In [1]:

```python
##importing csv file
import pandas as pd
df=pd.read_csv('C:/Users/USER/Downloads/world-happiness-report-2021.csv')
print(df.head)
```

```
<bound method NDFrame.head of     Country name  Regional indicator  Ladder score  \
0        Finland      Western Europe         7.842
1        Denmark      Western Europe         7.620
2    Switzerland      Western Europe         7.571
3        Iceland      Western Europe         7.554
4    Netherlands      Western Europe         7.464
..           ...                 ...           ...
144      Lesotho  Sub-Saharan Africa         3.512
145     Botswana  Sub-Saharan Africa         3.467
146       Rwanda  Sub-Saharan Africa         3.415
147     Zimbabwe  Sub-Saharan Africa         3.145
148  Afghanistan          South Asia         2.523

     Standard error of ladder score  upperwhisker  lowerwhisker  \
0                             0.032         7.904         7.780
1                             0.035         7.687         7.552
2                             0.036         7.643         7.500
3                             0.059         7.670         7.438
4                             0.027         7.518         7.410
..                              ...           ...           ...
144                           0.120         3.748         3.276
145                           0.074         3.611         3.322
146                           0.068         3.548         3.282
147                           0.058         3.259         3.030
148                           0.038         2.596         2.449

     Logged GDP per capita  Social support  Healthy life expectancy  \
0                   10.775           0.954                   72.000
1                   10.933           0.954                   72.700
2                   11.117           0.942                   74.400
3                   10.878           0.983                   73.000
4                   10.932           0.942                   72.400
..                     ...             ...                      ...
144                  7.926           0.787                   48.700
145                  9.782           0.784                   59.269
146                  7.676           0.552                   61.400
147                  7.943           0.750                   56.201
148                  7.695           0.463                   52.493

     Freedom to make life choices  Generosity  Perceptions of corruption  \
0                           0.949      -0.098                      0.186
1                           0.946       0.030                      0.179
2                           0.919       0.025                      0.292
3                           0.955       0.160                      0.673
4                           0.913       0.175                      0.338
..                            ...         ...                        ...
144                         0.715      -0.131                      0.915
145                         0.824      -0.246                      0.801
146                         0.897       0.061                      0.167
147                         0.677      -0.047                      0.821
148                         0.382      -0.102                      0.924

     Ladder score in Dystopia  Explained by: Log GDP per capita  \
0                        2.43                             1.446
1                        2.43                             1.502
2                        2.43                             1.566
3                        2.43                             1.482
4                        2.43                             1.501
..                        ...                               ...
144                      2.43                             0.451
145                      2.43                             1.099
146                      2.43                             0.364
147                      2.43                             0.457
148                      2.43                             0.370

     Explained by: Social support  Explained by: Healthy life expectancy  \
0                           1.106                                  0.741
1                           1.108                                  0.763
2                           1.079                                  0.816
3                           1.172                                  0.772
4                           1.079                                  0.753
..                            ...                                    ...
144                         0.731                                  0.007
145                         0.724                                  0.340
146                         0.202                                  0.407
147                         0.649                                  0.243
148                         0.000                                  0.126

     Explained by: Freedom to make life choices  Explained by: Generosity  \
0                                         0.691                     0.124
1                                         0.686                     0.208
2                                         0.653                     0.204
3                                         0.698                     0.293
4                                         0.647                     0.302
..                                          ...                       ...
144                                       0.405                     0.103
145                                       0.539                     0.027
146                                       0.627                     0.227
147                                       0.359                     0.157
148                                       0.000                     0.122

     Explained by: Perceptions of corruption  Dystopia + residual
0                                      0.481                3.253
1                                      0.485                2.868
2                                      0.413                2.839
3                                      0.170                2.967
4                                      0.384                2.798
..                                       ...                  ...
144                                    0.015                1.800
145                                    0.088                0.648
146                                    0.493                1.095
147                                    0.075                1.205
148                                    0.010                1.895

[149 rows x 20 columns]>
```

In [2]:

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

Out[2]:

