WORLD MILITARY EXPENDITURES

DATS 6103 – Individual Project 1

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SOURCE OF DATA

- The SIPRI Military Expenditure Database contains consistent time series on the military spending of countries for the period 1949–2016 in millions of USD: https://www.sipri.org/databases/milex
- Sheets used : Current USD, Share of GDP, Per capita
- GDP per capita : https://data.worldbank.org/indicator/NY.GDP.PCAP.CD
- Military spending is not only money spent on weapons; it includes spending on wages, pensions, equipment, research and development.

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DATA CLEANING

- The SIPRI and The World Bank databases had many unnecessary values like missing data, garbage values, header and footer notes that had to be discarded to transform the database into a usable one.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Military expenditure by country, in millions of US$ at current prices and exchange rates, 1949-2016**												**© SIPRI 2017**	
2	Figures are in US $m., in current prices, converted at the exchange rate for the given year.													
3	Figures in blue are SIPRI estimates. Figures in red indicate highly uncertain data.													
4	". ." = data unavailable. "xxx" = country did not exist or was not independent during all or part of the year in question.													
5														
6	**Country**	**Notes**	**1949**	**1950**	**1951**	**1952**	**1953**	**1954**	**1955**	**1956**	**1957**	**1958**	**1959**	**1960**
7	Czechoslovakia	71	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
8	German DR	73	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
9	Yugoslavia (former)	79	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
10	USSR	84	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
11	Yemen, North	103	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
12	UAE	101	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
13	Libya	‡ ¶ 2	xxx	xxx	. .	. .	. .	. .	. .	. .	. .	. .	5.6	5.6
14	Yemen	102	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
15	Laos		. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
16	Iceland	† 87	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
17	Central African Rep.	‡ 5	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	. .
18	Djibouti		xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
19	Eritrea	8	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
20	Somalia	22	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	. .
21	Costa Rica	27	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
22	Haiti	30	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
23	Panama	33	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
24	Turkmenistan	46	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
25	Uzbekistan	47	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
26	Korea, North	50	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
27	Qatar		xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
28	Syria		. .	. .	. .	. .	. .	. .	. .	55.6	48.3	81.0	83.0	90.2
29	Myanmar	60	. .	. .	32.1	46.7	64.9	77.6	71.0	75.0	79.4	85.4	86.3	89.5
30	Lebanon		. .	. .	. .	. .	. .	. .	13	18	19	22	21	23
31	Cuba	28	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .

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INITIAL ANALYSIS

- According to the available data, the global military spending in 2016 was 1641 bill USD.

```
def total(year):
    year = str(year)
    ans = np.round(np.sum(final[year], axis = 0 ), decimals = 2)
    return ans

total(2016)
```

