Task4:- Customized Complex Plots

1. Task Description:

Use the Object-Oriented API of Matplotlib to create complex and highly customized plots.

2. Task Output Screenshot:

```
#Let's find which region earns the highest Profit
regions = data.groupby(by='Region')
```

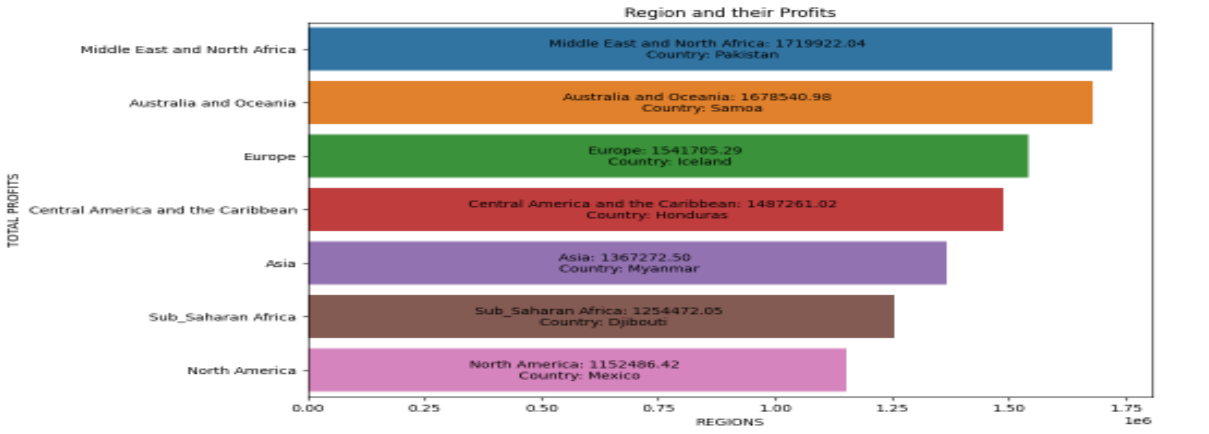
```
df_highest_profit_regions = pd.DataFrame(columns=data.columns)
```

```
for reg, data in regions:
    highest_profit = data.nlargest(1, 'Total_Profit')
    df_highest_profit_regions = pd.concat([df_highest_profit_regions, highest_profit])
```

```
df_highest_profit_regions.sort_values(by='Total_Profit', ascending=False)
```

	Region	Country	Item_Type	Sales_Channel	Order_Priority	Ship_Date	Unit_Cost	Total_Revenue	Total_Profit	Expenses	Profit_Margin
74	Middle East and North Africa	Pakistan	Cosmetics	Offline	L	16/08/2013	263.33	4324782.40	1719922.04	2604860.36	39.788984
79	Australia and Oceania	Samoa	Cosmetics	Online	H	06/07/2013	263.33	4220728.80	1678540.98	2542187.82	39.788984
48	Europe	Iceland	Cosmetics	Online	C	31/12/2016	263.33	3878852.40	1541705.29	2337147.11	39.788984
13	Central America and the Caribbean	Honduras	Household	Offline	H	13/02/2017	502.54	5997054.98	1487261.02	4509793.96	24.799856
33	Asia	Myanmar	Household	Offline	H	03/01/2015	502.54	5513227.50	1367272.50	4145955.00	24.799856
59	Sub_Saharan Africa	Djibouti	Cosmetics	Offline	H	19/04/2014	263.33	3154398.00	1254472.05	1899925.95	39.788984
75	North America	Mexico	Household	Offline	C	12/12/2014	502.54	4647149.58	1152486.42	3494663.16	24.799856

```
fig, ax = plt.subplots(figsize=(18,7))

tmp_df = df_highest_profit_regions.copy()

tmp_df = tmp_df.sort_values(by='Total_Profit', ascending=False)

sns.barplot(x = tmp_df['Total_Profit'], y=tmp_df['Region'], orient='h', data=tmp_df,\
            order=['Middle East and North Africa', 'Australia and Oceania', 'Europe', 'Central America and the Caribbean', 'Asia',
'Sub_Saharan Africa', 'North America'],
             capsize=0.2, ax=ax)

lbs = ['Middle East and North Africa: 1719922.84 \n Country: Pakistan',
       'Australia and Oceania: 1678548.98 \n Country: Samoa',
       'Europe: 1541705.29 \n Country: Iceland',
       'Central America and the Caribbean: 1487261.02 \n Country: Honduras',
       'Asia: 1367272.50 \n Country: Myanmar',
       'Sub_Saharan Africa: 1254472.05 \n Country: Djibouti',
       'North America: 1152486.42 \n Country: Mexico']

ax.bar_label(ax.containers[-1], labels=lbs,label_type='center')

plt.title('Region and their Profits')
plt.xlabel('REGIONS')
plt.ylabel('TOTAL PROFITS')
plt.show()
```



