

```
In [20]: # Data Source1: https://www.kaggle.com/worldbank/world-development-indicators
# Folder: 'world-development-indicators'
#Data source 2:http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_
historical_climate&ThisCCode=MAR
```

Part of agriculture in Morocco's GDP.

Morocco is a country where agriculture is an important sector that employs a lot of people and forms a significant part of the Moroccan GDP. However this sector depends constantly on weather conditions. Therefore I will in follow the next steps in order to deal with this subject. First we will try to see the evolution of gdp per capita by year in Morocco. Second we will look for the part of agriculture in the gdp. And third we will see the weather change in morocco especially raining. The three parts will give us an idea about the moroccan policy and answer to some questions like? Is the moroccan gdp depends constantly of the agriculture sector? Does climate change pose a danger to the moroccan economy? What are the policies adopted by morocco to cope with this danger?

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In [2]: import pandas as pd
import numpy as np
import random
import matplotlib.pyplot as plt
```

```
In [3]: data = pd.read_csv('./Indicators.csv')
data.shape
```

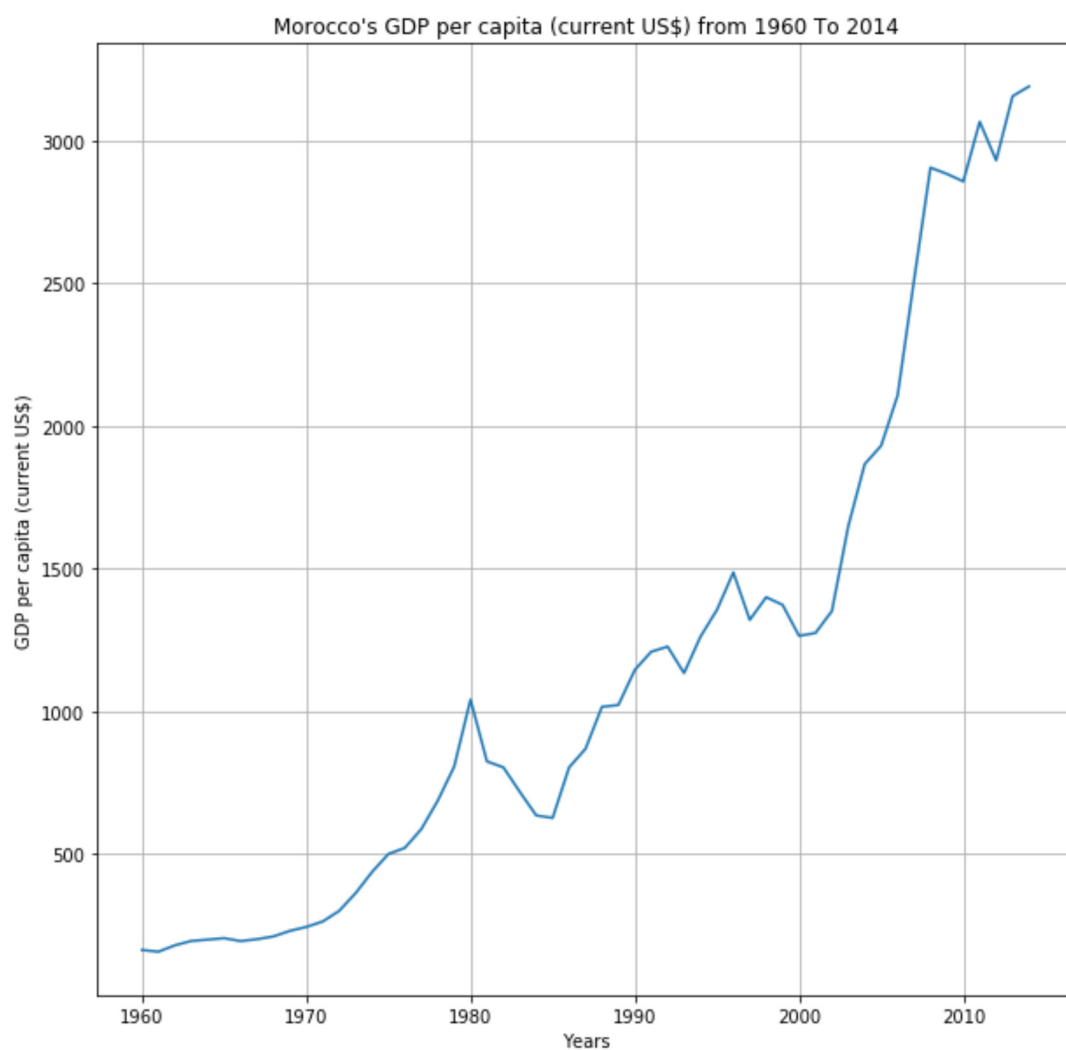
```
Out[3]: (5656458, 6)
```

Section1: Morocco's GDP per capita (current US\$)