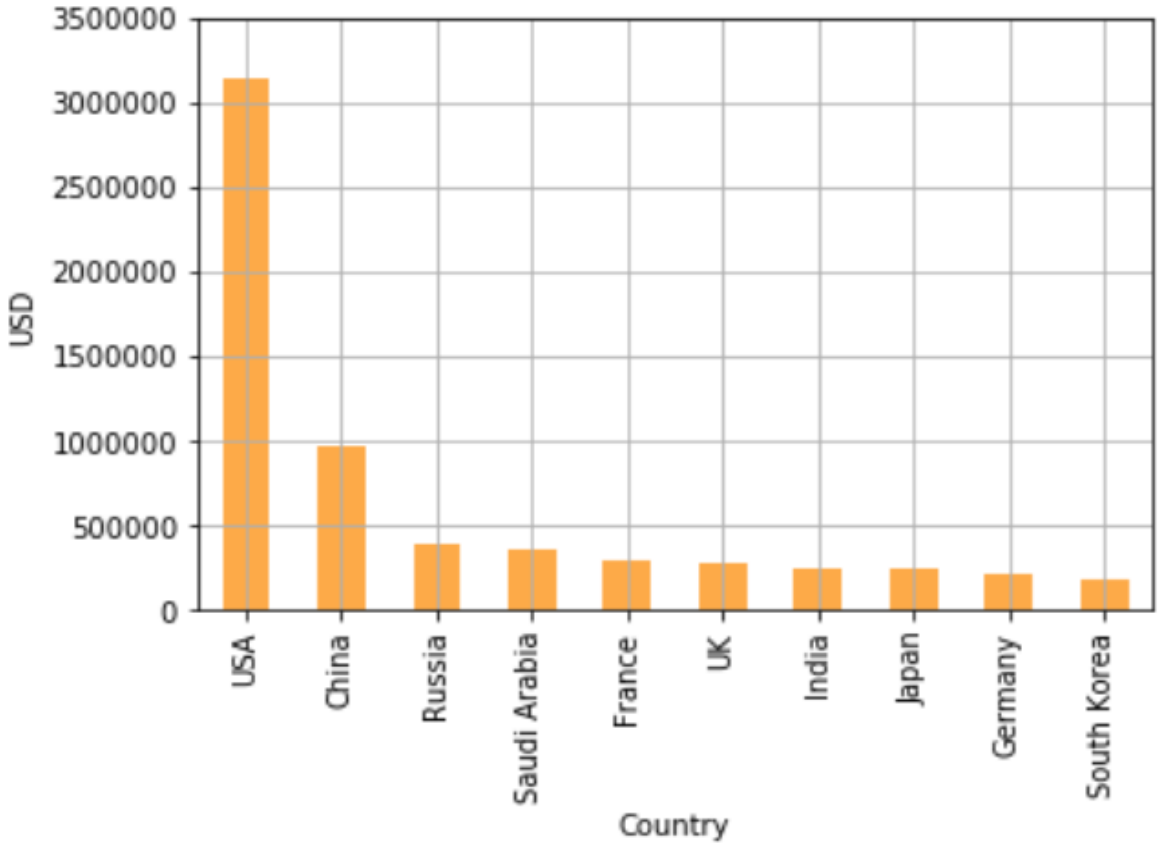
```
Out[5]: 1641007.5
```

- The table below shows the top 10 countries who have spent the most in military expenditures between 2012 and 2016:

	Country	2012	2013	2014	2015	2016	Total
0	USA	684780.00	639704.00	609914.00	596009.64	611186.44	3141594.08
1	China	157390.38	179880.45	200772.20	214093.07	215175.93	967312.03
2	Russia	81469.40	88352.90	84696.50	66418.71	69245.31	390182.82
3	Saudi Arabia	56497.87	67020.00	80762.40	87185.87	63672.80	355138.93
4	France	60035.15	62417.10	63613.57	55342.13	55745.48	297153.43
