COIMBATORE INSTITUTE OF TECHNOLOGY

1. EXPLORATORY DATA ANALYSIS ON THE GIVEN DATA SETS (COUNTRY-WISE-AVERAGE.CSV AND MALNUTRITION-ESTIMATES.CSV)

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AIM:

To perform exploratory data analysis without using built-in packages and to visualize the results.

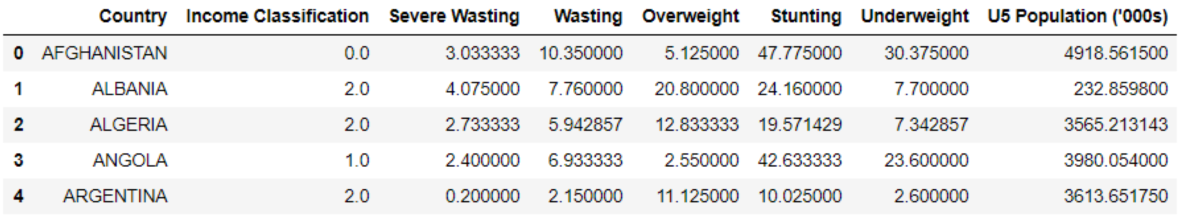
DESCRIPTION:

The given data(**country-wise-average.csv and malnutrition-estimates.csv**) involves many missing values. Also some of the data are not in usable format. For that the types of the data to be changed(column). After changing types, missing values should be filled with appropriate values such that, for categorical values we should choose mode, for numerical data mean should be used(not skewed). After filling missing values we have to determine the summary statistics for the given data to get an overview about the data. For that each and every function (mean, median, mode, quartiles(25%), quartile(75%)) should be written in scratch. After performing all the above steps finally the results should be visualized.

CODE:

```
#importing basic packages to load file
import numpy as np
import pandas as pd
import seaborn as sns

#load data
df_country = pd.read_csv(r'C:/Users/THANGAVEL/Desktop/country-wise-average.csv')
df_mal = pd.read_csv(r'C:/Users/THANGAVEL/Desktop/malnutrition-estimates.csv')


df_country.head()
```

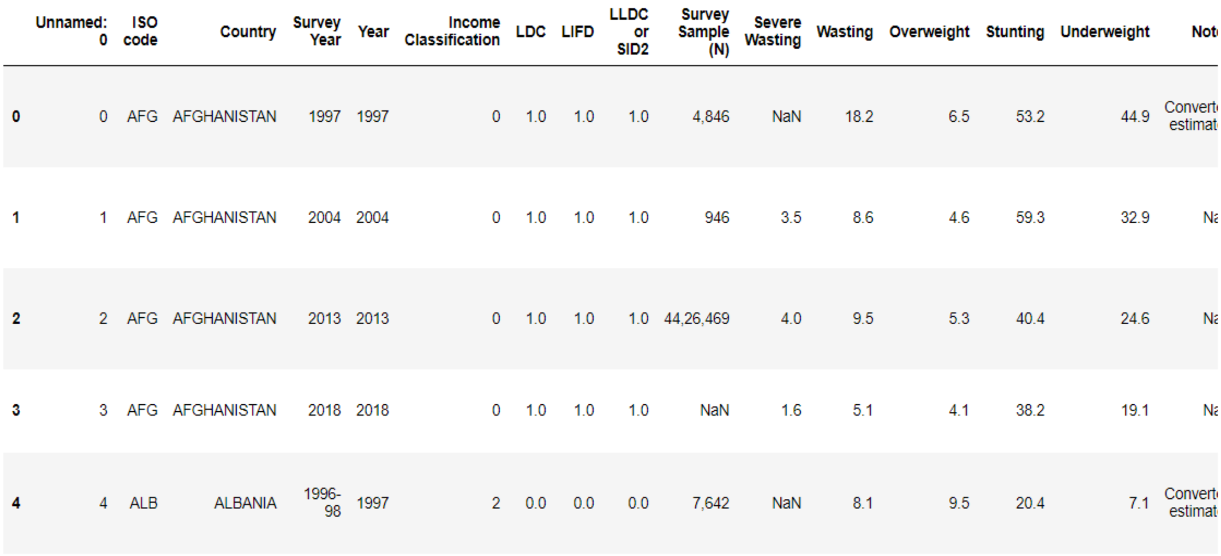
OUTPUT:



	Country	Income Classification	Severe Wasting	Wasting	Overweight	Stunting	Underweight	U5 Population ('000s)
0	AFGHANISTAN	0.0	3.033333	10.350000	5.125000	47.775000	30.375000	4918.561500
1	ALBANIA	2.0	4.075000	7.760000	20.800000	24.160000	7.700000	232.859800
2	ALGERIA	2.0	2.733333	5.942857	12.833333	19.571429	7.342857	3565.213143
3	ANGOLA	1.0	2.400000	6.933333	2.550000	42.633333	23.600000	3980.054000
4	ARGENTINA	2.0	0.200000	2.150000	11.125000	10.025000	2.600000	3613.651750

df_mal.head()

OUTPUT:



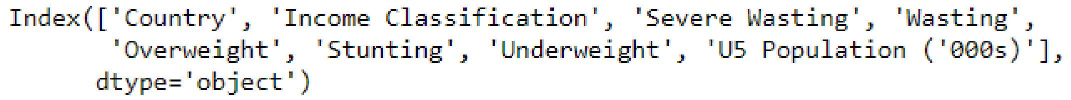
	Unnamed: 0	ISO code	Country	Survey Year	Year	Income Classification	LDC	LIFD	LLDC or SID2	Survey Sample (N)	Severe Wasting	Wasting	Overweight	Stunting	Underweight	Not
0	0	AFG	AFGHANISTAN	1997	1997	0	1.0	1.0	1.0	4,846	NaN	18.2	6.5	53.2	44.9	Convert estimat
1	1	AFG	AFGHANISTAN	2004	2004	0	1.0	1.0	1.0	946	3.5	8.6	4.6	59.3	32.9	Na
2	2	AFG	AFGHANISTAN	2013	2013	0	1.0	1.0	1.0	44,26,469	4.0	9.5	5.3	40.4	24.6	Na
3	3	AFG	AFGHANISTAN	2018	2018	0	1.0	1.0	1.0	NaN	1.6	5.1	4.1	38.2	19.1	Na
4	4	ALB	ALBANIA	1996-98	1997	2	0.0	0.0	0.0	7,642	NaN	8.1	9.5	20.4	7.1	Convert estimat

#EXPLORATORY DATA ANALYSIS

#columns

df_country.columns

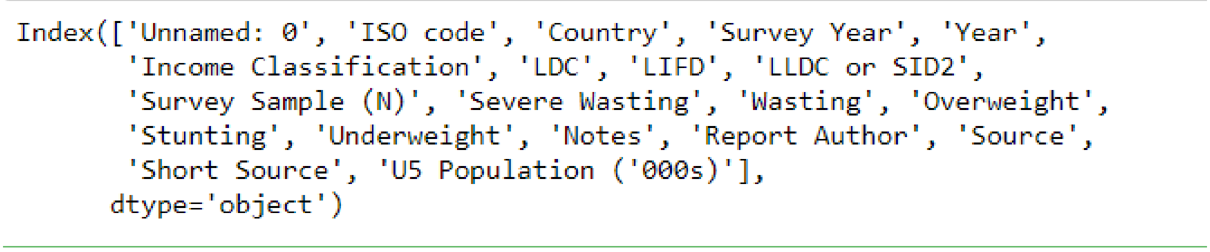
OUTPUT :



```
Index(['Country', 'Income Classification', 'Severe Wasting', 'Wasting',
       'Overweight', 'Stunting', 'Underweight', 'U5 Population ('000s)'],
      dtype='object')
```

df_mal.columns

OUTPUT:



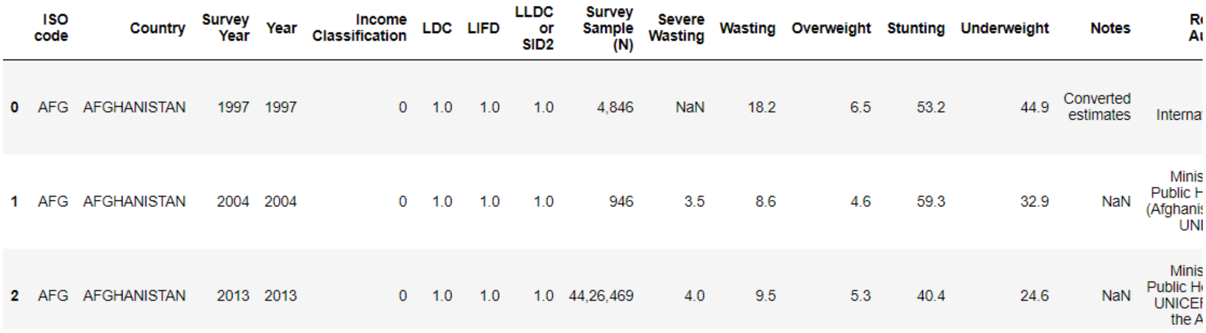
```
Index(['Unnamed: 0', 'ISO code', 'Country', 'Survey Year', 'Year',
       'Income Classification', 'LDC', 'LIFD', 'LLDC or SID2',
       'Survey Sample (N)', 'Severe Wasting', 'Wasting', 'Overweight',
       'Stunting', 'Underweight', 'Notes', 'Report Author', 'Source',
       'Short Source', 'U5 Population ('000s)'],
      dtype='object')
```

#removing first colums

df_mal = df_mal.iloc[:,1:]

df_mal.head()

OUTPUT:

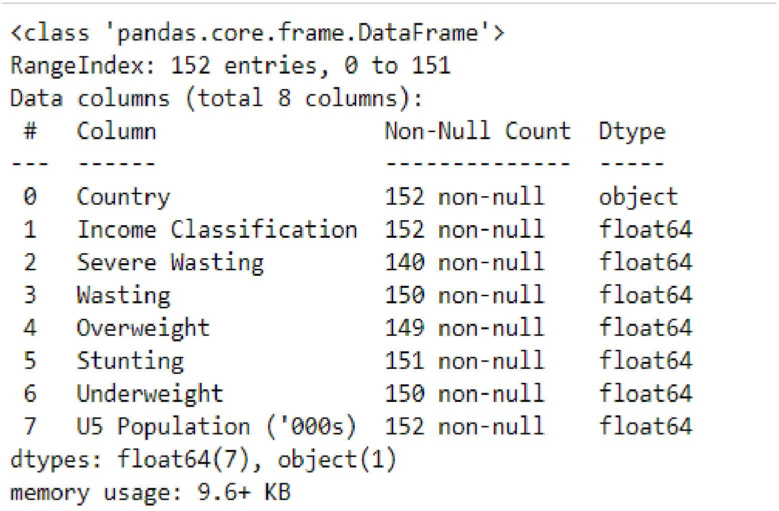


	ISO code	Country	Survey Year	Year	Income Classification	LDC	LIFD	LLDC or SID2	Survey Sample (N)	Severe Wasting	Wasting	Overweight	Stunting	Underweight	Notes	Re Au
0	AFG	AFGHANISTAN	1997	1997	0	1.0	1.0	1.0	4,846	NaN	18.2	6.5	53.2	44.9	Converted estimates	Interna
1	AFG	AFGHANISTAN	2004	2004	0	1.0	1.0	1.0	946	3.5	8.6	4.6	59.3	32.9	NaN	Minis Public H (Afghanis UNI
2	AFG	AFGHANISTAN	2013	2013	0	1.0	1.0	1.0	44,26,469	4.0	9.5	5.3	40.4	24.6	NaN	Minis Public H UNICEF the A

#country_average info

df_country.info()

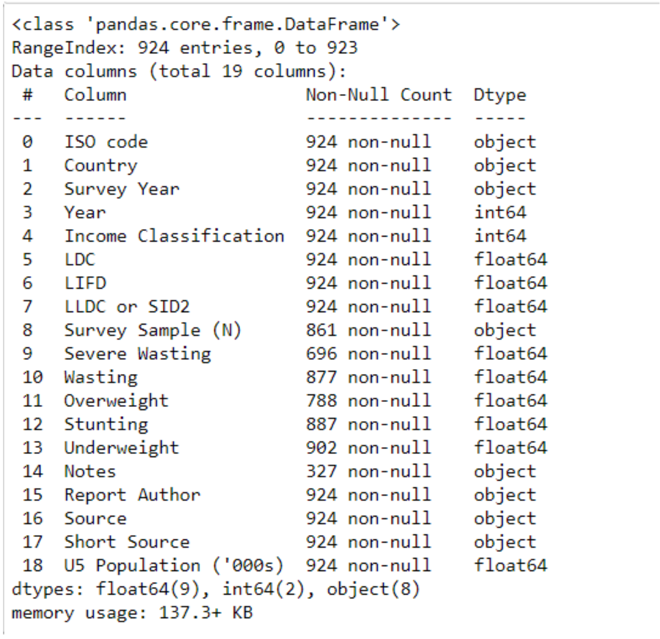
OUTPUT:



```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 152 entries, 0 to 151
Data columns (total 8 columns):
 #   Column                 Non-Null Count  Dtype  
---  ------                 --------------  -----  
 0   Country                152 non-null    object 
 1   Income Classification  152 non-null    float64
 2   Severe Wasting         140 non-null    float64
 3   Wasting                150 non-null    float64
 4   Overweight             149 non-null    float64
 5   Stunting               151 non-null    float64
 6   Underweight            150 non-null    float64
 7   U5 Population ('000s)  152 non-null    float64
dtypes: float64(7), object(1)
memory usage: 9.6+ KB
```

df_mal.info()

OUTPUT:



```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 924 entries, 0 to 923
Data columns (total 19 columns):
 #   Column                 Non-Null Count  Dtype  
---  ------                 --------------  -----  
 0   ISO code               924 non-null    object 
 1   Country                924 non-null    object 
 2   Survey Year            924 non-null    object 
 3   Year                   924 non-null    int64  
 4   Income Classification  924 non-null    int64  
 5   LDC                    924 non-null    float64
 6   LIFD                   924 non-null    float64
 7   LLDC or SID2           924 non-null    float64
 8   Survey Sample (N)      861 non-null    object 
 9   Severe Wasting         696 non-null    float64
 10  Wasting                877 non-null    float64
 11  Overweight             788 non-null    float64
 12  Stunting               887 non-null    float64
 13  Underweight            902 non-null    float64
 14  Notes                  327 non-null    object 
 15  Report Author          924 non-null    object 
 16  Source                 924 non-null    object 
 17  Short Source           924 non-null    object 
 18  U5 Population ('000s)  924 non-null    float64
dtypes: float64(9), int64(2), object(8)
memory usage: 137.3+ KB
```