	Country name	Regional indicator	Ladder score	Standard error of ladder score	upperwhisker	lowerwhisker	Logged GDP per capita	Social support	Healthy life expectancy	Freedom to make life choices	Generosity	Perceptions of corruption	Ladder score in Dystopia	Explained by: Log GDP per capita	Explained by: Social support	Explained by: Healthy life expectancy	Explained by: Freedom to make life choices	Ex Ger
0	Finland	Western Europe	7.842	0.032	7.904	7.780	10.775	0.954	72.0	0.949	-0.098	0.186	2.43	1.446	1.106	0.741	0.691	
1	Denmark	Western Europe	7.620	0.035	7.687	7.552	10.933	0.954	72.7	0.946	0.030	0.179	2.43	1.502	1.108	0.763	0.686	
2	Switzerland	Western Europe	7.571	0.036	7.643	7.500	11.117	0.942	74.4	0.919	0.025	0.292	2.43	1.566	1.079	0.816	0.653	
3	Iceland	Western Europe	7.554	0.059	7.670	7.438	10.878	0.983	73.0	0.955	0.160	0.673	2.43	1.482	1.172	0.772	0.698	
4	Netherlands	Western Europe	7.464	0.027	7.518	7.410	10.932	0.942	72.4	0.913	0.175	0.338	2.43	1.501	1.079	0.753	0.647	
5	Norway	Western Europe	7.392	0.035	7.462	7.323	11.053	0.954	73.3	0.960	0.093	0.270	2.43	1.543	1.108	0.782	0.703	
6	Sweden	Western Europe	7.363	0.036	7.433	7.293	10.867	0.934	72.7	0.945	0.086	0.237	2.43	1.478	1.062	0.763	0.685	
7	Luxembourg	Western Europe	7.324	0.037	7.396	7.252	11.647	0.908	72.6	0.907	-0.034	0.386	2.43	1.751	1.003	0.760	0.639	
8	New Zealand	North America and ANZ	7.277	0.040	7.355	7.198	10.643	0.948	73.4	0.929	0.134	0.242	2.43	1.400	1.094	0.785	0.665	
9	Austria	Western Europe	7.268	0.036	7.337	7.198	10.906	0.934	73.3	0.908	0.042	0.481	2.43	1.492	1.062	0.782	0.640	

In [19]:

```python
x=df[['Social support','Healthy life expectancy','Logged GDP per capita']]
y=df['Ladder score']
```

In [4]:

```python
#sklearn
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.3)
```

In [5]:

```python
x_test
```

Out[5]:

	Social support	Healthy life expectancy	Logged GDP per capita
145	0.784	59.269	9.782
136	0.708	55.809	8.145
58	0.812	67.300	8.648
83	0.811	69.593	9.673
133	0.795	57.161	8.542
124	0.826	62.250	8.485
31	0.915	76.953	11.488
91	0.710	59.802	8.118
121	0.691	67.201	9.266
67	0.823	72.600	10.279
13	0.926	73.800	10.776
19	0.906	72.199	10.823
123	0.818	56.799	9.161
88	0.913	70.600	9.826
120	0.688	60.704	8.361
10	0.940	73.900	10.796
57	0.879	72.600	10.421
49	0.905	66.701	10.008
23	0.898	69.600	10.871
101	0.639	55.008	7.838
135	0.569	54.914	7.362
82	0.636	58.221	8.117
34	0.882	66.601	9.577
131	0.750	61.998	9.367
111	0.776	59.962	9.603
113	0.765	62.000	8.360
138	0.603	60.633	8.755
80	0.817	67.102	10.238
51	0.847	68.001	9.557
16	0.934	72.500	10.707
56	0.898	69.000	9.962
54	0.864	67.657	8.620
147	0.750	56.201	7.943
143	0.537	57.948	6.958
86	0.774	64.233	8.120
65	0.821	68.800	9.313
66	0.893	64.401	8.538
8	0.948	73.400	10.643
85	0.799	67.055	9.487
148	0.463	52.493	7.695
144	0.787	48.700	7.926
87	0.931	67.000	10.016
59	0.924	70.799	10.217
106	0.861	66.700	9.073
6	0.934	72.700	10.867

In [6]:

```python
len(x_test)
```

Out[6]: 45

In [7]:

```python
from sklearn.linear_model import LinearRegression
lin_reg=LinearRegression()
lin_reg.fit(x_train,y_train)
```