5	UK	58495.66	56861.76	59182.86	53862.19	48252.52	276654.98
6	India	47216.92	47403.53	50914.11	51295.48	55923.17	252753.21
7	Japan	60011.53	49023.93	46634.51	41103.23	46126.33	242899.53
8	Germany	46470.87	45930.54	46102.67	39812.58	41067.46	219384.13
9	South Korea	31951.76	34354.11	37286.22	36432.68	36776.73	176801.51

TOP 10 SPENDERS (2012-2016)

- The top 10 countries have spent a total of 6319 bill USD between 2012 and 2016.

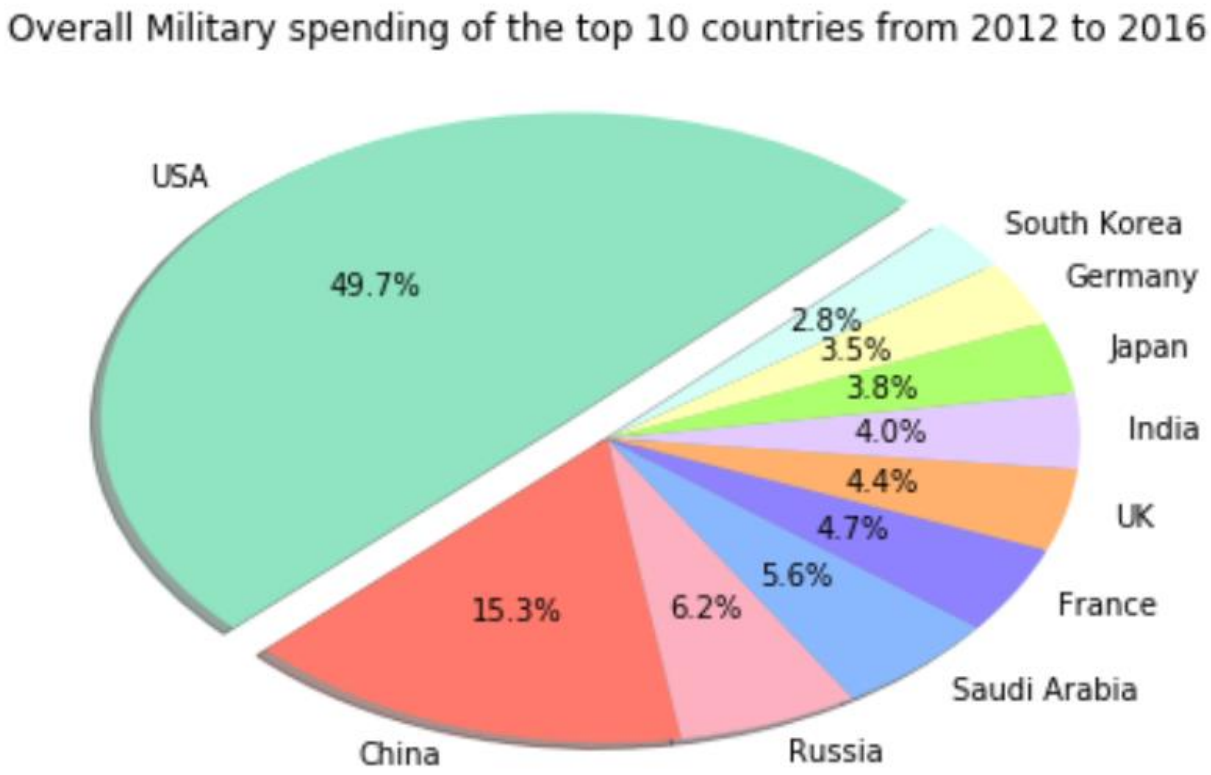



```
top10_total_5years
Out[10]:  6319874.65
```