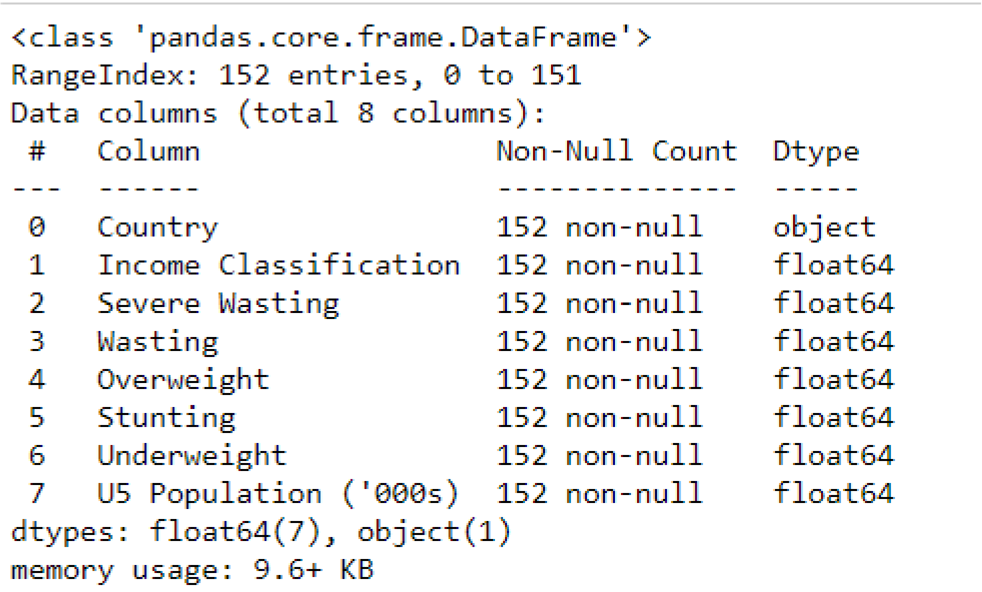
#mean,median,mode functions for EDA

```
def find_mean(df,x):
   s = 0
   for i in df:
      s+=i
   print("MEAN of %s : %.3f"%(x,(s/len(df))))


def find_stdev(df,x):
   s = 0
   for i in df:
      s+=i
   m = s/len(df)
   total = 0
   for i in df:
      total = total+((i-m)**2)
```

```
    res = (total/len(df))**(1/2)
    print("STDEV of %s : %.3f"%(x,res))


def find_median(df,x):
    df1 = df.sort_values(ascending = True)
    mid = (len(df)+1)//2
    print("MEDIAN of %s : %d"%(x,df1[mid]))


def find_mode(df,x):
    dic = {}
    for i in df:
        if i not in dic:
            dic[i] = 1
        else:
            dic[i] += 1
    res = max(dic.values())
    print("MODE of %s : %d"%(x,res))


def find_quart(df,x,pos):
    df1 = df.sort_values(ascending = True)
    qar = pos*((len(df)+1)//4)
    print("QUARTILE of %s : %d"%(x,df1[qar]))


#filling missing values in country averages(df_country)
for i in df_country.columns:
    if type(df_country[i][0]) == np.float64:
        df_country[i]=df_country[i].fillna(df_country[i].mean())
```

df_country.info()

OUTPUT:



```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 152 entries, 0 to 151
Data columns (total 8 columns):
 #   Column                 Non-Null Count  Dtype  
---  ------                 --------------  -----  
 0   Country                152 non-null    object 
 1   Income Classification  152 non-null    float64
 2   Severe Wasting         152 non-null    float64
 3   Wasting                152 non-null    float64
 4   Overweight             152 non-null    float64
 5   Stunting               152 non-null    float64
 6   Underweight            152 non-null    float64
 7   U5 Population ('000s)  152 non-null    float64
dtypes: float64(7), object(1)
memory usage: 9.6+ KB
```

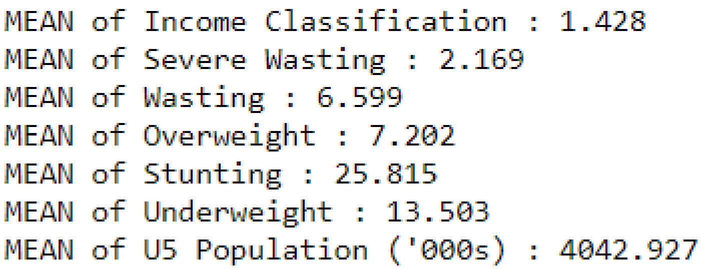
#filling missing values in malnutrition (df_mal)

df_mal = df_mal.fillna(df_mal.mean())

#finding mean for all possible rows(int and float) on country_average

```
for i in df_country.columns:
    if type(df_country[i][0]) == np.float64:
        find_mean(df_country[i],i)
```

OUTPUT:

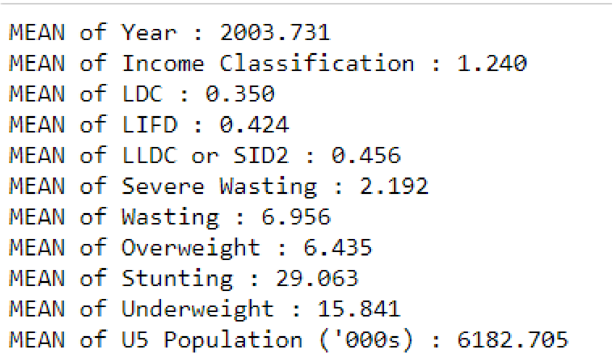


```
MEAN of Income Classification : 1.428
MEAN of Severe Wasting : 2.169
MEAN of Wasting : 6.599
MEAN of Overweight : 7.202
MEAN of Stunting : 25.815
MEAN of Underweight : 13.503
MEAN of U5 Population ('000s) : 4042.927
```