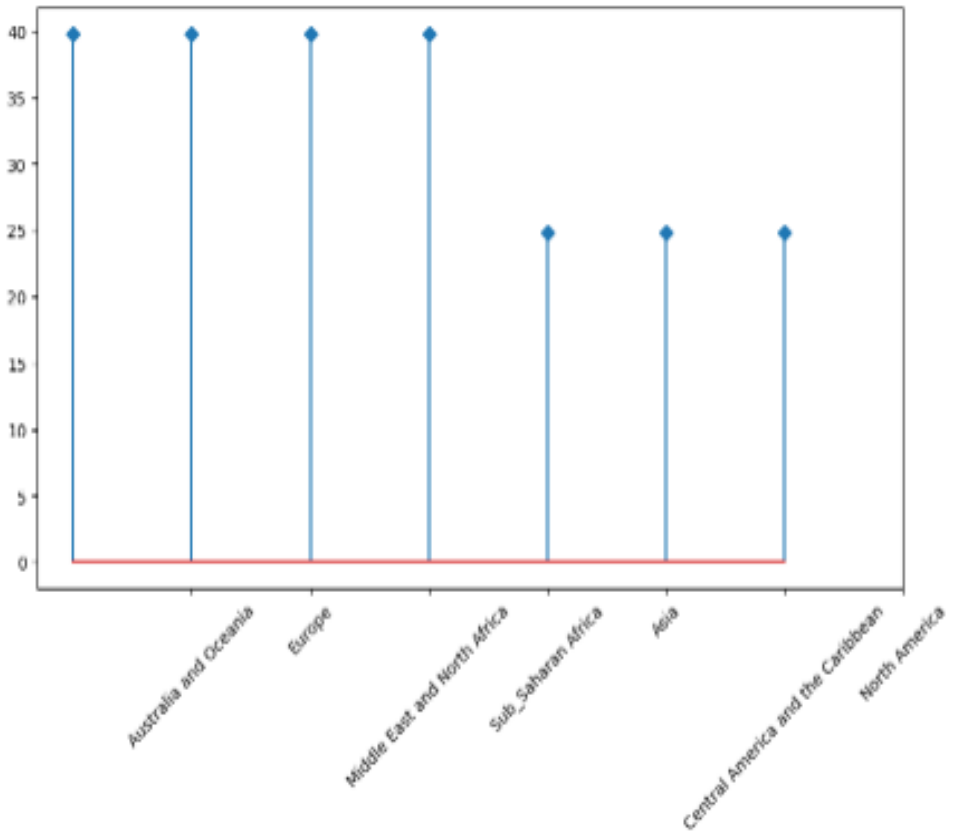
```
#Let's check Which Region earns the highest Profit Margin
df_highest_pmargin_region = pd.DataFrame(columns=data.columns)
```

```
for reg, data in regions:
    highest_margin = data.nlargest(1, 'Profit_Margin')
    df_highest_pmargin_region = pd.concat([df_highest_pmargin_region, highest_margin])
```

```
df_highest_pmargin_region.sort_values(by='Profit_Margin', ascending=False)
```

	Region	Country	Item_Type	Sales_Channel	Order_Priority	Ship_Date	Unit_Cost	Total_Revenue	Total_Profit	Expenses	Profit_Margin
87	Central America and the Caribbean	Belize	Clothes	Offline	M	09/07/2016	35.84	600821.44	403773.12	197048.32	67.203514
12	Asia	Bangladesh	Clothes	Online	L	03/01/2017	35.84	902980.84	606834.72	296146.92	67.203514
58	Australia and Oceania	Fiji	Clothes	Offline	C	08/01/2010	35.84	1082418.40	727423.20	354995.20	67.203514
15	Europe	Bulgaria	Clothes	Online	M	08/03/2012	35.84	182825.44	122865.12	59960.32	67.203514
83	Middle East and North Africa	Libya	Clothes	Offline	H	17/11/2010	35.84	668356.48	449159.04	219197.44	67.203514
11	Sub-Saharan Africa	Cape Verde	Clothes	Offline	H	19/08/2014	35.84	456479.04	306897.92	149381.12	67.203514
98	North America	Mexico	Personal Care	Offline	M	08/08/2015	56.67	471338.91	144521.02	326815.89	30.661936

```
fig, ax = plt.subplots(figsize=(18,6))
tmp_df = df_highest_profit_regions.copy()
tmp_df = tmp_df.sort_values(by='Profit_Margin', ascending=False)
plt.stem(tmp_df['Profit_Margin'],markerfmt='D')
my_range=range(1,len(tmp_df.index)+1)
plt.xticks( my_range, tmp_df['Region'], rotation=45)
plt.show()
```



3. **Algorithm Used In Task:**

    - Object-Oriented API of Matplotlib is used because it is allows more control over plotting elements.
    - Groupby function is used for grouping data by regions.
    - Nlargest function is used for identifying the rows with the highest profits and profit margins.