```
In [4]: countries = data['CountryName'].unique().tolist()
indicators = data['IndicatorName'].unique().tolist()
#select the country: Morocco
countryFilter = (data['CountryName']=='Morocco')
#Check all the moroccan indicators whose names contain by "GDP per capita"
indicatorFilter = (data['IndicatorName'].str.contains("GDP per capita")==True)
array_indicators = data[countryFilter & indicatorFilter][['IndicatorName', 'IndicatorCode']].drop_duplicates()
print (array_indicators)
```

	IndicatorName	IndicatorCode
15597	GDP per capita (constant LCU)	NY.GDP.PCAP.KN
15598	GDP per capita (current LCU)	NY.GDP.PCAP.CN
15599	GDP per capita (current US\$)	NY.GDP.PCAP.CD
41069	GDP per capita growth (annual %)	NY.GDP.PCAP.KD.ZG
189091	GDP per capita (constant 2005 US\$)	NY.GDP.PCAP.KD
1957850	GDP per capita, PPP (constant 2011 international...)	NY.GDP.PCAP.PP.KD
1957851	GDP per capita, PPP (current international \$)	NY.GDP.PCAP.PP.CD
2982752	Government expenditure per primary student as ...	SE.XPD.PRIM.PC.ZS
2982753	Government expenditure per secondary student a...	SE.XPD.SECO.PC.ZS
2982754	Government expenditure per tertiary student as...	SE.XPD.TERT.PC.ZS

```
In [5]: #Select the indicator GDP per capita by its code
indicatorGdpCapFilter = (data['IndicatorCode']=='NY.GDP.PCAP.CD')
DataSetGdpCap = data[countryFilter & indicatorGdpCapFilter]
startYear= min(DataSetGdpCap['Year'])
endYear= max(DataSetGdpCap['Year'])
#Visulize the data selected
years = DataSetGdpCap['Year'].values
gdp_per_cap_ma = DataSetGdpCap['Value'].values
#Change the size of the figure
plt.figure(figsize=(10,10))
plt.grid()
plt.xlabel('Years')
plt.ylabel(DataSetGdpCap['IndicatorName'].iloc[0])
#Add a title
plt.title("Morocco's GDP per capita (current US$) from "+str(startYear)+" To "+str(endYear))
# Plot
plt.plot(years,gdp_per_cap_ma)
plt.show()
```



```
In [6]: #Obtain other statistics
        DataSetGdpCap.describe()
```

Out [6]:

	Year	Value
count	55.00000	55.000000
mean	1987.00000	1143.882484
std	16.02082	900.600872
min	1960.00000	158.893299
25%	1973.50000	400.640134
50%	1987.00000	1016.672332
75%	2000.50000	1387.375898
max	2014.00000	3190.310444

Note

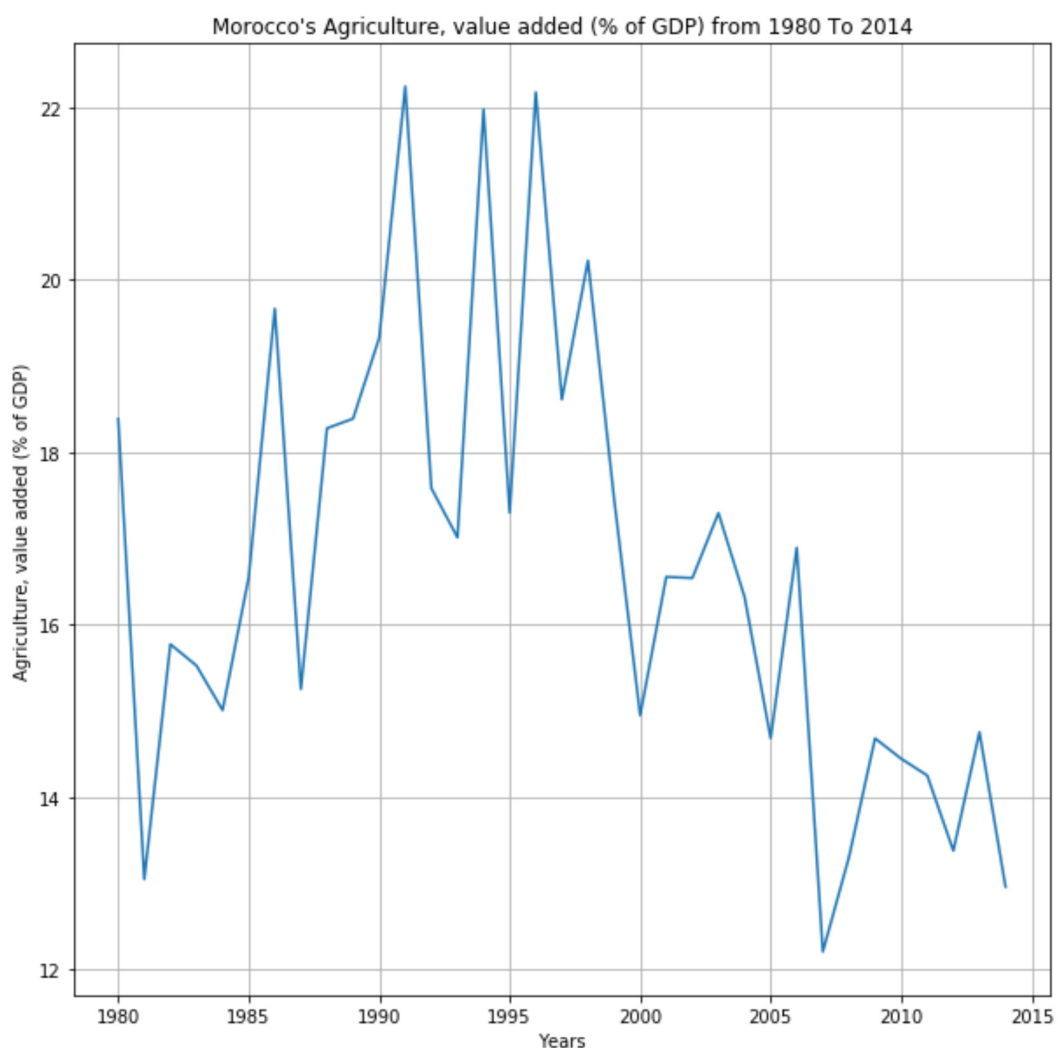
In the previous graph we can note that moroccan gdp per capita has increased especially from 2000. But we wonder if the agriculture had an impact in this growth. That is why we will visualize in the second section the part of agriculture in GDP

Section 2: Morocco's Agriculture, value added (% of GDP)