#finding mean for all possible rows(int and float) in malnutrition

```
for i in df_mal.columns:
    if (type(df_mal[i][1]) == np.float64) or (type(df_mal[i][1]) == np.int64):
        find_mean(df_mal[i],i)
```

OUTPUT:

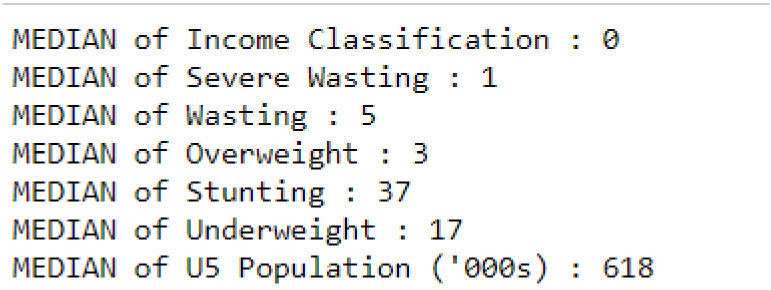


```
MEAN of Year : 2003.731
MEAN of Income Classification : 1.240
MEAN of LDC : 0.350
MEAN of LIFD : 0.424
MEAN of LLDC or SID2 : 0.456
MEAN of Severe Wasting : 2.192
MEAN of Wasting : 6.956
MEAN of Overweight : 6.435
MEAN of Stunting : 29.063
MEAN of Underweight : 15.841
MEAN of U5 Population ('000s) : 6182.705
```

#finding median for all possible rows(int and float) on country_average

```
for i in df_country.columns:
    if type(df_country[i][0]) == np.float64:
        find_median(df_country[i],i)
```

OUTPUT:

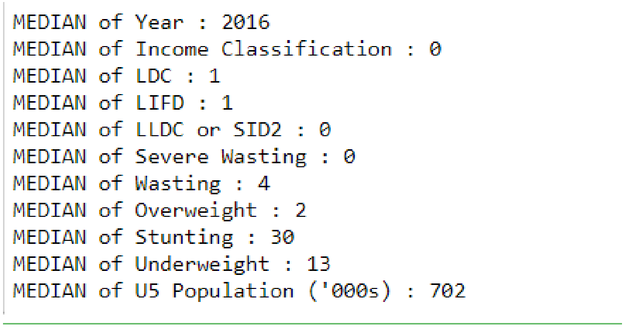


```
MEDIAN of Income Classification : 0
MEDIAN of Severe Wasting : 1
MEDIAN of Wasting : 5
MEDIAN of Overweight : 3
MEDIAN of Stunting : 37
MEDIAN of Underweight : 17
MEDIAN of U5 Population ('000s) : 618
```

#finding median for all possible rows(int and float) in malnutrition

```
for i in df_mal.columns:
    if (type(df_mal[i][1]) == np.float64) or (type(df_mal[i][1]) == np.int64):
        find_median(df_mal[i],i)
```

OUPUT:

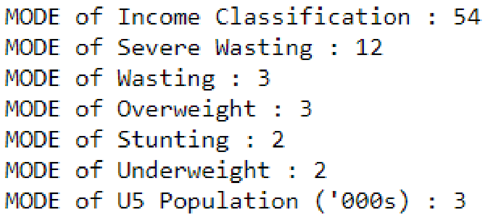


```
MEDIAN of Year : 2016
MEDIAN of Income Classification : 0
MEDIAN of LDC : 1
MEDIAN of LIFD : 1
MEDIAN of LLDC or SID2 : 0
MEDIAN of Severe Wasting : 0
MEDIAN of Wasting : 4
MEDIAN of Overweight : 2
MEDIAN of Stunting : 30
MEDIAN of Underweight : 13
MEDIAN of U5 Population ('000s) : 702
```

#finding mean for all possible rows(int and float) on country_average

```
for i in df_country.columns:
    if type(df_country[i][0]) == np.float64:
        find_mode(df_country[i],i)
```

OUTPUT:

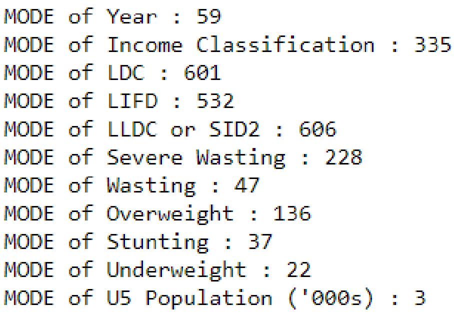


```
MODE of Income Classification : 54
MODE of Severe Wasting : 12
MODE of Wasting : 3
MODE of Overweight : 3
MODE of Stunting : 2
MODE of Underweight : 2
MODE of U5 Population ('000s) : 3
```

#finding mode for all possible rows(int and float) in malnutrition

```
for i in df_mal.columns:
    if (type(df_mal[i][1]) == np.float64) or (type(df_mal[i][1]) == np.int64):
        find_mode(df_mal[i],i)
```

OUTPUT:

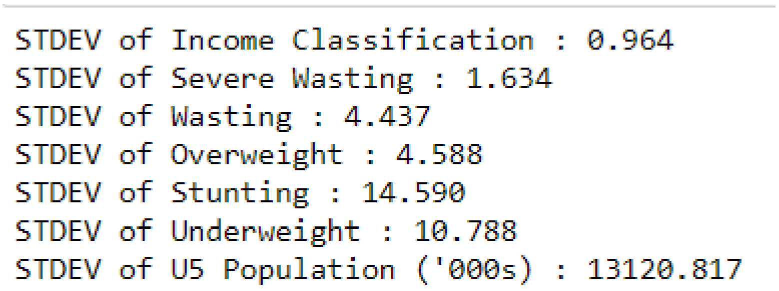


```
MODE of Year : 59
MODE of Income Classification : 335
MODE of LDC : 601
MODE of LIFD : 532
MODE of LLDC or SID2 : 606
MODE of Severe Wasting : 228
MODE of Wasting : 47
MODE of Overweight : 136
MODE of Stunting : 37
MODE of Underweight : 22
MODE of U5 Population ('000s) : 3
```

#finding standard deviation for all possible rows(int and float) on country_average

```
for i in df_country.columns:
    if type(df_country[i][0]) == np.float64:
        find_stdev(df_country[i],i)
```

OUTPUT:

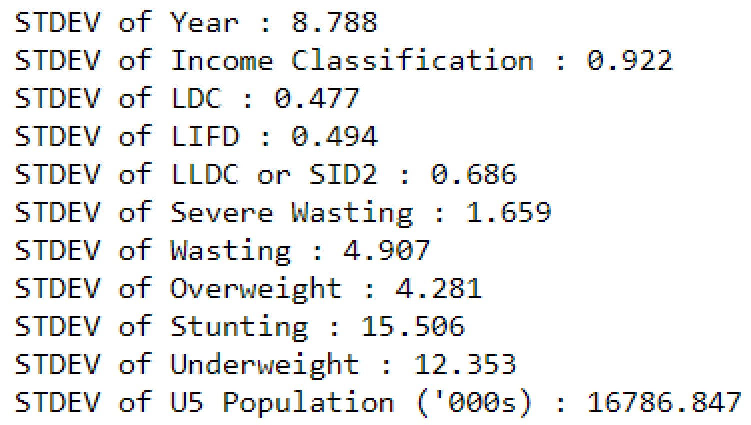


```
STDEV of Income Classification : 0.964
STDEV of Severe Wasting : 1.634
STDEV of Wasting : 4.437
STDEV of Overweight : 4.588
STDEV of Stunting : 14.590
STDEV of Underweight : 10.788
STDEV of U5 Population ('000s) : 13120.817
```

#finding standard deviation for all possible rows(int and float) in malnutrition

```
for i in df_mal.columns:
    if (type(df_mal[i][1]) == np.float64) or (type(df_mal[i][1]) == np.int64):
        find_stdev(df_mal[i],i)
```

OUTPUT:

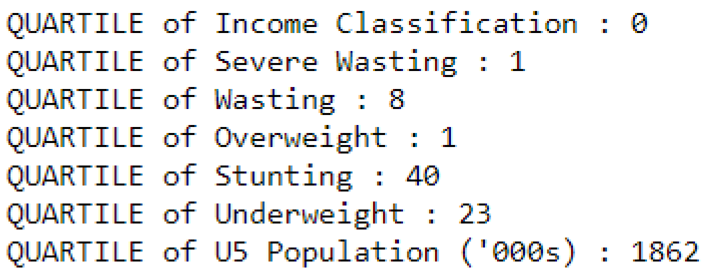


```
STDEV of Year : 8.788
STDEV of Income Classification : 0.922
STDEV of LDC : 0.477
STDEV of LIFD : 0.494
STDEV of LLDC or SID2 : 0.686
STDEV of Severe Wasting : 1.659
STDEV of Wasting : 4.907
STDEV of Overweight : 4.281
STDEV of Stunting : 15.506
STDEV of Underweight : 12.353
STDEV of U5 Population ('000s) : 16786.847
```

#finding 1st quartile(75%) for all possible rows(int and float) on country_average

```
for i in df_country.columns:
    if type(df_country[i][0]) == np.float64:
        find_quart(df_country[i],i,1)
```

OUTPUT:

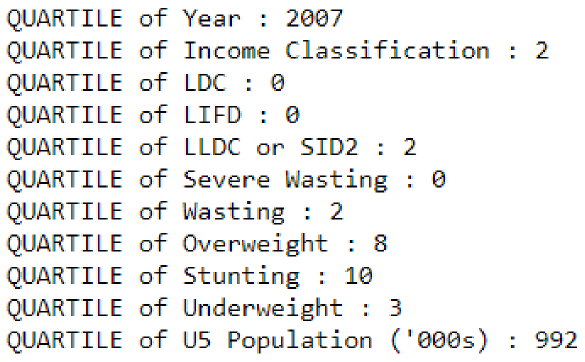


```
QUARTILE of Income Classification : 0
QUARTILE of Severe Wasting : 1
QUARTILE of Wasting : 8
QUARTILE of Overweight : 1
QUARTILE of Stunting : 40
QUARTILE of Underweight : 23
QUARTILE of U5 Population ('000s) : 1862
```

#finding 1st quartile(75%) for all possible rows(int and float) in malnutrition

```
for i in df_mal.columns:
    if (type(df_mal[i][1]) == np.float64) or (type(df_mal[i][1]) == np.int64):
        find_quart(df_mal[i],i,1)
```

