

```
from google.colab import files
```

```
uploaded = files.upload()
```

Choose Files gdp.csv

- **gdp.csv**(n/a) - 43656 bytes, last modified: 12/8/2020 - 100% done

Saving gdp.csv to gdp.csv

```
import numpy as np
import pandas as pd
```

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

```
import io
```

```
df = pd.read_csv(io.BytesIO(uploaded['gdp.csv']))
```

```
print(df)
```

v	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	1961	4.45	NaN	46.2	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
2	1962	4.88	NaN	19.8	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
3	1963	9.17	NaN	24.7	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
4	1964	8.89	NaN	25.1	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
5	1965	11.30	NaN	22.6	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
6	1966	8.57	NaN	26.0	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
7	1967	6.77	NaN	23.4	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
8	1968	8.90	NaN	23.1	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
9	1969	10.10	NaN	23.8	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
10	1970	9.78	NaN	22.1	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
11	1971	10.90	NaN	18.4	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
12	1972	14.80	NaN	20.4	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
13	1973	12.90	NaN	25.5	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
14	1974	14.00	NaN	38.7	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
15	1975	12.70	NaN	33.7	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	22.8	NaN							
16	1976	13.20	NaN	33.1	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	22.0	NaN							
17	1977	11.70	NaN	30.6	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	21.4	NaN							
18	1978	10.80	NaN	25.5	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	22.0	NaN							
19	1979	NaN	NaN	31.1	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	21.8	NaN							
20	1980	NaN	23.10	34.3	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	23.4	NaN							
21	1981	NaN	23.00	34.6	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	19.4	NaN							
22	1982	NaN	19.40	30.9	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	16.9	NaN							
23	1983	NaN	18.20	27.9	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	16.4	NaN							
24	1984	NaN	17.40	25.7	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	20.6	NaN							
25	1985	NaN	16.20	23.6	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	22.2	NaN							
26	1986	NaN	15.10	12.9	...	6.62	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	24.0	NaN							
27	1987	NaN	15.50	14.3	...	6.00	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	24.0	NaN							
28	1988	NaN	16.40	15.5	...	3.95	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	23.7	NaN							
29	1989	NaN	17.90	18.6	...	23.80	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	23.3	NaN							
30	1990	NaN	14.90	23.4	...	36.00	12.20	NaN	22.9	NaN																					
31	1991	NaN	7.22	29.1	...	30.90	11.00	NaN	23.9	NaN																					

32	1992	NaN	11.50	25.3	...	34.70	10.40	NaN	27.2
33	1993	NaN	15.40	21.8	...	28.70	12.60	NaN	30.7
34	1994	NaN	11.40	22.5	...	34.00	12.50	33.0	34.6
35	1995	NaN	12.50	26.2	...	32.80	22.40	32.9	38.2
36	1996	NaN	11.20	29.8	...	40.90	38.50	28.5	36.1
37	1997	NaN	9.75	30.9	...	43.10	36.30	27.4	37.6
38	1998	NaN	10.80	22.6	...	44.80	26.50	24.6	43.4
39	1999	NaN	15.80	28.2	...	50.00	34.80	25.0	37.4
40	2000	NaN	17.90	42.1	...	53.90	41.40	23.9	38.2
41	2001	NaN	18.40	36.7	...	55.10	35.90	25.1	35.0
42	2002	32.40	19.60	35.5	...	54.70	37.00	27.1	31.8
43	2003	43.60	20.40	38.2	...	56.70	36.40	25.7	32.4
44	2004	34.00	22.00	40.1	...	59.70	36.40	33.5	34.5
45	2005	27.40	22.80	47.2	...	63.70	40.90	30.6	33.5
46	2006	26.50	24.90	48.8	...	67.70	41.30	32.6	36.0
47	2007	17.80	28.10	47.1	...	70.50	35.90	33.6	37.8
48	2008	18.00	25.30	48.0	...	70.30	37.80	28.9	41.5
49	2009	14.70	25.20	35.4	...	62.60	28.30	29.3	21.8
50	2010	10.00	28.00	38.4	...	72.00	30.00	37.0	35.2
51	2011	6.11	29.20	38.8	...	79.40	30.30	40.5	40.6
52	2012	5.52	28.90	36.9	...	80.00	24.90	40.1	30.2
53	2013	6.31	28.90	33.2	...	83.60	22.40	40.5	27.2
54	2014	6.57	28.20	30.2	...	86.40	21.50	38.8	25.7
55	2015	7.00	27.30	23.2	...	89.80	10.90	37.1	23.5
56	2016	6.90	28.90	21.0	...	93.60	3.58	35.3	24.7
57	2017	NaN	31.50	24.0	...	102.00	NaN	35.2	24.1

[58 rows x 186 columns]

Since, this is a GDP data set with null values make sure that the null value isn't filled by zero. Since, a country's GDP can't be zero. If filled with zero and the analysis is done, wrong interpretation will be produced.

```
df.isna().sum()
```

Year	0
Afghanistan	24
Albania	20
Algeria	0
Angola	31
..	
Venezuela	3
Vietnam	26
Yemen	31
Zambia	34
Zimbabwe	15