```
In [7]: #Check all the moroccan indicators whose names contain by "GDP per capita"
        indicatorAgriFilter = (data['IndicatorName'].str.contains("Agriculture")==True)
        array_indicators = data[countryFilter & indicatorAgriFilter][['IndicatorName', 'IndicatorCode']].drop_duplicates()
        print (array_indicators)
```

	IndicatorName	IndicatorCode
157421	Agriculture, value added (constant 2005 US\$)	NV.AGR.TOTL.KD
157422	Agriculture, value added (constant LCU)	NV.AGR.TOTL.KN
157423	Agriculture, value added (current LCU)	NV.AGR.TOTL.CN
157424	Agriculture, value added (current US\$)	NV.AGR.TOTL.CD
189031	Agriculture, value added (annual % growth)	NV.AGR.TOTL.KD.ZG
1065390	Agriculture value added per worker (constant 2...	EA.PRD.AGRI.KD
1065391	Agriculture, value added (% of GDP)	NV.AGR.TOTL.ZS

```
In [8]: #Select the indicator agriculture value added
indicatorAgriGdp = (data['IndicatorCode']=='NV.AGR.TOTL.ZS')
DataSetAgriGdp = data[countryFilter & indicatorAgriGdp]
startYear= min(DataSetAgriGdp['Year'])
endYear= max(DataSetAgriGdp['Year'])
#Visulize the data selected
years = DataSetAgriGdp['Year'].values
agriPartGdpMa = DataSetAgriGdp['Value'].values
#Change the size of the figure
plt.figure(figsize=(10,10))
plt.grid()
plt.xlabel('Years')
plt.ylabel(DataSetAgriGdp['IndicatorName'].iloc[0])
#Add a title
plt.title("Morocco's Agriculture, value added (% of GDP) from "+str(startYear)+"
To "+str(endYear))
# Plot
plt.plot(years,agriPartGdpMa)
plt.show()
```