OUTPUT:

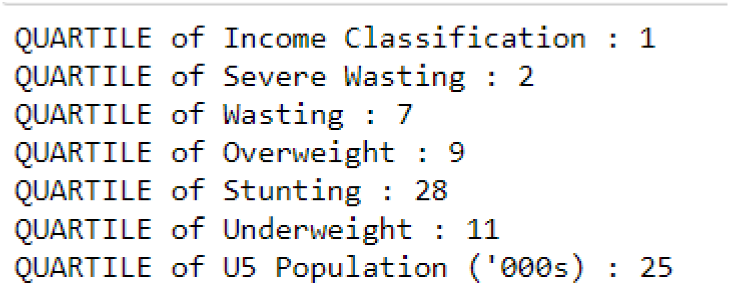


```
QUARTILE of Year : 2007
QUARTILE of Income Classification : 2
QUARTILE of LDC : 0
QUARTILE of LIFD : 0
QUARTILE of LLDC or SID2 : 2
QUARTILE of Severe Wasting : 0
QUARTILE of Wasting : 2
QUARTILE of Overweight : 8
QUARTILE of Stunting : 10
QUARTILE of Underweight : 3
QUARTILE of U5 Population ('000s) : 992
```

#finding 1st quartile(25%) for all possible rows(int and float) on country_average

```
for i in df_country.columns:
    if type(df_country[i][0]) == np.float64:
        find_quart(df_country[i],i,3)
```

OUTPUT:

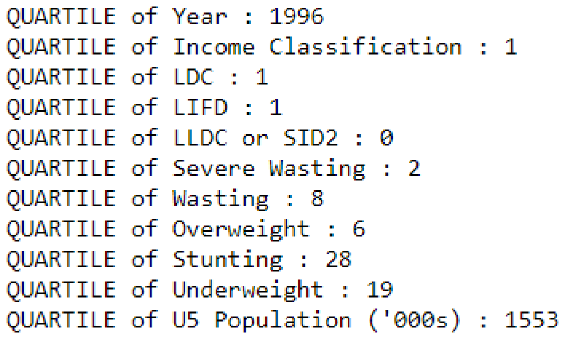


```
QUARTILE of Income Classification : 1
QUARTILE of Severe Wasting : 2
QUARTILE of Wasting : 7
QUARTILE of Overweight : 9
QUARTILE of Stunting : 28
QUARTILE of Underweight : 11
QUARTILE of U5 Population ('000s) : 25
```

#finding 1st quartile(25%) for all possible rows(int and float) in malnutrition

```
for i in df_mal.columns:
    if (type(df_mal[i][1]) == np.float64) or (type(df_mal[i][1]) == np.int64):
        find_quart(df_mal[i],i,3)
```

OUTPUT:



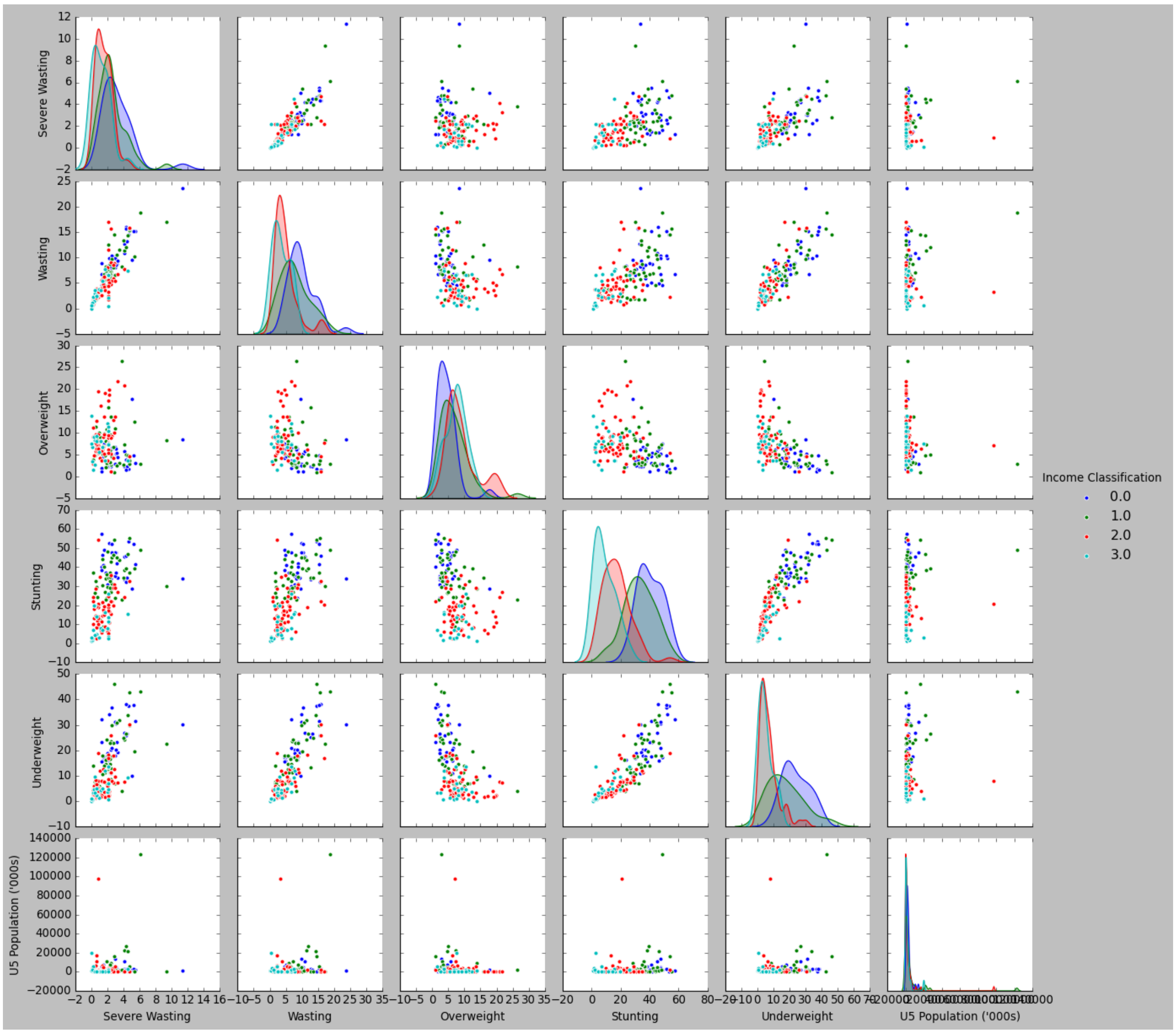
```
QUARTILE of Year : 1996
QUARTILE of Income Classification : 1
QUARTILE of LDC : 1
QUARTILE of LIFD : 1
QUARTILE of LLDC or SID2 : 0
QUARTILE of Severe Wasting : 2
QUARTILE of Wasting : 8
QUARTILE of Overweight : 6
QUARTILE of Stunting : 28
QUARTILE of Underweight : 19
QUARTILE of U5 Population ('000s) : 1553
```