Length: 186, dtype: int64

```
df['Afghanistan']=df['Afghanistan'].fillna(0)
df['Albania']=df['Albania'].fillna(0)
df['Algeria']=df['Algeria'].fillna(0)
df['Angola']=df['Angola'].fillna(0)
df['Antigua and Barbuda']=df['Antigua and Barbuda'].fillna(0)
```

```
df['Argentina']=df['Argentina'].fillna(0)
df['Armenia']=df['Armenia'].fillna(0)
df['Australia']=df['Australia'].fillna(0)
df['Austria']=df['Austria'].fillna(0)
df['Azerbaijan']=df['Azerbaijan'].fillna(0)
df['Bahamas']=df['Bahamas'].fillna(0)
df['Bahrain']=df['Bahrain'].fillna(0)
df['Bangladesh']=df['Bangladesh'].fillna(0)
df['Barbados']=df['Barbados'].fillna(0)
df['Belarus']=df['Belarus'].fillna(0)
df['Belgium']=df['Belgium'].fillna(0)
df['Belize']=df['Belize'].fillna(0)
df['Benin']=df['Benin'].fillna(0)
df['Bhutan']=df['Bhutan'].fillna(0)
df['Bolivia']=df['Bolivia'].fillna(0)
df['Bosnia and Herzegovina']=df['Bosnia and Herzegovina'].fillna(0)
df['Botswana']=df['Botswana'].fillna(0)
df['Brazil']=df['Brazil'].fillna(0)
df['Brunei']=df['Brunei'].fillna(0)
df['Bulgaria']=df['Bulgaria'].fillna(0)
df['Burkina Faso']=df['Burkina Faso'].fillna(0)
df['Burundi']=df['Burundi'].fillna(0)
df['Cambodia']=df['Cambodia'].fillna(0)
df['Cameroon']=df['Cameroon'].fillna(0)
df['Canada']=df['Canada'].fillna(0)
df['Cape Verde']=df['Cape Verde'].fillna(0)
df['Central African Republic']=df['Central African Republic'].fillna(0)
df['Chad']=df['Chad'].fillna(0)
df['Chile']=df['Chile'].fillna(0)
df['Colombia']=df['Colombia'].fillna(0)
df['Comoros']=df['Comoros'].fillna(0)
df['Congo, Dem. Rep.']=df['Congo, Dem. Rep.'].fillna(0)
df['Congo, Rep.']=df['Congo, Rep.'].fillna(0)
df['Costa Rica']=df['Costa Rica'].fillna(0)
df['Cote d'Ivoire']=df['Cote d'Ivoire'].fillna(0)
df['Croatia']=df['Croatia'].fillna(0)
df['Cuba']=df['Cuba'].fillna(0)
df['Cyprus']=df['Cyprus'].fillna(0)
df['Czech Republic']=df['Czech Republic'].fillna(0)
df['Denmark']=df['Denmark'].fillna(0)
df['Djibouti']=df['Djibouti'].fillna(0)
df['Dominica']=df['Dominica'].fillna(0)
df['Dominican Republic']=df['Dominican Republic'].fillna(0)
df['Ecuador']=df['Ecuador'].fillna(0)
df['Egypt']=df['Egypt'].fillna(0)
df['El Salvador']=df['El Salvador'].fillna(0)
df['Equatorial Guinea']=df['Equatorial Guinea'].fillna(0)
df['Eritrea']=df['Eritrea'].fillna(0)
df['Estonia']=df['Estonia'].fillna(0)
df['Ethiopia']=df['Ethiopia'].fillna(0)
df['Fiji']=df['Fiji'].fillna(0)
df['Finland']=df['Finland'].fillna(0)
```

```
df['France']=df['France'].fillna(0)
df['Gabon']=df['Gabon'].fillna(0)
df['Gambia']=df['Gambia'].fillna(0)
df['Georgia']=df['Georgia'].fillna(0)
df['Germany']=df['Germany'].fillna(0)
df['Germany']=df['Germany'].fillna(0)
df['Ghana']=df['Ghana'].fillna(0)
df['Greece']=df['Greece'].fillna(0)
df['Grenada']=df['Grenada'].fillna(0)
df['Guatemala']=df['Guatemala'].fillna(0)
df['Guinea']=df['Guinea'].fillna(0)
df['Guinea-Bissau']=df['Guinea-Bissau'].fillna(0)
df['Guyana']=df['Guyana'].fillna(0)
df['Haiti']=df['Haiti'].fillna(0)
df['Honduras']=df['Honduras'].fillna(0)
df['Hungary']=df['Hungary'].fillna(0)
df['Iceland']=df['Iceland'].fillna(0)
df['India']=df['India'].fillna(0)
df['Indonesia']=df['Indonesia'].fillna(0)
df['Iran']=df['Iran'].fillna(0)
df['Iraq']=df['Iraq'].fillna(0)
df['Ireland']=df['Ireland'].fillna(0)
df['Israel']=df['Israel'].fillna(0)
df['Italy']=df['Italy'].fillna(0)
df['Jamaica']=df['Jamaica'].fillna(0)
df['Japan']=df['Japan'].fillna(0)
df['Jordan']=df['Jordan'].fillna(0)
df['Kazakhstan']=df['Kazakhstan'].fillna(0)
df['Kenya']=df['Kenya'].fillna(0)
df['Kiribati']=df['Kiribati'].fillna(0)
df['Kuwait']=df['Kuwait'].fillna(0)
df['Kyrgyz Republic']=df['Kyrgyz Republic'].fillna(0)
df['Lao']=df['Lao'].fillna(0)
df['Latvia']=df['Latvia'].fillna(0)
df['Lebanon']=df['Lebanon'].fillna(0)
df['Lesotho']=df['Lesotho'].fillna(0)
df['Liberia']=df['Liberia'].fillna(0)
df['Libya']=df['Libya'].fillna(0)
df['Lithuania']=df['Lithuania'].fillna(0)
df['Luxembourg']=df['Luxembourg'].fillna(0)
df['Macedonia, FYR']=df['Macedonia, FYR'].fillna(0)
df['Madagascar']=df['Madagascar'].fillna(0)
df['Malawi']=df['Malawi'].fillna(0)
df['Malaysia']=df['Malaysia'].fillna(0)
df['Maldives']=df['Maldives'].fillna(0)
df['Mali']=df['Mali'].fillna(0)
df['Malta']=df['Malta'].fillna(0)
df['Marshall Islands']=df['Marshall Islands'].fillna(0)
df['Mauritania']=df['Mauritania'].fillna(0)
df['Mauritius']=df['Mauritius'].fillna(0)
df['Mexico']=df['Mexico'].fillna(0)
```

```
df['Micronesia']=df['Micronesia'].fillna(0)
df['Moldova']=df['Moldova'].fillna(0)
df['Mongolia']=df['Mongolia'].fillna(0)
df['Montenegro']=df['Montenegro'].fillna(0)
df['Morocco']=df['Morocco'].fillna(0)
df['Mozambique']=df['Mozambique'].fillna(0)
df['Myanmar']=df['Myanmar'].fillna(0)
df['Namibia']=df['Namibia'].fillna(0)
df['Nauru']=df['Nauru'].fillna(0)
df['Nepal']=df['Nepal'].fillna(0)
df['Netherlands']=df['Netherlands'].fillna(0)
df['New Zealand']=df['New Zealand'].fillna(0)
df['Nicaragua']=df['Nicaragua'].fillna(0)
df['Niger']=df['Niger'].fillna(0)
df['Nigeria']=df['Nigeria'].fillna(0)
df['Niger']=df['Niger'].fillna(0)
df['Norway']=df['Norway'].fillna(0)
df['Oman']=df['Oman'].fillna(0)
df['Pakistan']=df['Pakistan'].fillna(0)
df['Palau']=df['Palau'].fillna(0)
df['Palestine']=df['Palestine'].fillna(0)
df['Panama']=df['Panama'].fillna(0)
df['Papua New Guinea']=df['Papua New Guinea'].fillna(0)
df['Paraguay']=df['Paraguay'].fillna(0)
df['Peru']=df['Peru'].fillna(0)
df['Philippines']=df['Philippines'].fillna(0)
df['Poland']=df['Poland'].fillna(0)
df['Portugal']=df['Portugal'].fillna(0)
df['Romania']=df['Romania'].fillna(0)
df['Russia']=df['Russia'].fillna(0)
df['Rwanda']=df['Rwanda'].fillna(0)
df['Samoa']=df['Samoa'].fillna(0)
df['Saudi Arabia']=df['Saudi Arabia'].fillna(0)
df['Senegal']=df['Senegal'].fillna(0)
df['Serbia']=df['Serbia'].fillna(0)
df['Seychelles']=df['Seychelles'].fillna(0)
df['Sierra Leone']=df['Sierra Leone'].fillna(0)
df['Singapore']=df['Singapore'].fillna(0)
df['Slovak Republic']=df['Slovak Republic'].fillna(0)
df['Slovenia']=df['Slovenia'].fillna(0)
df['Solomon Islands']=df['Solomon Islands'].fillna(0)
df['Somalia']=df['Somalia'].fillna(0)
df['South Africa']=df['South Africa'].fillna(0)
df['South Korea']=df['South Korea'].fillna(0)
df['South Sudan']=df['South Sudan'].fillna(0)
df['Spain']=df['Spain'].fillna(0)
df['Sri Lanka']=df['Sri Lanka'].fillna(0)
df['St. Vincent and the Grenadines']=df['St. Vincent and the Grenadines'].fillna(0)
df['St. Kitts and Nevis']=df['St. Kitts and Nevis'].fillna(0)
df['Sudan']=df['Sudan'].fillna(0)
df['Suriname']=df['Suriname'].fillna(0)
df['Swaziland']=df['Swaziland'].fillna(0)
```

```
df['Sweden']=df['St. Kitts and Nevis'].fillna(0)
df['Switzerland']=df['Switzerland'].fillna(0)
df['Syria']=df['Syria'].fillna(0)
df['Tajikistan']=df['Tajikistan'].fillna(0)
df['Tanzania']=df['Tanzania'].fillna(0)
df['Thailand']=df['Thailand'].fillna(0)
df['Timor-Leste']=df['Timor-Leste'].fillna(0)
df['Togo']=df['Togo'].fillna(0)
df['Tonga']=df['Tonga'].fillna(0)
df['Tunisia']=df['Tunisia'].fillna(0)
df['Turkey']=df['Turkey'].fillna(0)
df['Turkmenistan']=df['Turkmenistan'].fillna(0)
df['Uganda']=df['Uganda'].fillna(0)
df['Ukraine']=df['Ukraine'].fillna(0)
df['United Arab Emirates']=df['United Arab Emirates'].fillna(0)
df['United Kingdom']=df['United Kingdom'].fillna(0)
df['United States']=df['United States'].fillna(0)
df['Uruguay']=df['Uruguay'].fillna(0)
df['Uzbekistan']=df['Uzbekistan'].fillna(0)
df['Vanuatu']=df['Vanuatu'].fillna(0)
df['Venezuela']=df['Venezuela'].fillna(0)
df['Vietnam']=df['Vietnam'].fillna(0)
df['Yemen']=df['Yemen'].fillna(0)
df['Zambia']=df['Zambia'].fillna(0)
df['Zimbabwe']=df['Zimbabwe'].fillna(0)
```

```
r=pd.to_datetime(df.Year, format='%Y')
```

```
r
```

```
0    1960-01-01
1    1961-01-01
2    1962-01-01
3    1963-01-01
4    1964-01-01
5    1965-01-01
6    1966-01-01
7    1967-01-01
8    1968-01-01
9    1969-01-01
10   1970-01-01
11   1971-01-01
12   1972-01-01
13   1973-01-01
14   1974-01-01
15   1975-01-01
16   1976-01-01
17   1977-01-01
18   1978-01-01
19   1979-01-01
20   1980-01-01
21   1981-01-01
22   1982-01-01
```

```
23 1983-01-01
24 1984-01-01
25 1985-01-01
26 1986-01-01
27 1987-01-01
28 1988-01-01
29 1989-01-01
30 1990-01-01
31 1991-01-01
32 1992-01-01
33 1993-01-01
34 1994-01-01
35 1995-01-01
36 1996-01-01
37 1997-01-01
38 1998-01-01
39 1999-01-01
40 2000-01-01
41 2001-01-01
42 2002-01-01
43 2003-01-01
44 2004-01-01
45 2005-01-01
46 2006-01-01
47 2007-01-01
48 2008-01-01
49 2009-01-01
50 2010-01-01
51 2011-01-01
52 2012-01-01
53 2013-01-01
54 2014-01-01
55 2015-01-01
56 2016-01-01
57 2017-01-01
```

```
Name: Year, dtype: datetime64[ns]
```

```
pivot = df.pivot_table(index=[r], values=['Afghanistan'], aggfunc=[np.median], fill_value=0, margins=True)
```