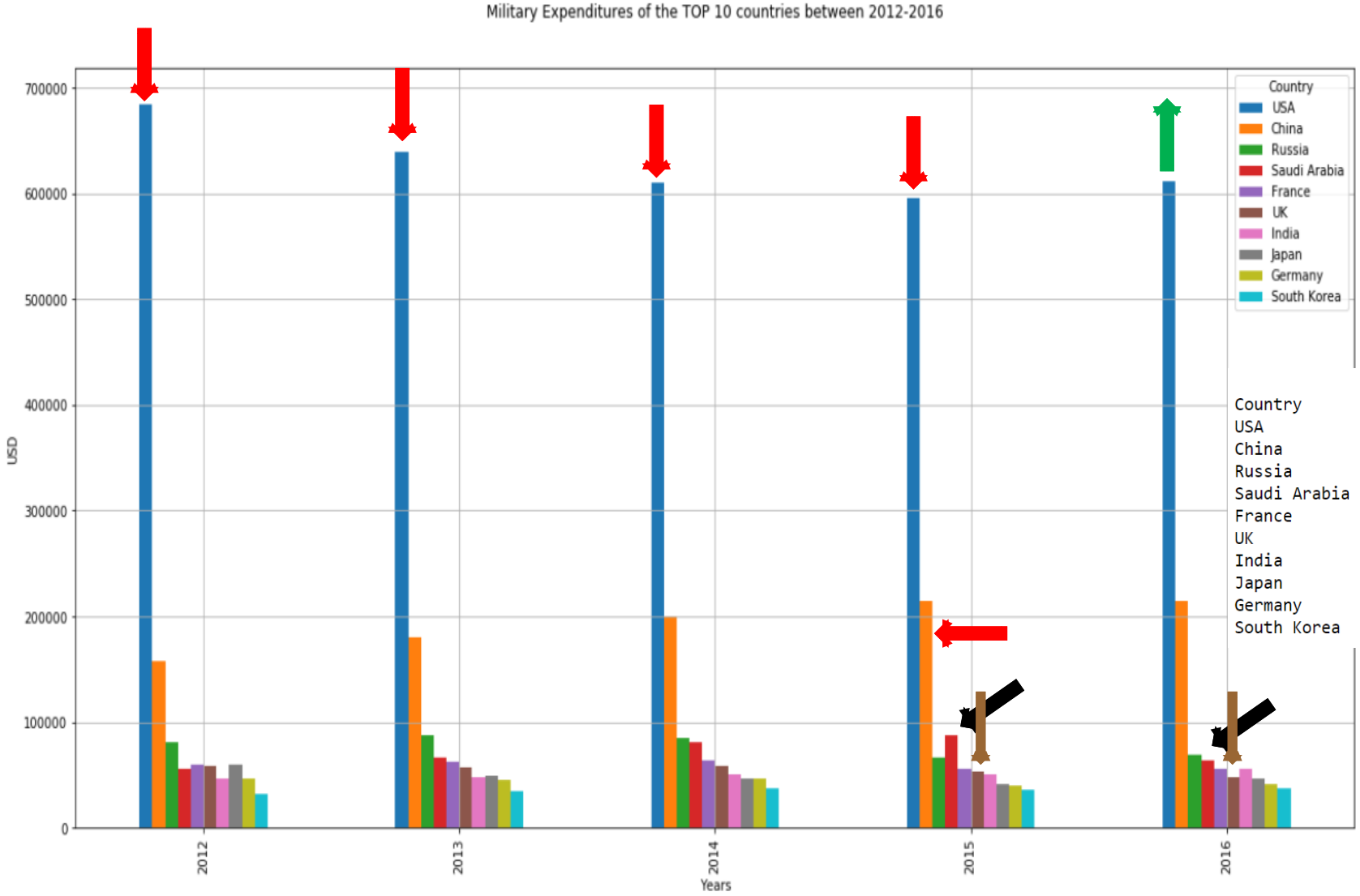
FROM 2012 TO 2016, US HAS SPENT A SHARE ALMOST EQUAL TO THE OTHER TOP 9 COUNTRIES

```
#COMPARING THE OVERALL MILITARY SPENDING OF THE TOP 10 COUNTRIES FROM 2012 TO 2016

colors = ['xkcd:light teal','xkcd:salmon', 'xkcd:soft pink',
          'xkcd:carolina blue' , 'xkcd:periwinkle', 'xkcd:apricot',
          'xkcd:pale lilac', 'xkcd:key lime', 'xkcd:creme', 'xkcd:ice']

#PLOTTING PERCENT SHARE OF ALL COUNTRIES FROM 2012-2016
plt.pie(
        top10['Percent Share'],
        labels=top10['Country'],
        shadow=True,
        colors=colors,
        explode=(0.1, 0, 0, 0, 0,0,0,0,0,0),
        startangle=45,
        autopct='%1.1f%%'
        )

plt.tight_layout()
plt.title("Overall Military spending of the top 10 countries from 2012 to 2016")
plt.show()
```

```
top10_total_5years
Out[10]: 6319874.65
```