#VISUALIZATION

#pairplot for country Income Classification

```
sns.pairplot(df_country, hue='Income Classification');
```

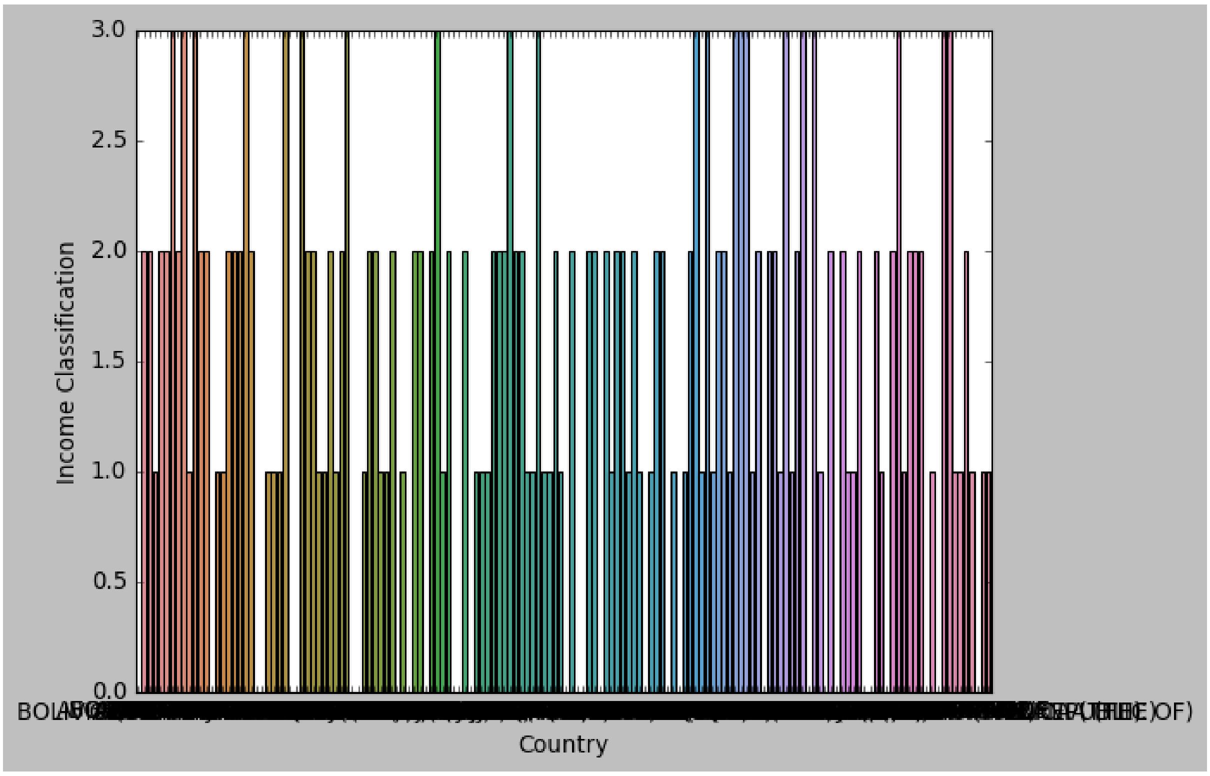
OUTPUT:



#bar plot

```
ax = sns.barplot(x="Country", y="Income Classification", data=df_country)
```

OUTPUT:


Income Classification
Country