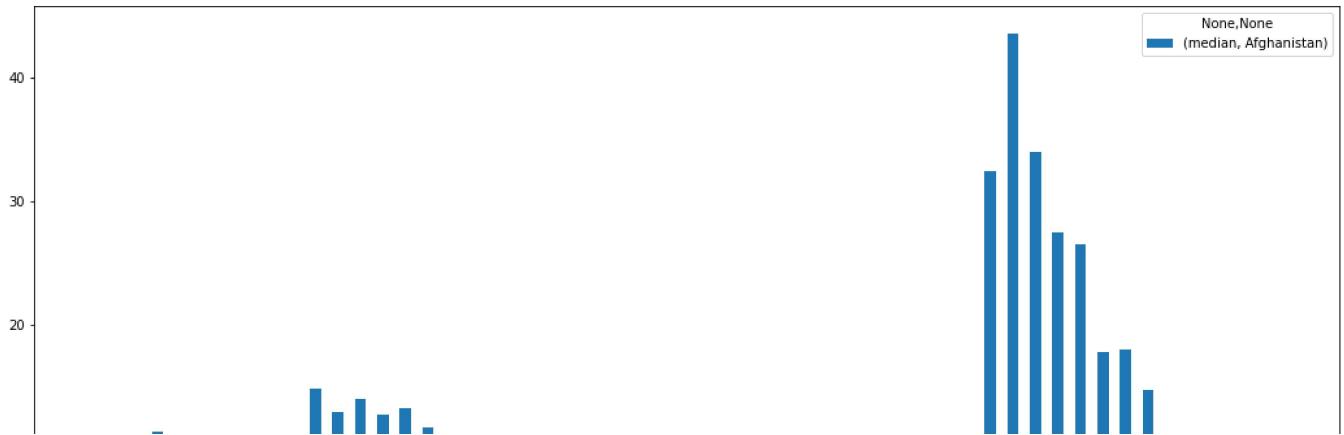
```
pivot
```

1960-01-01	4.13
1961-01-01	4.45
1962-01-01	4.88
1963-01-01	9.17
1964-01-01	8.89
1965-01-01	11.30
1966-01-01	8.57
1967-01-01	6.77
1968-01-01	8.90
1969-01-01	10.10
1970-01-01	9.78
1971-01-01	10.90
1972-01-01	14.80
1973-01-01	12.90
1974-01-01	14.00
1975-01-01	12.70
1976-01-01	13.20
1977-01-01	11.70
1978-01-01	10.80
1979-01-01	0.00
1980-01-01	0.00
1981-01-01	0.00
1982-01-01	0.00
1983-01-01	0.00
1984-01-01	0.00
1985-01-01	0.00
1986-01-01	0.00
1987-01-01	0.00
1988-01-01	0.00
1989-01-01	0.00
1990-01-01	0.00
1991-01-01	0.00

```
1992-01-01      0.00
1993-01-01      0.00
1994-01-01      0.00
1995-01-01      0.00
1996-01-01      0.00
1997-01-01      0.00
1998-01-01      0.00
1999-01-01      0.00
2000-01-01      0.00
2001-01-01      0.00
2002-01-01      32.40
2003-01-01      43.60
2004-01-01      34.00
2005-01-01      27.40
2006-01-01      26.50
2007-01-01      17.80
2008-01-01      18.00
2009-01-01      14.70
```

```
pivot.plot(kind='bar')
```

