)',
       'Generosity', 'Dystopia Residual']]
y=df1[['Freedom']]
```

In [13]:

```
from sklearn.model_selection import train_test_split
```

In [14]:

```
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.3)
```

In [15]:

```
from sklearn.linear_model import LinearRegression

lr=LinearRegression()
lr.fit(x_train,y_train)#ValueError: Input contains NaN, infinity or a value too large for
```

Out[15]:

```
LinearRegression()
```

In [16]:

```
print(lr.intercept_)
```

```
[-0.00160156]
```

In [17]:

```
coef= pd.DataFrame(lr.coef_)
coef
```

Out[17]:

	0	1	2	3	4	5	6	7	
0	0.000005	1.000534	0.000027	-1.000402	-1.00028	-1.000254	-1.000323	-1.000317	-1.00038

In [18]:

```
print(lr.score(x_test,y_test))
```

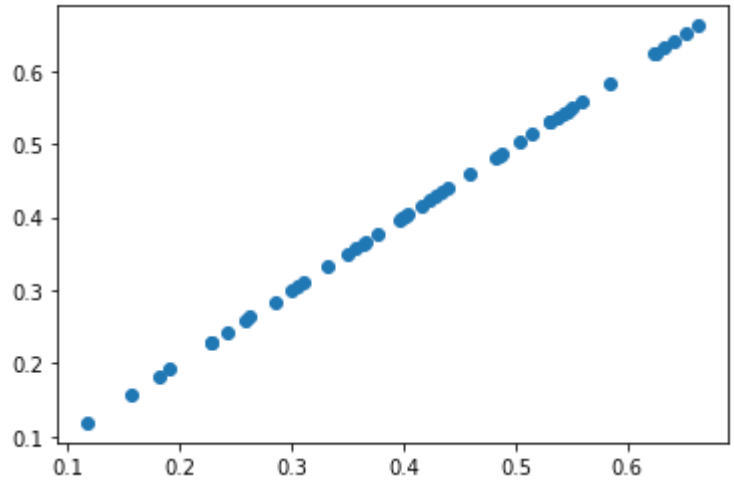
```
0.9999956413301576
```

In [19]:

```
prediction = lr.predict(x_test)
plt.scatter(y_test,prediction)
```

Out[19]:

```
<matplotlib.collections.PathCollection at 0x2c708a531c0>
```



In [20]:

```
lr.score(x_test,y_test)
```

Out[20]:

```
0.9999956413301576
```

In [21]:

```
lr.score(x_train,y_train)
```

Out[21]:

```
0.9999969931495063
```

In [22]:

```
from sklearn.linear_model import Ridge,Lasso
```

In [23]:

```
rr=Ridge(alpha=10)
rr.fit(x_train,y_train)
```

Out[23]:

```
Ridge(alpha=10)
```

In [24]:

```
rr.score(x_test,y_test)
```

Out[24]:

```
0.46175555377527266
```

In [25]:

```
la=Lasso(alpha=10)
la.fit(x_train,y_train)
```

Out[25]:

```
Lasso(alpha=10)
```

In [26]:

```
la.score(x_test,y_test)
```

Out[26]:

```
-0.009243259323250097
```

Elastic Net

In [27]:

```
from sklearn.linear_model import ElasticNet
en = ElasticNet()
en.fit(x_train,y_train)
```

Out[27]:

```
ElasticNet()
```

In [28]:

```
print(en.coef_)
```

```
[-0.00162821  0.         -0.         -0.          0.         -0.
  0.          0.         -0.        ]
```

In [29]:

```
print(en.intercept_)
```

```
[0.56117016]
```

In [30]:

```
prediction=en.predict(x_test)
print(prediction)
```

```
[0.53837527 0.35113155 0.33322128 0.45533675 0.37555465 0.37229823
 0.35927258 0.40649056 0.45696496 0.4146316  0.46347778 0.52209321
 0.32182384 0.48301626 0.37392644 0.42277263 0.51395218 0.38695209
 0.37067003 0.52372141 0.362529   0.4927855  0.50255473 0.30391357
 0.43742648 0.53674706 0.4944137  0.30716998 0.31693922 0.48464446
 0.52534962 0.42114442 0.46184958 0.34624693 0.41788801 0.3902085
 0.5448881  0.55140092 0.30554178 0.41137518 0.53023424 0.50418294
 0.42765725 0.32508025 0.54000348 0.34299052 0.49929832 0.38206747]
```

In [31]:

```
print(en.score(x_test,y_test))
```

```
0.3276251292165341
```

Evaluation Metrics

In [32]:

```
from sklearn import metrics
```

In [33]:

```
print("Mean Absolute Error:",metrics.mean_absolute_error(y_test,prediction))
```

```
Mean Absolute Error: 0.095120969626674
```

In [34]:

```
print("Mean Squared Error:",metrics.mean_squared_error(y_test,prediction))
```

```
Mean Squared Error: 0.013470737654789225
```

In [35]:

```
print("Root Mean Squared Error:",np.sqrt(metrics.mean_squared_error(y_test,prediction)))
```

```
Root Mean Squared Error: 0.11606350698987698
```