MILITARY EXPENDITURE VALUES OF THE TOP 10 COUNTRIES (2012-2016)



Country	2012	2013	2014	2015	2016
USA	684780.00	639704.00	609914.00	596009.64	611186.44
China	157390.38	179880.45	200772.20	214093.07	215175.93
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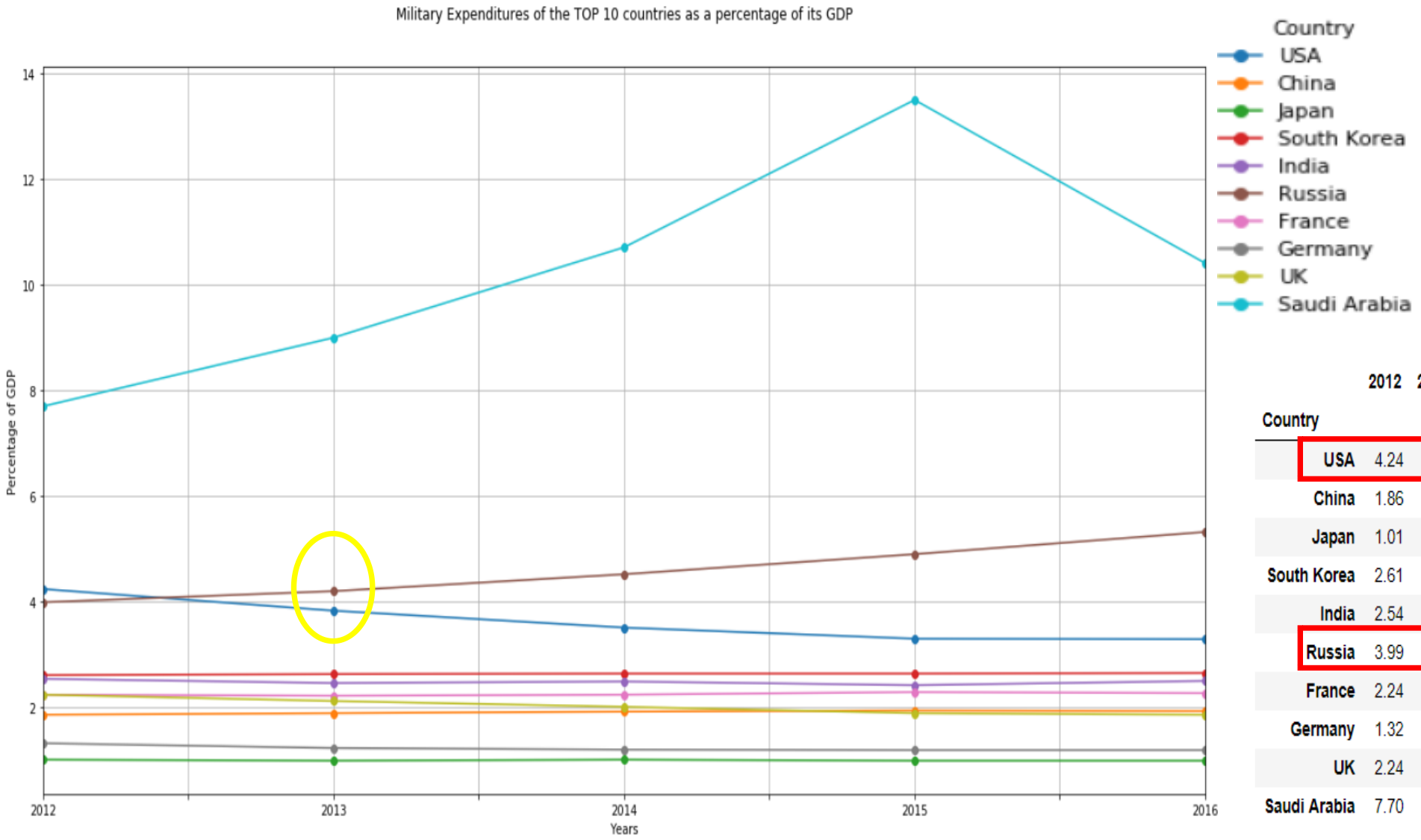
South Korea	31951.76	34354.11	37286.22	36432.68	36776.73