<matplotlib.axes._subplots.AxesSubplot at 0x7f7af1e6f320>



The above graph is misleading. Because, for particular years GDP is found to be none! which is impossible. So, such an analyze can be misinterpreted. Thus, fill the null values with Median.

```
v _____
```

```
df['Afghanistan']=df['Afghanistan'].fillna(df.median)
df['Albania']=df['Albania'].fillna(df.median)
df['Algeria']=df['Algeria'].fillna(df.median)
df['Angola']=df['Angola'].fillna(df.median)
df['Antigua and Barbuda']=df['Antigua and Barbuda'].fillna(df.median)
df['Argentina']=df['Argentina'].fillna(df.median)
df['Armenia']=df['Armenia'].fillna(df.median)
df['Australia']=df['Australia'].fillna(df.median)
df['Austria']=df['Austria'].fillna(df.median)
df['Azerbaijan']=df['Azerbaijan'].fillna(df.median)
df['Bahamas']=df['Bahamas'].fillna(df.median)
df['Bahrain']=df['Bahrain'].fillna(df.median)
df['Bangladesh']=df['Bangladesh'].fillna(df.median)
df['Barbados']=df['Barbados'].fillna(df.median)
df['Belarus']=df['Belarus'].fillna(df.median)
df['Belgium']=df['Belgium'].fillna(df.median)
df['Belize']=df['Belize'].fillna(df.median)
df['Benin']=df['Benin'].fillna(df.median)
df['Bhutan']=df['Bhutan'].fillna(df.median)
df['Bolivia']=df['Bolivia'].fillna(df.median)
df['Bosnia and Herzegovina']=df['Bosnia and Herzegovina'].fillna(df.median)
df['Botswana']=df['Botswana'].fillna(df.median)
df['Brazil']=df['Brazil'].fillna(df.median)
df['Brunei']=df['Brunei'].fillna(df.median)
df['Bulgaria']=df['Bulgaria'].fillna(df.median)
df['Burkina Faso']=df['Burkina Faso'].fillna(df.median)
df['Burundi']=df['Burundi'].fillna(df.median)
df['Cambodia']=df['Cambodia'].fillna(df.median)
df['Cameroon']=df['Cameroon'].fillna(df.median)
df['Canada']=df['Canada'].fillna(df.median)
df['Cape Verde']=df['Cape Verde'].fillna(df.median)
df['Central African Republic']=df['Central African Republic'].fillna(df.median)
df['Chad']=df['Chad'].fillna(df.median)
df['Chile']=df['Chile'].fillna(df.median)
```

```
df['Colombia']=df['Colombia'].fillna(df.median)
df['Comoros']=df['Comoros'].fillna(df.median)
df['Congo, Dem. Rep.']=df['Congo, Dem. Rep.'].fillna(df.median)
df['Congo, Rep.']=df['Congo, Rep.'].fillna(df.median)
df['Costa Rica']=df['Costa Rica'].fillna(df.median)
df["Cote d'Ivoire"]=df["Cote d'Ivoire"].fillna(df.median)
df['Croatia']=df['Croatia'].fillna(df.median)
df['Cuba']=df['Cuba'].fillna(df.median)
df['Cyprus']=df['Cyprus'].fillna(df.median)
df['Czech Republic']=df['Czech Republic'].fillna(df.median)
df['Denmark']=df['Denmark'].fillna(df.median)
df['Djibouti']=df['Djibouti'].fillna(df.median)
df['Dominica']=df['Dominica'].fillna(df.median)
df['Dominican Republic']=df['Dominican Republic'].fillna(df.median)
df['Ecuador']=df['Ecuador'].fillna(df.median)
df['Egypt']=df['Egypt'].fillna(df.median)
df['El Salvador']=df['El Salvador'].fillna(df.median)
df['Equatorial Guinea']=df['Equatorial Guinea'].fillna(df.median)
df['Eritrea']=df['Eritrea'].fillna(df.median)
df['Estonia']=df['Estonia'].fillna(df.median)
df['Ethiopia']=df['Ethiopia'].fillna(df.median)
df['Fiji']=df['Fiji'].fillna(df.median)
df['Finland']=df['Finland'].fillna(df.median)
df['France']=df['France'].fillna(df.median)
df['Gabon']=df['Gabon'].fillna(df.median)
df['Gambia']=df['Gambia'].fillna(df.median)
df['Georgia']=df['Georgia'].fillna(df.median)
df['Germany']=df['Germany'].fillna(df.median)
df['Germany']=df['Germany'].fillna(df.median)
df['Ghana']=df['Ghana'].fillna(df.median)
df['Greece']=df['Greece'].fillna(df.median)
df['Grenada']=df['Grenada'].fillna(df.median)
df['Guatemala']=df['Guatemala'].fillna(df.median)
df['Guinea']=df['Guinea'].fillna(df.median)
df['Guinea-Bissau']=df['Guinea-Bissau'].fillna(df.median)
df['Guyana']=df['Guyana'].fillna(df.median)
df['Haiti']=df['Haiti'].fillna(df.median)
df['Honduras']=df['Honduras'].fillna(df.median)
df['Hungary']=df['Hungary'].fillna(df.median)
df['Iceland']=df['Iceland'].fillna(df.median)
df['India']=df['India'].fillna(df.median)
df['Indonesia']=df['Indonesia'].fillna(df.median)
df['Iran']=df['Iran'].fillna(df.median)
df['Iraq']=df['Iraq'].fillna(df.median)
df['Ireland']=df['Ireland'].fillna(df.median)
df['Israel']=df['Israel'].fillna(df.median)
df['Italy']=df['Italy'].fillna(df.median)
df['Jamaica']=df['Jamaica'].fillna(df.median)
df['Japan']=df['Japan'].fillna(df.median)
df['Jordan']=df['Jordan'].fillna(df.median)
df['Kazakhstan']=df['Kazakhstan'].fillna(df.median)
df['Kenya']=df['Kenya'].fillna(df.median)
```

```
df['Kiribati']=df['Kiribati'].fillna(df.median)
df['Kuwait']=df['Kuwait'].fillna(df.median)
df['Kyrgyz Republic']=df['Kyrgyz Republic'].fillna(df.median)
df['Lao']=df['Lao'].fillna(df.median)
df['Latvia']=df['Latvia'].fillna(df.median)
df['Lebanon']=df['Lebanon'].fillna(df.median)
df['Lesotho']=df['Lesotho'].fillna(df.median)
df['Liberia']=df['Liberia'].fillna(df.median)
df['Libya']=df['Libya'].fillna(df.median)
df['Lithuania']=df['Lithuania'].fillna(df.median)
df['Luxembourg']=df['Luxembourg'].fillna(df.median)
df['Macedonia, FYR']=df['Macedonia, FYR'].fillna(df.median)
df['Madagascar']=df['Madagascar'].fillna(df.median)
df['Malawi']=df['Malawi'].fillna(df.median)
df['Malaysia']=df['Malaysia'].fillna(df.median)
df['Maldives']=df['Maldives'].fillna(df.median)
df['Mali']=df['Mali'].fillna(df.median)
df['Malta']=df['Malta'].fillna(df.median)
df['Marshall Islands']=df['Marshall Islands'].fillna(df.median)
df['Mauritania']=df['Mauritania'].fillna(df.median)
df['Mauritius']=df['Mauritius'].fillna(df.median)
df['Mexico']=df['Mexico'].fillna(df.median)
df['Micronesia, Fed. Sts.']=df['Micronesia, Fed. Sts.'].fillna(df.median)
df['Moldova']=df['Moldova'].fillna(df.median)
df['Mongolia']=df['Mongolia'].fillna(df.median)
df['Montenegro']=df['Montenegro'].fillna(df.median)
df['Morocco']=df['Morocco'].fillna(df.median)
df['Mozambique']=df['Mozambique'].fillna(df.median)
df['Myanmar']=df['Myanmar'].fillna(df.median)
df['Namibia']=df['Namibia'].fillna(df.median)
df['Nauru']=df['Nauru'].fillna(df.median)
df['Nepal']=df['Nepal'].fillna(df.median)
df['Netherlands']=df['Netherlands'].fillna(df.median)
df['New Zealand']=df['New Zealand'].fillna(df.median)
df['Nicaragua']=df['Nicaragua'].fillna(df.median)
df['Niger']=df['Niger'].fillna(df.median)
df['Nigeria']=df['Nigeria'].fillna(df.median)
df['Niger']=df['Niger'].fillna(df.median)
df['Norway']=df['Norway'].fillna(df.median)
df['Oman']=df['Oman'].fillna(df.median)
df['Pakistan']=df['Pakistan'].fillna(df.median)
df['Palau']=df['Palau'].fillna(df.median)
df['Palestine']=df['Palestine'].fillna(df.median)
df['Panama']=df['Panama'].fillna(df.median)
df['Papua New Guinea']=df['Papua New Guinea'].fillna(df.median)
df['Paraguay']=df['Paraguay'].fillna(df.median)
df['Peru']=df['Peru'].fillna(df.median)
df['Philippines']=df['Philippines'].fillna(df.median)
df['Poland']=df['Poland'].fillna(df.median)
df['Portugal']=df['Portugal'].fillna(df.median)
df['Romania']=df['Romania'].fillna(df.median)
```

```
df['Russia']=df['Russia'].fillna(df.median)
df['Rwanda']=df['Rwanda'].fillna(df.median)
df['Samoa']=df['Samoa'].fillna(df.median)
df['Saudi Arabia']=df['Saudi Arabia'].fillna(df.median)
df['Senegal']=df['Senegal'].fillna(df.median)
df['Serbia']=df['Serbia'].fillna(df.median)
df['Seychelles']=df['Seychelles'].fillna(df.median)
df['Sierra Leone']=df['Sierra Leone'].fillna(df.median)
df['Singapore']=df['Singapore'].fillna(df.median)
df['Slovak Republic']=df['Slovak Republic'].fillna(df.median)
df['Slovenia']=df['Slovenia'].fillna(df.median)
df['Solomon Islands']=df['Solomon Islands'].fillna(df.median)
df['Somalia']=df['Somalia'].fillna(df.median)
df['South Africa']=df['South Africa'].fillna(df.median)
df['South Korea']=df['South Korea'].fillna(df.median)
df['South Sudan']=df['South Sudan'].fillna(df.median)
df['Spain']=df['Spain'].fillna(df.median)
df['Sri Lanka']=df['Sri Lanka'].fillna(df.median)
df['St. Vincent and the Grenadines']=df['St. Vincent and the Grenadines'].fillna(df.median)
df['St. Kitts and Nevis']=df['St. Kitts and Nevis'].fillna(df.median)
df['Sudan']=df['Sudan'].fillna(df.median)
df['Suriname']=df['Suriname'].fillna(df.median)
df['Swaziland']=df['Swaziland'].fillna(df.median)
df['Sweden']=df['Sweden'].fillna(df.median)
df['Switzerland']=df['Switzerland'].fillna(df.median)
df['Syria']=df['Syria'].fillna(df.median)
df['Tajikistan']=df['Tajikistan'].fillna(df.median)
df['Tanzania']=df['Tanzania'].fillna(df.median)
df['Thailand']=df['Thailand'].fillna(df.median)
df['Timor-Leste']=df['Timor-Leste'].fillna(df.median)
df['Togo']=df['Togo'].fillna(df.median)
df['Tonga']=df['Tonga'].fillna(df.median)
df['Tunisia']=df['Tunisia'].fillna(df.median)
df['Turkey']=df['Turkey'].fillna(df.median)
df['Turkmenistan']=df['Turkmenistan'].fillna(df.median)
df['Uganda']=df['Uganda'].fillna(df.median)
df['Ukraine']=df['Ukraine'].fillna(df.median)
df['United Arab Emirates']=df['United Arab Emirates'].fillna(df.median)
df['United Kingdom']=df['United Kingdom'].fillna(df.median)
df['United States']=df['United States'].fillna(df.median)
df['Uruguay']=df['Uruguay'].fillna(df.median)
df['Uzbekistan']=df['Uzbekistan'].fillna(df.median)
df['Vanuatu']=df['Vanuatu'].fillna(df.median)
df['Venezuela']=df['Venezuela'].fillna(df.median)
df['Vietnam']=df['Vietnam'].fillna(df.median)
df['Yemen']=df['Yemen'].fillna(df.median)
df['Zambia']=df['Zambia'].fillna(df.median)
df['Zimbabwe']=df['Zimbabwe'].fillna(df.median)

t=pd.to_datetime(df.Year, format='%Y')
```