```
In [9]: #Obtain other statistics  
DataSetAgriGdp.describe()
```

Out [9]:

	Year	Value
count	35.000000	35.000000
mean	1997.000000	16.653829
std	10.246951	2.627335
min	1980.000000	12.199043
25%	1988.500000	14.712681
50%	1997.000000	16.543642
75%	2005.500000	18.330474
max	2014.000000	22.245241

Note

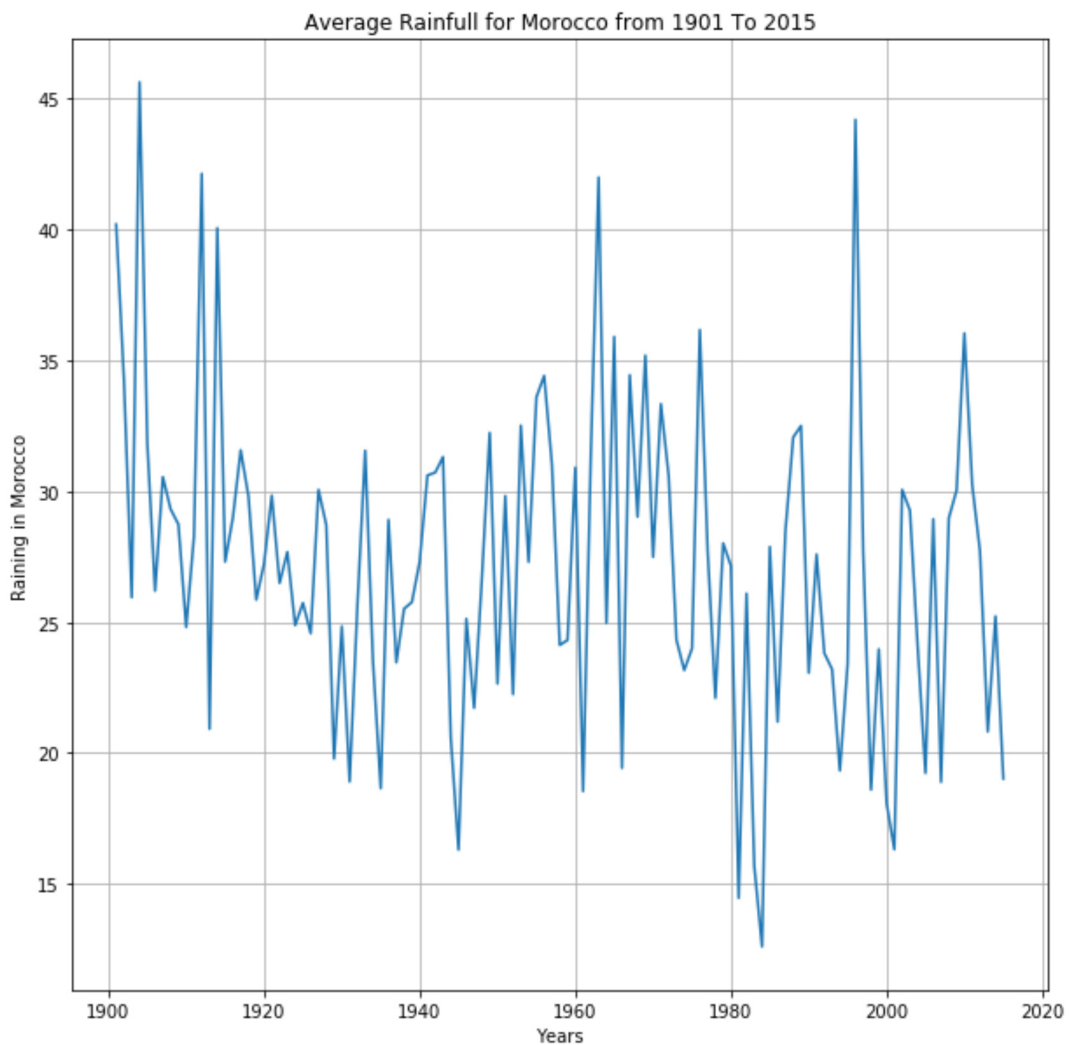
As we can see in the second graph. The percentage of Agriculture in GDP has decreased since 2000. That doesn't mean that Morocco produce less in agriculture. But it indicates that there are other sectors that contributes in GDP such as: Industry and services. Consequently we wonder why Morocco tends to integrate other sectors for the constitution of GDP. One of the aspects that can help to understand this is the study of climate change in Morocco and its impact on the agriculture. For this purpose we tried to use data from the Climate change knowledge portale in the link:
http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_historical_climate&ThisCCCode=MAR
(http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_historical_climate&ThisCCCode=MAR)

```

In [12]: data = pd.read_csv('./raining_ma_1901_2015.csv')
data=data.drop(columns=['Country','ISO3','ISO2','Month'])
data.dropna()
#Group By year to obtain the raining by year in Morocco
dataRainYear=data.groupby('Year', as_index=False).agg({"pr": "mean"})
#Visualize the results

startYear= min(dataRainYear['Year'])
endYear= max(dataRainYear['Year'])
#Visulize the data selected
years = dataRainYear['Year'].values
agriPartGdpMa = dataRainYear['pr'].values
#Change the size of the figure
plt.figure(figsize=(10,10))
plt.grid()
plt.xlabel('Years')
plt.ylabel('Raining in Morocco')
#Add a title
plt.title("Average Rainfull for Morocco from "+str(startYear)+" To "+str(endYear)
))
# Plot
plt.plot(years,agriPartGdpMa)
plt.show()

```



Conclusion

From the graph it's clear that the average rainfall in Morocco has decreased. But this doesn't mean that there aren't years where the rainfall is high. Consequently Morocco has decreased the part of agriculture in GDP by looking for new opportunities like services.