MILITARY SPENDINGS OF TOP 10 COUNTRIES AS % OF GDP (2012-2016)

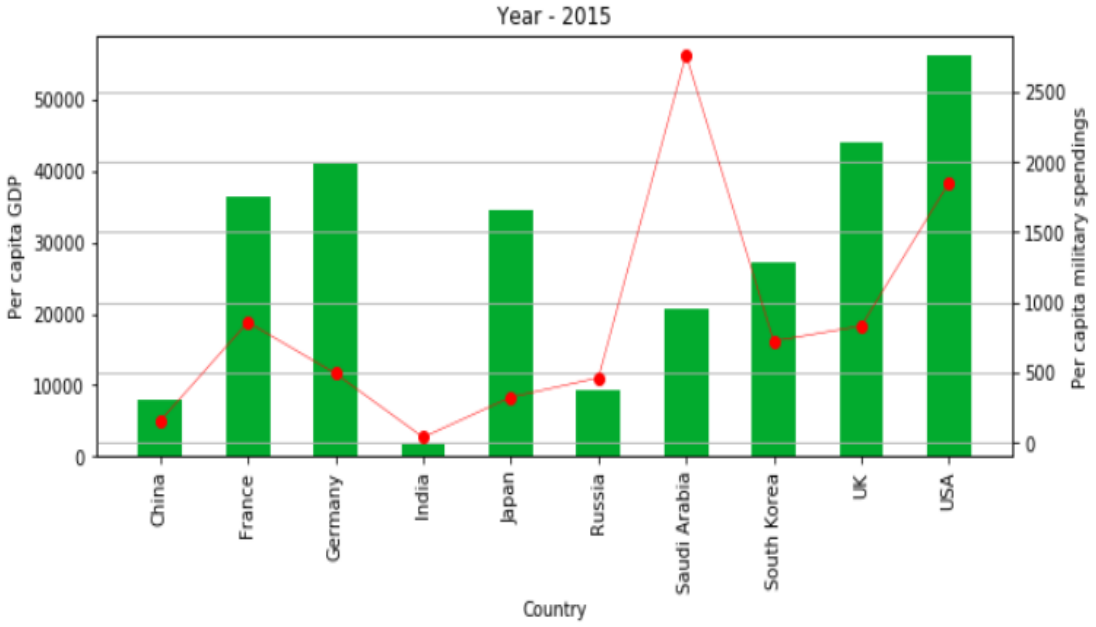


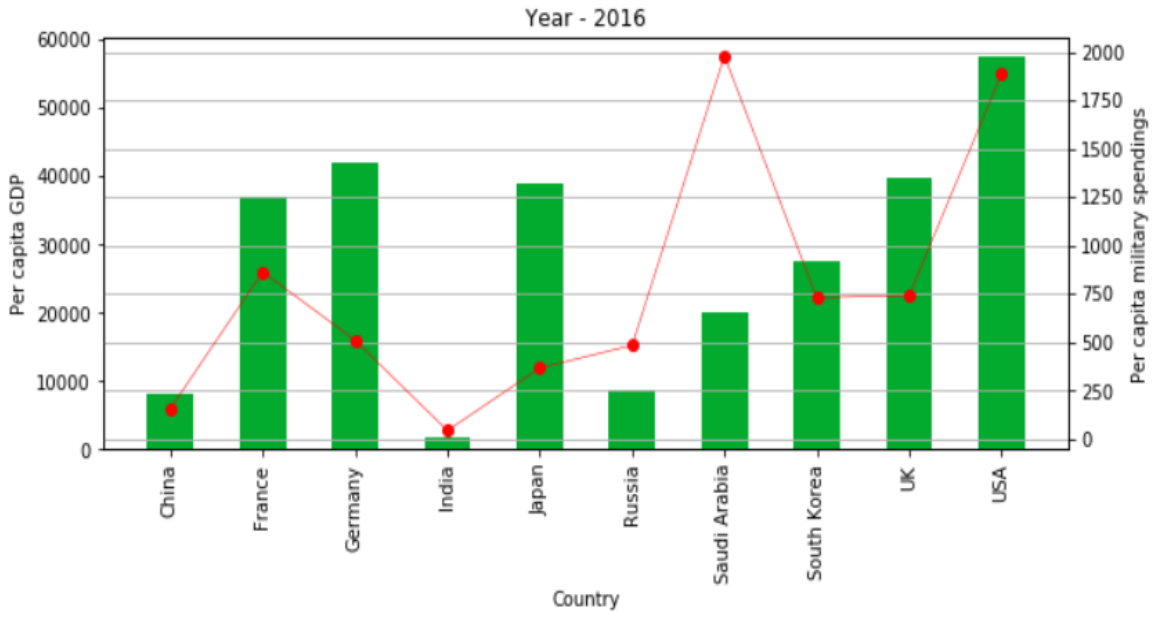
Country	2012	2013	2014	2015	2016
USA	4.24	3.83	3.51	3.30	3.29
China	1.86	1.89	1.92	1.94	1.93
Japan	1.01	0.99	1.01	0.99	0.99
South Korea	2.61	2.63	2.64	2.64	2.65
India	2.54	2.46	2.49	2.42	2.50
Russia	3.99	4.20	4.52	4.90	5.32
France	2.24	2.22	2.24	2.29	2.27
Germany	1.32	1.23	1.20	1.19	1.19
UK	2.24	2.12	2.01	1.89	1.86
Saudi Arabia	7.70	9.00	10.71	13.50	10.41