t

```
0    1960-01-01
1    1961-01-01
2    1962-01-01
3    1963-01-01
4    1964-01-01
5    1965-01-01
6    1966-01-01
7    1967-01-01
8    1968-01-01
9    1969-01-01
10   1970-01-01
11   1971-01-01
12   1972-01-01
13   1973-01-01
14   1974-01-01
15   1975-01-01
16   1976-01-01
17   1977-01-01
18   1978-01-01
19   1979-01-01
20   1980-01-01
21   1981-01-01
22   1982-01-01
23   1983-01-01
24   1984-01-01
25   1985-01-01
26   1986-01-01
27   1987-01-01
28   1988-01-01
29   1989-01-01
30   1990-01-01
31   1991-01-01
32   1992-01-01
33   1993-01-01
34   1994-01-01
35   1995-01-01
36   1996-01-01
37   1997-01-01
38   1998-01-01
39   1999-01-01
40   2000-01-01
41   2001-01-01
42   2002-01-01
43   2003-01-01
44   2004-01-01
45   2005-01-01
46   2006-01-01
47   2007-01-01
48   2008-01-01
49   2009-01-01
50   2010-01-01
51   2011-01-01
52   2012-01-01
53   2013-01-01
54   2014-01-01
```

```
55    2015-01-01
56    2016-01-01
57    2017-01-01
Name: Year, dtype: datetime64[ns]
```

```
pivott = df.pivot_table(index=[t], values=['Afghanistan'], aggfunc=[np.median], fill_value=0, ma
pivott
```

median
Afghanistan

Year	median
1960-01-01	4.13
1961-01-01	4.45
1962-01-01	4.88
1963-01-01	9.17
1964-01-01	8.89
1965-01-01	11.30
1966-01-01	8.57
1967-01-01	6.77
1968-01-01	8.90
1969-01-01	10.10
1970-01-01	9.78
1971-01-01	10.90
1972-01-01	14.80
1973-01-01	12.90
1974-01-01	14.00
1975-01-01	12.70
1976-01-01	13.20
1977-01-01	11.70
1978-01-01	10.80
1979-01-01	0.00
1980-01-01	0.00
1981-01-01	0.00
1982-01-01	0.00
1983-01-01	0.00
1984-01-01	0.00
1985-01-01	0.00
1986-01-01	0.00
1987-01-01	0.00

1988-01-01 0.00

```
y = pivott.resample('MS').mean()
y
```

median
Afghanistan

Year

1960-01-01	4.13
1960-02-01	NaN
1960-03-01	NaN
1960-04-01	NaN
1960-05-01	NaN
...	...
2016-09-01	NaN
2016-10-01	NaN
2016-11-01	NaN
2016-12-01	NaN
2017-01-01	0.00

685 rows × 1 columns *21.40*

```
y = y.replace('nan', np.nan).fillna(y.median())
```

