

Importing libraries

```
In [1]: import pandas as pd
import numpy as np
from numpy import linalg as la
from numpy import cov
```

Importing dataset

```
In [2]: data=pd.read_csv(r"C:\Users\user\Downloads\VE.CSV.csv")
data
```

Out[2]:

	Country	Region	Happiness Rank	Happiness Score	Standard Error	Economy (GDP per Capita)	Family	Health (Life Expectancy)	Freedom
0	Switzerland	Western Europe	1	7.587	0.03411	1.39651	1.34951	0.94143	0.66557
1	Iceland	Western Europe	2	7.561	0.04884	1.30232	1.40223	0.94784	0.62877
2	Denmark	Western Europe	3	7.527	0.03328	1.32548	1.36058	0.87464	0.64938
3	Norway	Western Europe	4	7.522	0.03880	1.45900	1.33095	0.88521	0.66973
4	Canada	North America	5	7.427	0.03553	1.32629	1.32261	0.90563	0.63297
...
153	Rwanda	Sub-Saharan Africa	154	3.465	0.03464	0.22208	0.77370	0.42864	0.59201
154	Benin	Sub-Saharan Africa	155	3.340	0.03656	0.28665	0.35386	0.31910	0.48450
155	Syria	Middle East and Northern Africa	156	3.006	0.05015	0.66320	0.47489	0.72193	0.15684
156	Burundi	Sub-Saharan Africa	157	2.905	0.08658	0.01530	0.41587	0.22396	0.11850
157	Togo	Sub-Saharan Africa	158	2.839	0.06727	0.20868	0.13995	0.28443	0.36453

158 rows × 12 columns

a.mean

In [3]:

```
print(data.mean())
```

Happiness Rank	79.493671
Happiness Score	5.375734
Standard Error	0.047885
Economy (GDP per Capita)	0.846137
Family	0.991046
Health (Life Expectancy)	0.630259
Freedom	0.428615
Trust (Government Corruption)	0.143422
Generosity	0.237296
Dystopia Residual	2.098977
dtype: float64	

median

In [4]:

```
print(data.median())
```

Happiness Rank	79.500000
Happiness Score	5.232500
Standard Error	0.043940
Economy (GDP per Capita)	0.910245
Family	1.029510
Health (Life Expectancy)	0.696705
Freedom	0.435515
Trust (Government Corruption)	0.107220
Generosity	0.216130
Dystopia Residual	2.095415
dtype: float64	

mode

In [5]:

```
print(data.mode())
```

	Country	Region	Happiness Rank	Happiness Score	\
0	Afghanistan	Sub-Saharan Africa	82.0	5.192	
1	Albania		NaN	NaN	
2	Algeria		NaN	NaN	
3	Angola		NaN	NaN	
4	Argentina		NaN	NaN	
..
153	Venezuela		NaN	NaN	
154	Vietnam		NaN	NaN	
155	Yemen		NaN	NaN	
156	Zambia		NaN	NaN	
157	Zimbabwe		NaN	NaN	
	Standard Error	Economy (GDP per Capita)	Family	\	
0	0.03751	0.00000	0.00000		
1	0.03780	0.01530	0.13995		

2	0.04394	0.01604	0.30285
3	0.04934	0.06940	0.35386
4	0.05051	0.07120	0.38174
..
153	NaN	1.45900	1.34043
154	NaN	1.52186	1.34951
155	NaN	1.55422	1.36058
156	NaN	1.56391	1.36948
157	NaN	1.69042	1.40223
 Health (Life Expectancy) Freedom Trust (Government Corruption) \			
0	0.92356	0.00000	0.32524
1	NaN	0.07699	NaN
2	NaN	0.09245	NaN
3	NaN	0.10081	NaN
4	NaN	0.10384	NaN
..
153	NaN	0.65821	NaN
154	NaN	0.65980	NaN
155	NaN	0.66246	NaN
156	NaN	0.66557	NaN
157	NaN	0.66973	NaN
 Generosity Dystopia Residual			
0	0.00000	0.32858	
1	0.00199	0.65429	
2	0.02641	0.67042	
3	0.05444	0.67108	
4	0.05547	0.89991	
..	
153	0.51535	3.10712	
154	0.51752	3.17728	
155	0.51912	3.19131	
156	0.57630	3.26001	
157	0.79588	3.60214	