COMPARISON OF PER CAPITA GDP VS PER CAPITA MILITARY SPENDINGS

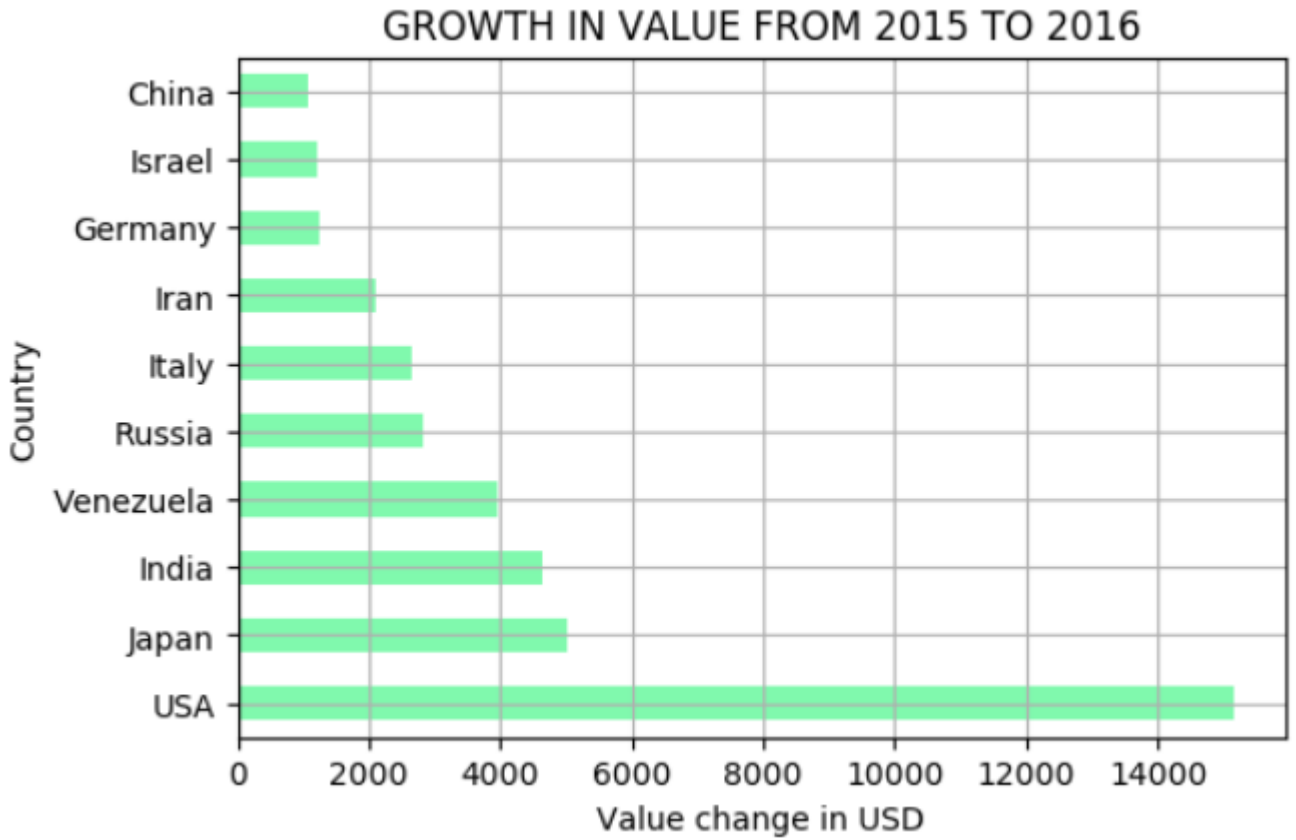
```
######### PLOTTING CHARTS FOR COMPARISON OF PER CAPITA GDP VS PER CAPITA MILITARY SPENDINGS (2012-2016) ################

### rename per_capita_gdp_top10 columns to G2012, G2013 .....  G represents the year for per capita GDP
### rename sipri_percapita_top10 columns to M2012, M2013 ..... M represents the year for per capita military spendings

a = per_capita_gdp_top10.rename(columns = {'2012': 'G2012', '2013':'G2013', '2014':'G2014', '2015':'G2015', '2016':'G2016'})
b = sipri_percapita_top10.rename(columns = {'2012': 'M2012', '2013':'M2013', '2014':'M2014', '2015':'M2015', '2016':'M2016'})

#PLOT CHARTS AND TABLES FROM 2012-2016
for i in range(1,6):
    chk1 =  a.iloc[:, [0,i]]
    chk2 =  b.iloc[:, [0,i]]
    check = chk1.merge(chk2, left_on='Country', right_on = 'Country')
    print(check)
    check = check.set_index('Country')
    fig = plt.subplots( figsize=(10,4) )
    ax = check.iloc[:,0].plot(kind='bar', use_index=True, color = "xkcd:kelly green")
    ax2 = ax.twinx()
    ax2.plot(check.iloc[:,1].values,linestyle='-', marker='o', linewidth=0.5, color='r')
    ax.set_title("Year - %d" % + float(i+2011))
    ax.set_ylabel("Per capita GDP")
    ax2.set_ylabel("Per capita military spendings")
    plt.grid()
    plt.show()
```

	Country	G2015	M2015	G2016	M2016
0	China	8069.21	155.59	8123.18	155.74
1	France	36526.77	859.41	36854.97	862.36
2	Germany	41176.88	493.41	41936.06	509.33
3	India	1613.19	39.13	1709.39	42.14
4	Japan	34474.14	324.74	38894.47	365.40
5	Russia	9329.30	462.99	8748.36	483.11
6	Saudi Arabia	20732.86	2764.26	20028.65	1978.19
7	South Korea	27105.08	724.40	27538.81	728.80
8	UK	43929.69	832.29	39899.39	741.31
9	USA	56207.04	1852.26	57466.79	1886.16