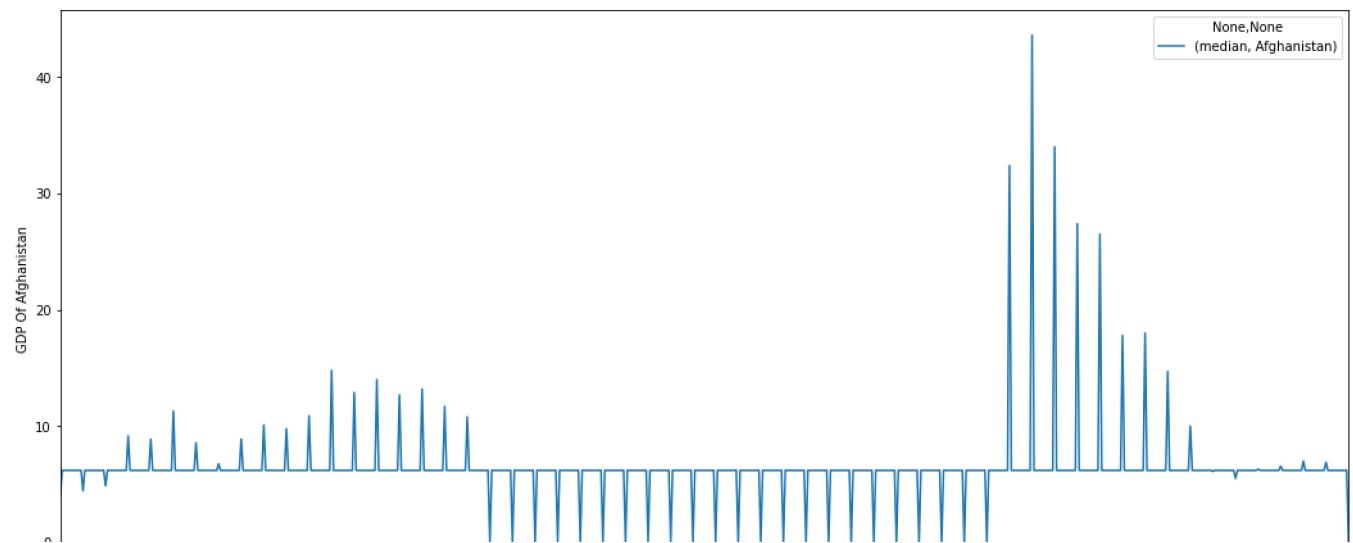
2007-01-01 17.80

```
y.isnull().sum()
```

```
median Afghanistan    0
dtype: int64
```

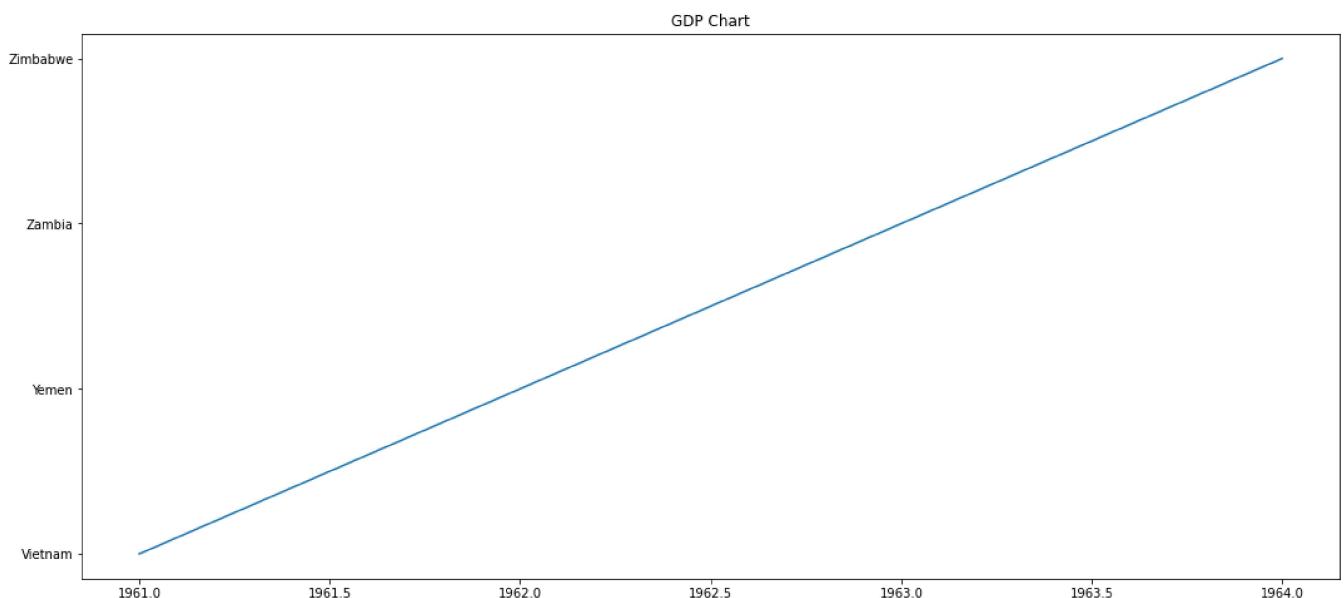
```
y.plot(xlabel="Years", ylabel="GDP Of Afghanistan")
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f7aeef4ac9e8>
```



This is the actual graphical representation of GDP Of Afghanistan.

```
plt.plot([1961,1962, 1963, 1964],[ 'Vietnam', 'Yemen', 'Zambia', 'Zimbabwe' ])
plt.title('GDP Chart')
plt.show()
```



This is absolutely wrong way of interpretation of this data. Here, year v/s country is taken without any consideration of the gdp values.

```
country=['Vietnam', 'Yemen', 'Zambia', 'Zimbabwe']
```

```
year = [1961, 1962, 1963, 1964]
```

```
# Figure Size
```

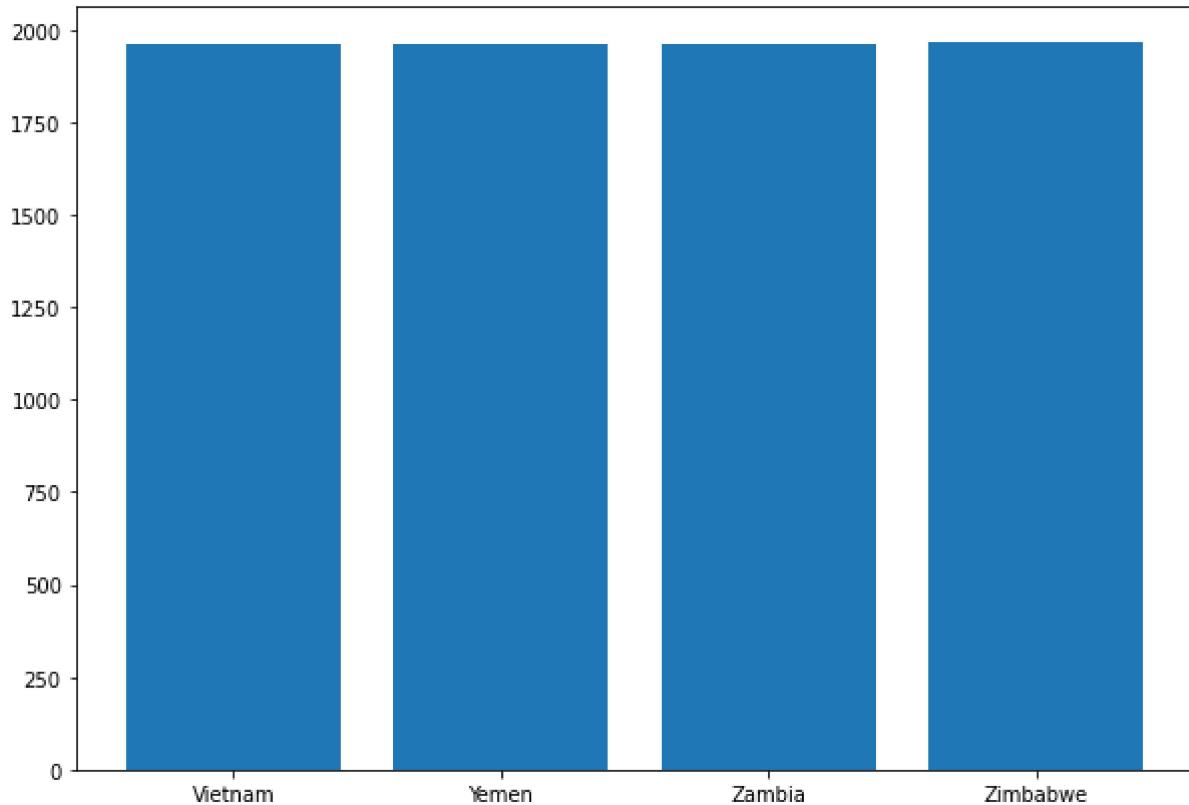
```
fig = plt.figure(figsize=(10, 7))
```

```
# Horizontal Bar Plot
```

```
plt.bar(country, year)
```

```
# Show Plot
```

```
plt.show()
```