[158 rows x 12 columns]

describe

In [6]:

```
print(data.describe())
```

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

```

          Freedom Trust (Government Corruption) Generosity \
count    158.000000           158.000000  158.000000
mean     0.428615            0.143422   0.237296
std      0.150693            0.120034   0.126685
min     0.000000             0.000000   0.000000
25%    0.328330             0.061675   0.150553
50%    0.435515             0.107220   0.216130
75%    0.549092             0.180255   0.309883
max     0.669730             0.551910   0.795880

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```

          Dystopia Residual
count    158.000000
mean     2.098977
std      0.553550
min     0.328580
25%    1.759410
50%    2.095415
75%    2.462415
max     3.602140

```

b.sum()

In [7]: `print(data.sum())`

	Country	Iceland	Denmark	Norway	Canada	Finland	Ne...
Region	Western Europe	West...					
Happiness Rank							12560
Happiness Score							849.366
Standard Error							7.56579
Economy (GDP per Capita)							133.68968
Family							156.58526
Health (Life Expectancy)							99.58098
Freedom							67.72116
Trust (Government Corruption)							22.66065
Generosity							37.49269
Dystopia Residual							331.63833
dtype: object							

cumsum()

In [8]: `print(data.cumsum())`

	Country	\					
0	Switzerland						
1	Switzerland	Iceland					
2	Switzerland	Iceland	Denmark				
3	Switzerland	Iceland	Denmark	Norway			
4	Switzerland	Iceland	Denmark	Norway	Canada		
..					...		
153	Switzerland	Iceland	Denmark	Norway	Canada	Finland	Ne...
154	Switzerland	Iceland	Denmark	Norway	Canada	Finland	Ne...
155	Switzerland	Iceland	Denmark	Norway	Canada	Finland	Ne...
156	Switzerland	Iceland	Denmark	Norway	Canada	Finland	Ne...
157	Switzerland	Iceland	Denmark	Norway	Canada	Finland	Ne...

	Region	Happiness Rank	\	
0	Western Europe	1		
1	Western Europe	Western Europe	3	
2	Western Europe	Western Europe	Western Europe	6

3	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe
4	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe
..											
153	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe
154	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe
155	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe
156	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe
157	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe	Western Europe
	Happiness Score	Standard Error	Economy (GDP per Capita)	Family \							
0	7.587	0.03411	1.39651	1.34951							
1	15.148	0.08295	2.69883	2.75174							
2	22.675	0.11623	4.02431	4.11232							
3	30.197	0.15503	5.48331	5.44327							
4	37.624	0.19056	6.80960	6.76588							
..							
153	837.276	7.32523	132.51585	155.20069							
154	840.616	7.36179	132.80250	155.55455							
155	843.622	7.41194	133.46570	156.02944							
156	846.527	7.49852	133.48100	156.44531							
157	849.366	7.56579	133.68968	156.58526							
	Health (Life Expectancy)	Freedom	Trust (Government Corruption)	\							
0	0.94143	0.66557	0.41978								
1	1.88927	1.29434	0.56123								
2	2.76391	1.94372	1.04480								
3	3.64912	2.61345	1.40983								
4	4.55475	3.24642	1.73940								
..								
153	98.03156	66.59679	22.18356								
154	98.35066	67.08129	22.26366								
155	99.07259	67.23813	22.45272								
156	99.29655	67.35663	22.55334								
157	99.58098	67.72116	22.66065								
	Generosity	Dystopia Residual									
0	0.29678	2.51738									
1	0.73308	5.21939									
2	1.07447	7.71143									
3	1.42146	10.17674									
4	1.87957	12.62850									
..									
153	36.47422	326.27619									
154	36.65682	327.90947									
155	37.12861	328.23805									
156	37.32588	330.07107									
157	37.49269	331.63833									