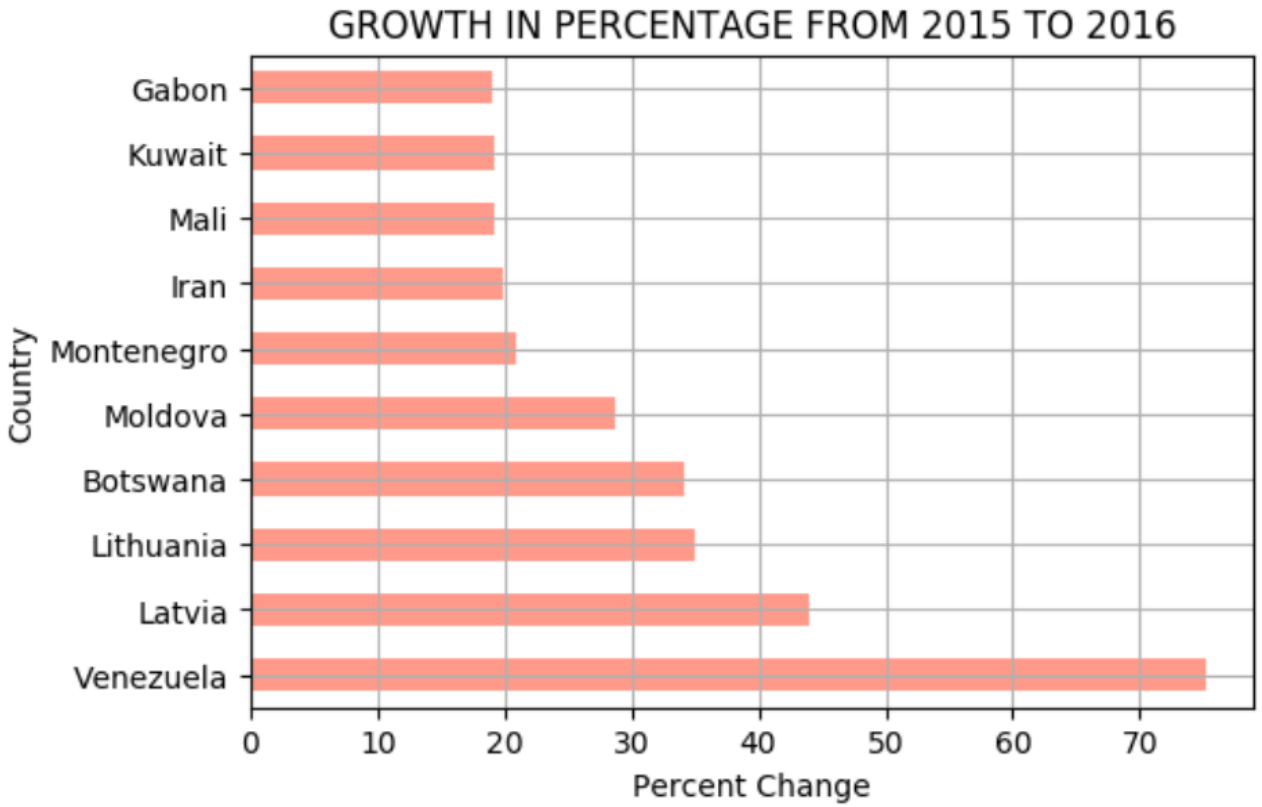


TOP 10 FASTEST GROWING COUNTRIES IN VALUE (2015-2016)



Country	Value Change from 2015 to 2016
USA	15176.80
Japan	5023.10
India	4627.69
Venezuela	3957.26
Russia	2826.60
Italy	2639.16
Iran	2096.24
Germany	1254.89
Israel	1213.45
China	1082.86

TOP 10 FASTEST GROWING COUNTRIES IN PERCENTAGE (2015-2016)



Country	Percent Change from 2015 to 2016
Venezuela	75.16
Latvia	43.92
Lithuania	34.99
Botswana	34.06
Moldova	28.63
Montenegro	20.96
Iran	19.80
Mali	19.27
Kuwait	19.22
Gabon	19.04

LEARNINGS

- Python is an easy language to pick up
- Packages like pandas, numpy, matplotlib are very useful for data manipulation and visualization
- Testing a single line of code first and then integrating it in loops and functions saves time
- Ample support for python is available online
- There is always a way to shorten the length of a piece of code
- With more experience in python, I can definitely improve my code

REFERENCES

- http://www.businessinsider.com/us-military-spending-chart-2014-4
- https://www.forbes.com/sites/niallmccarthy/2017/04/24/the-top-15-countries-for-military-expenditure-in-2016-infographic/#223bc46143f3
- https://stackoverflow.com/questions/31593201/pandas-iloc-vs-ix-vs-loc-explanation
- https://github.com/pandas-dev/pandas/blob/master/doc/cheatsheet/Pandas_Cheat_Sheet.pdf
- https://www.youtube.com/user/sentdex

THANK YOU