This is also wrong interpretation using bar charts.

Time Series Of North-American Countries.

```
r=pd.to_datetime(df.Year, format='%Y')
```

```
r
```

```
0    1960-01-01  
1    1961-01-01  
2    1962-01-01
```

```
3    1963-01-01
4    1964-01-01
5    1965-01-01
6    1966-01-01
7    1967-01-01
8    1968-01-01
9    1969-01-01
10   1970-01-01
11   1971-01-01
12   1972-01-01
13   1973-01-01
14   1974-01-01
15   1975-01-01
16   1976-01-01
17   1977-01-01
18   1978-01-01
19   1979-01-01
20   1980-01-01
21   1981-01-01
22   1982-01-01
23   1983-01-01
24   1984-01-01
25   1985-01-01
26   1986-01-01
27   1987-01-01
28   1988-01-01
29   1989-01-01
30   1990-01-01
31   1991-01-01
32   1992-01-01
33   1993-01-01
34   1994-01-01
35   1995-01-01
36   1996-01-01
37   1997-01-01
38   1998-01-01
39   1999-01-01
40   2000-01-01
41   2001-01-01
42   2002-01-01
43   2003-01-01
44   2004-01-01
45   2005-01-01
46   2006-01-01
47   2007-01-01
48   2008-01-01
49   2009-01-01
50   2010-01-01
51   2011-01-01
52   2012-01-01
53   2013-01-01
54   2014-01-01
55   2015-01-01
56   2016-01-01
57   2017-01-01
```

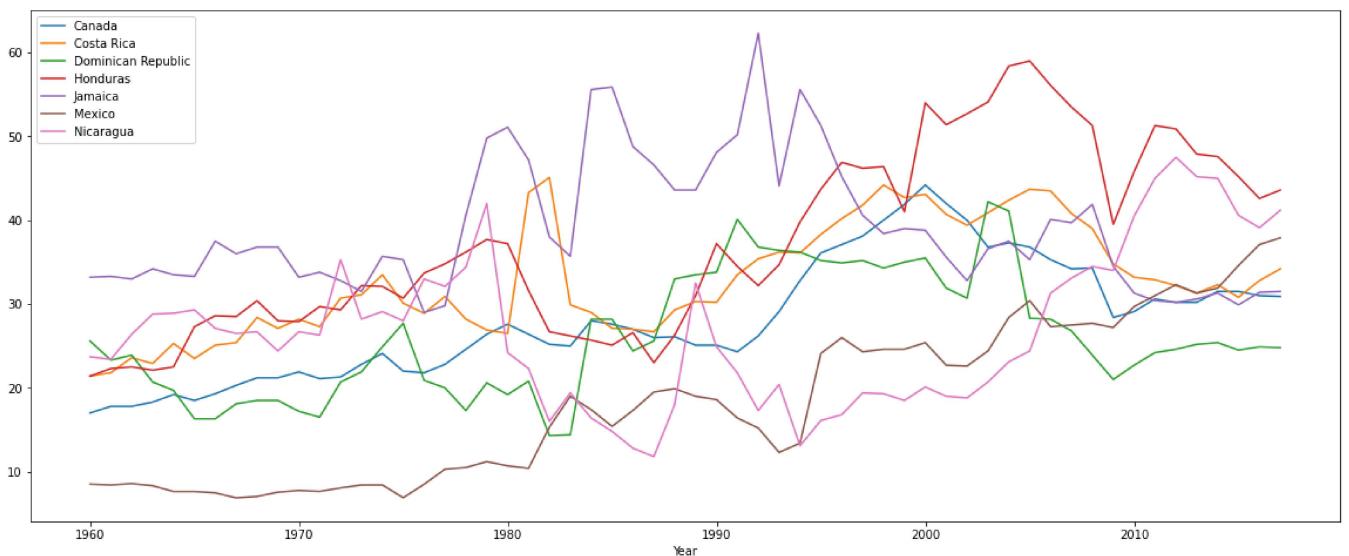
Name: Year, dtype: datetime64[ns]

```
able = pd.pivot_table(dt, values =[ 'Antigua and Barbuda', 'Bahamas', 'Barbados', 'Belize', 'Canada',
able
```

```
table.isna().sum()
```

Canada	0
Costa Rica	0
Dominican Republic	0
Honduras	0
Jamaica	0
Mexico	0
Nicaragua	0
	dtype: int64

```
table.plot(figsize=(20, 8))
plt.show()
```



```
r=pd.to_datetime(df.Year, format='%Y')
```

```
r
```

0	1960-01-01
1	1961-01-01

```
2    1962-01-01
3    1963-01-01
4    1964-01-01
5    1965-01-01
6    1966-01-01
7    1967-01-01
8    1968-01-01
9    1969-01-01
10   1970-01-01
11   1971-01-01
12   1972-01-01
13   1973-01-01
14   1974-01-01
15   1975-01-01
16   1976-01-01
17   1977-01-01
18   1978-01-01
19   1979-01-01
20   1980-01-01
21   1981-01-01
22   1982-01-01
23   1983-01-01
24   1984-01-01
25   1985-01-01
26   1986-01-01
27   1987-01-01
28   1988-01-01
29   1989-01-01
30   1990-01-01
31   1991-01-01
32   1992-01-01
33   1993-01-01
34   1994-01-01
35   1995-01-01
36   1996-01-01
37   1997-01-01
38   1998-01-01
39   1999-01-01
40   2000-01-01
41   2001-01-01
42   2002-01-01
43   2003-01-01
44   2004-01-01
45   2005-01-01
46   2006-01-01
47   2007-01-01
48   2008-01-01
49   2009-01-01
50   2010-01-01
51   2011-01-01
52   2012-01-01
53   2013-01-01
54   2014-01-01
55   2015-01-01
56   2016-01-01
57   2017-01-01
Name: Year, dtype: datetime64[ns]
```

```
#pivot table is created.  
pivot = df.pivot_table(index=[r], values=['Antigua and Barbuda', 'Bahamas', 'Barbados', 'Belize'  
  
pivot
```

1975-01-01	24.1	33.5	24.9	32.1	35.7	8.41	29.1
1975-01-01	22.0	30.1	27.7	30.7	35.3	6.89	28.0
1976-01-01	21.8	28.9	20.9	33.7	29.0	8.49	33.0
1977-01-01	22.8	30.9	20.0	34.8	29.8	10.30	32.1
1978-01-01	24.6	28.2	17.3	36.2	40.6	10.50	34.4
1979-01-01	26.4	26.9	20.6	37.7	49.8	11.20	42.0
1980-01-01	27.6	26.5	19.2	37.2	51.1	10.70	24.2
1981-01-01	26.4	43.3	20.8	31.6	47.2	10.40	22.3
1982-01-01	25.2	45.1	14.3	26.7	38.0	15.30	16.0
1983-01-01	25.0	29.9	14.4	26.2	35.7	19.00	19.4
1984-01-01	28.0	29.0	28.2	25.7	55.6	17.40	16.4
1985-01-01	27.6	27.1	28.2	25.1	55.9	15.40	14.8
1986-01-01	27.0	27.0	24.4	26.6	48.8	17.30	12.8
1987-01-01	26.0	26.7	25.6	23.0	46.6	19.50	11.8
1988-01-01	26.1	29.3	33.0	26.3	43.6	19.90	18.0
1989-01-01	25.1	30.3	33.5	31.0	43.6	19.00	32.5
1990-01-01	25.1	30.2	33.8	37.2	48.1	18.60	24.9
1991-01-01	24.3	33.5	40.1	34.5	50.2	16.40	21.8
1992-01-01	26.2	35.4	36.8	32.2	62.3	15.20	17.3
1993-01-01	29.1	36.2	36.4	34.7	44.1	12.30	20.4

```
y = pivot.resample('MS').mean()
```

```
y
```

	median						
	Canada	Costa Rica	Dominican Republic	Honduras	Jamaica	Mexico	Nicaragua
Year							
1960-01-01	17.0	21.4		25.6	21.4	33.2	8.51
1960-02-01	NaN	NaN		NaN	NaN	NaN	NaN
1960-03-01	NaN	NaN		NaN	NaN	NaN	NaN
1960-04-01	NaN	NaN		NaN	NaN	NaN	NaN
1960-05-01	NaN	NaN		NaN	NaN	NaN	NaN
...
2016-09-01	NaN	NaN		NaN	NaN	NaN	NaN
2016-10-01	57.5	42.4		47.7	50.4	57.5	28.4

y.isna().sum()

```
median    Canada      0
          Costa Rica   0
          Dominican Republic  0
          Honduras     0
          Jamaica      0
          Mexico        0
          Nicaragua    0
dtype: int64
```

```
y = y.replace('nan', np.nan).fillna(y.median())
```

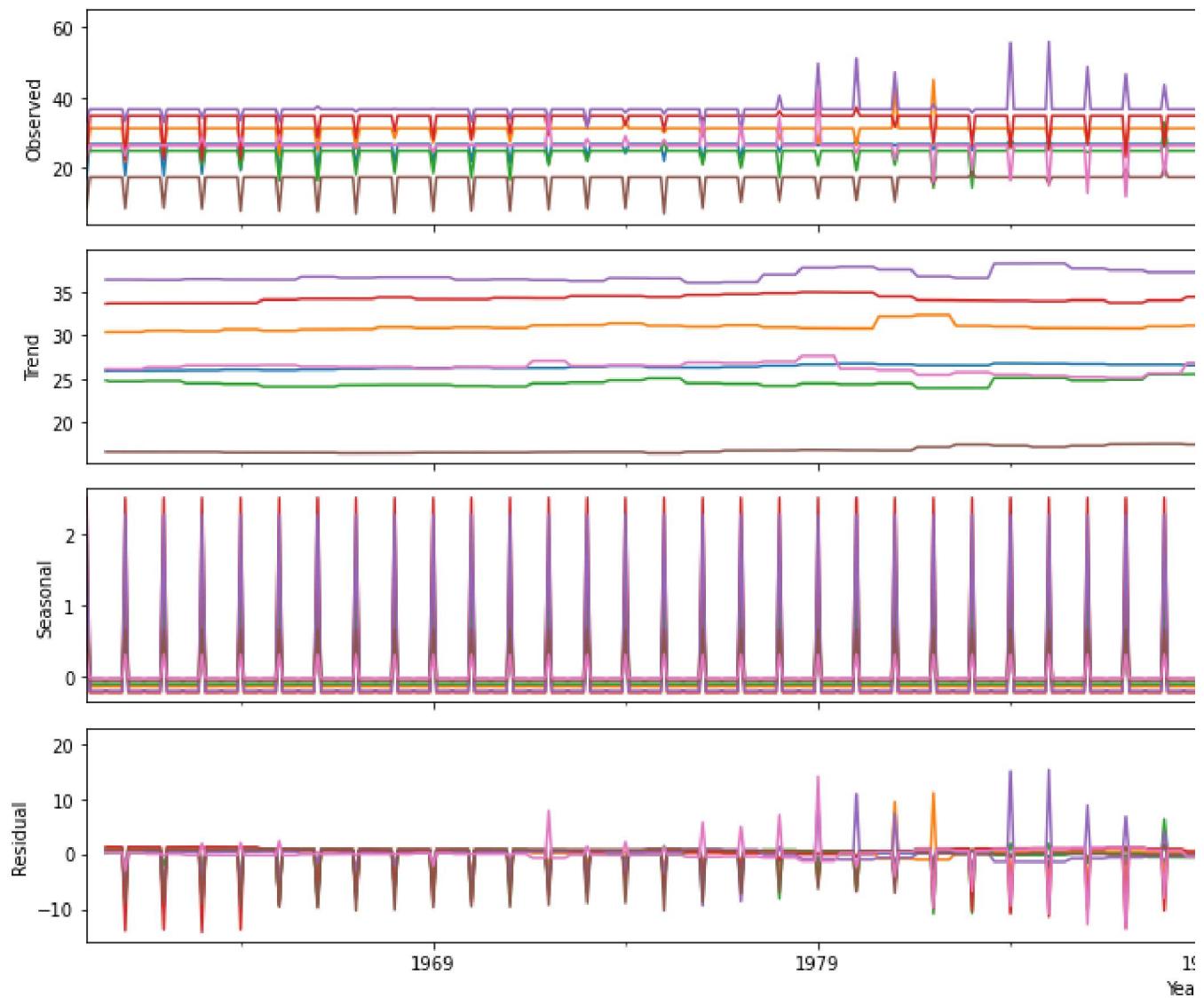
```
y.plot(xlabel="Years", ylabel="GDP Of North American Countries")
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f7b04bab940>
```



```
import statsmodels.api as sm
from pylab import rcParams
rcParams['figure.figsize'] = 18, 8
decomposition = sm.tsa.seasonal_decompose(y, model='additive')
fig = decomposition.plot()
plt.show()
```

```
/usr/local/lib/python3.6/dist-packages/statsmodels/tools/_testing.py:19: FutureWarning:
  import pandas.util.testing as tm
```



The above shown graphs, is useful for the correct prediction for the time series analysis.

```
Data = {'Year': [1960,1961,1962,1963,1964,1965,1966,1967,1968,1969,1970],
       'Rate': [4.13,4.45,4.88,9.17,8.89,11.3,8.57,6.77,8.9,10.1,9.8]}
```