Out[7]: LinearRegression()

In [8]:

```python
y_pred=lin_reg.predict(x_test)
```

In [9]:

```python
print(lin_reg.predict([[0.820 ,73.898 ,10.576]]))
```

```
[6.24814531]
```

In [10]:

```python
from sklearn.metrics import r2_score
r2_score(y_test,y_pred)
```

Out[10]: 0.6276045631161803

In [11]:

```python
from sklearn.model_selection import train_test_split
from sklearn import metrics
from sklearn.linear_model import LinearRegression
```

In [12]:

```python
df.dropna
```

Out[12]:

```
<bound method DataFrame.dropna of     Country name  Regional indicator  Ladder score  \
0        Finland      Western Europe         7.842
1        Denmark      Western Europe         7.620
2    Switzerland      Western Europe         7.571
3        Iceland      Western Europe         7.554
4    Netherlands      Western Europe         7.464
..           ...                 ...           ...
144      Lesotho  Sub-Saharan Africa         3.512
145     Botswana  Sub-Saharan Africa         3.467
146       Rwanda  Sub-Saharan Africa         3.415
147     Zimbabwe  Sub-Saharan Africa         3.145
148  Afghanistan          South Asia         2.523

     Standard error of ladder score  upperwhisker  lowerwhisker  \
0                             0.032         7.904         7.780
1                             0.035         7.687         7.552
2                             0.036         7.643         7.500
3                             0.059         7.670         7.438
4                             0.027         7.518         7.410
..                              ...           ...           ...
144                           0.120         3.748         3.276
145                           0.074         3.611         3.322
146                           0.068         3.548         3.282
147                           0.058         3.259         3.030
148                           0.038         2.596         2.449

     Logged GDP per capita  Social support  Healthy life expectancy  \
0                   10.775           0.954                   72.000
1                   10.933           0.954                   72.700
2                   11.117           0.942                   74.400
3                   10.878           0.983                   73.000
4                   10.932           0.942                   72.400
..                     ...             ...                      ...
144                  7.926           0.787                   48.700
145                  9.782           0.784                   59.269
146                  7.676           0.552                   61.400
147                  7.943           0.750                   56.201
148                  7.695           0.463                   52.493

     Freedom to make life choices  Generosity  Perceptions of corruption  \
0                           0.949      -0.098                      0.186
1                           0.946       0.030                      0.179
2                           0.919       0.025                      0.292
3                           0.955       0.160                      0.673
4                           0.913       0.175                      0.338
..                            ...         ...                        ...
144                         0.715      -0.131                      0.915
145                         0.824      -0.246                      0.801
146                         0.897       0.061                      0.167
147                         0.677      -0.047                      0.821
148                         0.382      -0.102                      0.924

     Ladder score in Dystopia  Explained by: Log GDP per capita  \
0                        2.43                             1.446
1                        2.43                             1.502
2                        2.43                             1.566
3                        2.43                             1.482
4                        2.43                             1.501
..                        ...                               ...
144                      2.43                             0.451
145                      2.43                             1.099
146                      2.43                             0.364
147                      2.43                             0.457
148                      2.43                             0.370

     Explained by: Social support  Explained by: Healthy life expectancy  \
0                           1.106                                  0.741
1                           1.108                                  0.763
2                           1.079                                  0.816
3                           1.172                                  0.772
4                           1.079                                  0.753
..                            ...                                    ...
144                         0.731                                  0.007
145                         0.724                                  0.340
146                         0.202                                  0.407
147                         0.649                                  0.243
148                         0.000                                  0.126

     Explained by: Freedom to make life choices  Explained by: Generosity  \
0                                         0.691                     0.124
1                                         0.686                     0.208
2                                         0.653                     0.204
3                                         0.698                     0.293
4                                         0.647                     0.302
..                                          ...                       ...
144                                       0.405                     0.103
145                                       0.539                     0.027
146                                       0.627                     0.227
147                                       0.359                     0.157
148                                       0.000                     0.122

     Explained by: Perceptions of corruption  Dystopia + residual
0                                      0.481                3.253
1                                      0.485                2.868
2                                      0.413                2.839
3                                      0.170                2.967
4                                      0.384                2.798
..                                       ...                  ...
144                                    0.015                1.800
145                                    0.088                0.648
146                                    0.493                1.095
147                                    0.075                1.205
148                                    0.010                1.895

[149 rows x 20 columns]>
```