[158 rows x 12 columns]

count

In [9]:

```
print(data.count())
```

Country	158
Region	158
Happiness Rank	158
Happiness Score	158
Standard Error	158
Economy (GDP per Capita)	158
Family	158
Health (Life Expectancy)	158

```
Freedom          158
Trust (Government Corruption) 158
Generosity       158
Dystopia Residual 158
dtype: int64
```

min

In [10]: `print(data.min())`

Country	Afghanistan
Region	Australia and New Zealand
Happiness Rank	1
Happiness Score	2.839
Standard Error	0.01848
Economy (GDP per Capita)	0.0
Family	0.0
Health (Life Expectancy)	0.0
Freedom	0.0
Trust (Government Corruption)	0.0
Generosity	0.0
Dystopia Residual	0.32858
dtype: object	

max()

In [11]: `print(data.max())`

Country	Zimbabwe
Region	Western Europe
Happiness Rank	158
Happiness Score	7.587
Standard Error	0.13693
Economy (GDP per Capita)	1.69042
Family	1.40223
Health (Life Expectancy)	1.02525
Freedom	0.66973
Trust (Government Corruption)	0.55191
Generosity	0.79588
Dystopia Residual	3.60214
dtype: object	

covariance

In [12]: `print(data.cov())`

	Happiness Rank	Happiness Score	\
Happiness Rank	2093.461743	-51.975613	
Happiness Score	-51.975613	1.311048	
Standard Error	0.124358	-0.003480	
Economy (GDP per Capita)	-14.483883	0.360476	
Family	-9.142720	0.230969	
Health (Life Expectancy)	-8.316021	0.204881	
Freedom	-3.839647	0.098042	
Trust (Government Corruption)	-2.044785	0.054316	
Generosity	-0.928243	0.026156	

Dystopia Residual	-13.220847	0.336225	
Happiness Rank	0.124358	-14.483883	\
Happiness Score	-0.003480	0.360476	
Standard Error	0.000294	-0.001504	
Economy (GDP per Capita)	-0.001504	0.162506	
Family	-0.000564	0.070852	
Health (Life Expectancy)	-0.001315	0.081323	
Freedom	-0.000335	0.022495	
Trust (Government Corruption)	-0.000367	0.014898	
Generosity	-0.000192	-0.000534	
Dystopia Residual	0.000797	0.008939	
	Family	Health (Life Expectancy)	Freedom \
Happiness Rank	-9.142720	-8.316021	-3.839647
Happiness Score	0.230969	0.204881	0.098042
Standard Error	-0.000564	-0.001315	-0.000335
Economy (GDP per Capita)	0.070852	0.081323	0.022495
Family	0.074185	0.035741	0.018122
Health (Life Expectancy)	0.035741	0.061047	0.013422
Freedom	0.018122	0.013422	0.022708
Trust (Government Corruption)	0.006722	0.007365	0.008927
Generosity	0.003020	0.003391	0.007138
Dystopia Residual	0.022332	0.002596	0.005237
	Trust (Government Corruption)	Generosity \	
Happiness Rank	-2.044785	-0.928243	
Happiness Score	0.054316	0.026156	
Standard Error	-0.000367	-0.000192	
Economy (GDP per Capita)	0.014898	-0.000534	
Family	0.006722	0.003020	
Health (Life Expectancy)	0.007365	0.003391	
Freedom	0.008927	0.007138	
Trust (Government Corruption)	0.014408	0.004199	
Generosity	0.004199	0.016049	
Dystopia Residual	-0.002200	-0.007104	
	Dystopia Residual		
Happiness Rank	-13.220847		
Happiness Score	0.336225		
Standard Error	0.000797		
Economy (GDP per Capita)	0.008939		
Family	0.022332		
Health (Life Expectancy)	0.002596		
Freedom	0.005237		
Trust (Government Corruption)	-0.002200		
Generosity	-0.007104		
Dystopia Residual	0.306417		

corelation

pearson corelation

In [14]:

```
from scipy.stats import pearsonr
print(pearsonr(data["Family"], data["Happiness Rank"]))

(-0.7336435317250533, 5.779193515088411e-28)
```

spearmen corelation

In [15]:

```
from scipy.stats import spearmanr  
print(spearmanr(data["Family"], data["Happiness Rank"]))
```

```
SpearmanResult(correlation=-0.7700379625427318, pvalue=2.938484452112375e-32)
```