In [13]:

```python
print(x_test)
```

```
     Social support  Healthy life expectancy  Logged GDP per capita
145           0.784                   59.269                  9.782
136           0.708                   55.809                  8.145
58            0.812                   67.300                  8.648
83            0.811                   69.593                  9.673
133           0.795                   57.161                  8.542
124           0.826                   62.250                  8.485
31            0.915                   76.953                 11.488
91            0.710                   59.802                  8.118
121           0.691                   67.201                  9.266
67            0.823                   72.600                 10.279
13            0.926                   73.800                 10.776
19            0.906                   72.199                 10.823
123           0.818                   56.799                  9.161
88            0.913                   70.600                  9.826
120           0.688                   60.704                  8.361
10            0.940                   73.900                 10.796
57            0.879                   72.600                 10.421
49            0.905                   66.701                 10.008
23            0.898                   69.600                 10.871
101           0.639                   55.008                  7.838
135           0.569                   54.914                  7.362
82            0.636                   58.221                  8.117
34            0.882                   66.601                  9.577
131           0.750                   61.998                  9.367
111           0.776                   59.962                  9.603
113           0.765                   62.000                  8.360
138           0.603                   60.633                  8.755
80            0.817                   67.102                 10.238
51            0.847                   68.001                  9.557
16            0.934                   72.500                 10.707
56            0.898                   69.000                  9.962
54            0.864                   67.657                  8.620
147           0.750                   56.201                  7.943
143           0.537                   57.948                  6.958
86            0.774                   64.233                  8.120
65            0.821                   68.800                  9.313
66            0.893                   64.401                  8.538
8             0.948                   73.400                 10.643
85            0.799                   67.055                  9.487
148           0.463                   52.493                  7.695
144           0.787                   48.700                  7.926
87            0.931                   67.000                 10.016
59            0.924                   70.799                 10.217
106           0.861                   66.700                  9.073
6             0.934                   72.700                 10.867
```

In [14]:

```python
print(y_train)
```

```
4      7.464
141    3.623
3      7.554
98     5.045
70     5.653
       ...
14     7.085
41     6.179
0      7.842
137    3.849
50     6.032
Name: Ladder score, Length: 104, dtype: float64
```

In [15]:

```python
print('Linear Regression:')
print()
reg = LinearRegression()
reg.fit(x_train, y_train)
Y_pred = reg.predict(x_test)
```

```
Linear Regression:
```

In [16]:

```python
import numpy as np
```

In [17]:

```python
print('Accuracy:',reg.score(x_train, y_train)*100)
print('Mean Absolute Error:', metrics.mean_absolute_error(y_test, y_pred))
print('Mean Squared Error:', metrics.mean_squared_error(y_test, y_pred))
print('Root Mean Squared Error:', np.sqrt(metrics.mean_squared_error(y_test, y_pred)))
#sns.scatterplot(Y_pred, Y_test)
```

```
Accuracy: 69.61484679234361
Mean Absolute Error: 0.5858132120044657
Mean Squared Error: 0.49550053270716077
Root Mean Squared Error: 0.7039179872024587
```

In [18]:

```python
from sklearn.ensemble import RandomForestRegressor
print('Random Forest Regressor:')
print()
rfr = RandomForestRegressor()
rfr.fit(x_train,y_train)
Y_pred = rfr.predict(x_test)
print('Accuracy:',rfr.score(x_test, y_test)*100)
print('Mean Absolute Error:', metrics.mean_absolute_error(y_test, y_pred))
print('Mean Squared Error:', metrics.mean_squared_error(y_test, y_pred))
print('Root Mean Squared Error:', np.sqrt(metrics.mean_squared_error(y_test, y_pred)))
```

```
Random Forest Regressor:

Accuracy: 67.54766002249924
Mean Absolute Error: 0.5858132120044657
Mean Squared Error: 0.49550053270716077
Root Mean Squared Error: 0.7039179872024587
```

In [ ]: