DA_Project

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Video Games Sales Analysis

~A Data Analytics Project

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[ ]:
```
#Importing libraries
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import plotly.express as px
import plotly.graph_objects as go
import plotly.io as pio
from plotly.subplots import make_subplots

pio.renderers.default='notebook+pdf'
pio.kaleido.scope.mathjax = None
```

[ ]:
```
#Importing the data
df=pd.read_csv("./vgsales.csv")
df.head()
```

[ ]:
```
   Rank                      Name Platform    Year         Genre Publisher  \
0     1                Wii Sports      Wii  2006.0        Sports  Nintendo
1     2         Super Mario Bros.      NES  1985.0      Platform  Nintendo
2     3            Mario Kart Wii      Wii  2008.0        Racing  Nintendo
3     4         Wii Sports Resort      Wii  2009.0        Sports  Nintendo
4     5  Pokemon Red/Pokemon Blue       GB  1996.0  Role-Playing  Nintendo

   NA_Sales  EU_Sales  JP_Sales  Other_Sales  Global_Sales
0     41.49     29.02      3.77         8.46         82.74
1     29.08      3.58      6.81         0.77         40.24
2     15.85     12.88      3.79         3.31         35.82
3     15.75     11.01      3.28         2.96         33.00
4     11.27      8.89     10.22         1.00         31.37
```

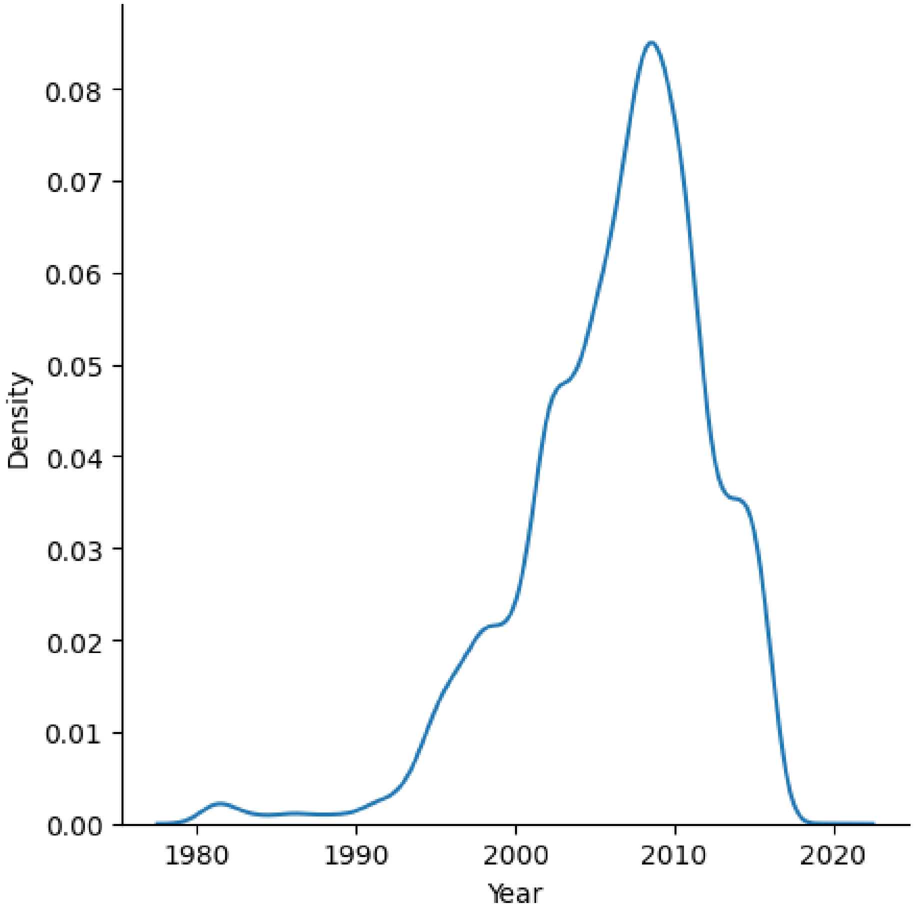
[ ]:

```python
#Missing data analysis
print('Total Rows : ', df.shape[0], 'Total Columns : ', df.shape[1])

print('\nMissing Data Column Wise : ')
print(df.isnull().sum())
```

```
Total Rows :  16598 Total Columns :  11

Missing Data Column Wise :
Rank              0
Name              0
Platform          0
Year            271
Genre             0
Publisher        58
NA_Sales          0
EU_Sales          0
JP_Sales          0
Other_Sales       0
Global_Sales      0
dtype: int64
```

[ ]:

```python
#Missing Year Values
sns.displot(df, x="Year", kind="kde")
plt.show()
```



0.0.1 As we can see the distribution of Year is skewed, so it is best to impute the missing values with the median

[ ]:

```
#Imputing Year
df["Year"].fillna(df["Year"].median(),inplace = True)
```

0.0.2 The Publisher column also has few missing values, but since it is a nominal data, we cannot impute it with any values, so we just drop those rows

[ ]:

```
df["Publisher"].dropna(inplace = True)
```

0.1 Now, Let us begin with our Exploratory Data Analysis

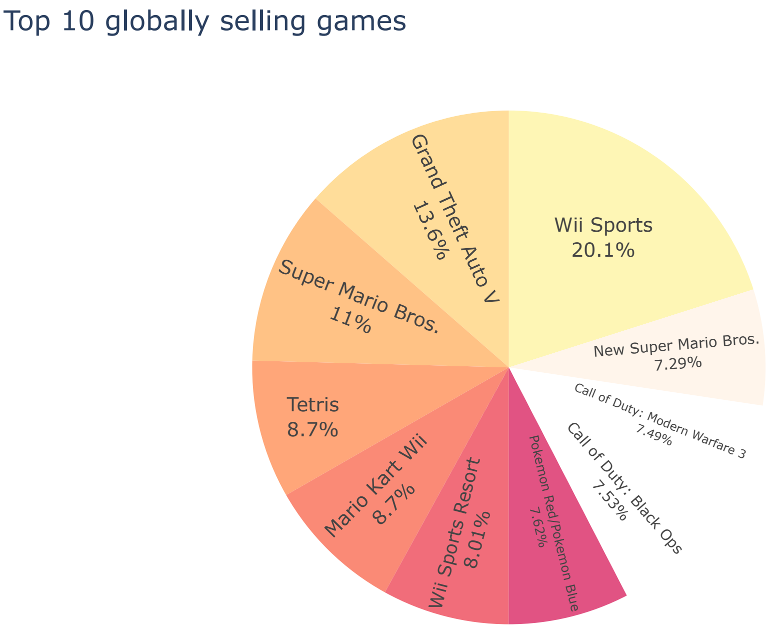
0.1.1 1. What are the top 10 games currently, making most sales all over the world?

```
[ ]: games_sales = df.groupby("Name")[["Global_Sales"]].sum()
     top_games = pd.DataFrame((games_sales.sort_values(by=['Global_Sales'],␣
      ↪ascending=False).reset_index()))
     top10_games = top_games.head(10)
     top10_games_output = top10_games.style.format({
         "Global_Sales": "${:.2f}M"
     }).hide(axis="index")

     print(pd.DataFrame(display((top10_games_output))))
```

```
<pandas.io.formats.style.Styler at 0x1f63815bac0>

Empty DataFrame
Columns: []
Index: []
```

We can make a pie chart for representing the top 10 globally selling games.

```
[ ]: pie_chart = px.pie(top10_games, values=top10_games['Global_Sales'],␣
      ↪names=top10_games['Name'],title='Top 10 globally selling games',␣
      ↪color_discrete_sequence=px.colors.sequential.Pinkyl)
     pie_chart.update_traces(textposition='inside',␣
      ↪textinfo='percent+label',showlegend=False)
     pie_chart.show()
```



0.1.2 2. Which region performed best in terms of overall sales?

[ ]:

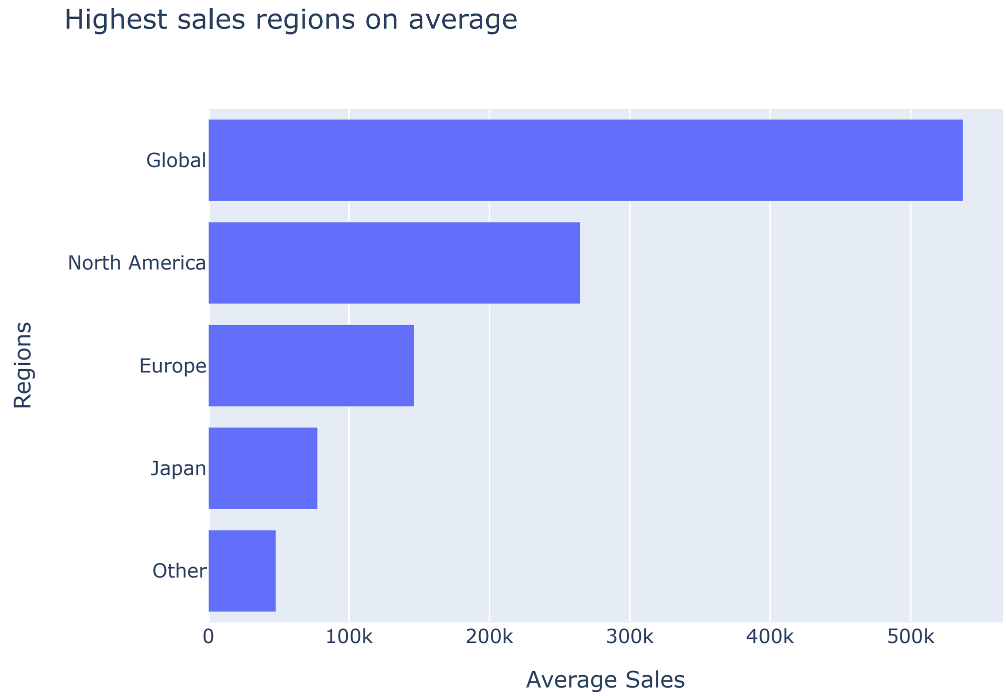
```
#Average sales can be seen to see the overall sales region wise

na = df['NA_Sales'].mean()*1000000
jp = df['JP_Sales'].mean()*1000000
eu = df['EU_Sales'].mean()*1000000
ot = df['Other_Sales'].mean()*1000000
gl = df['Global_Sales'].mean()*1000000

print('Average Sales in North America : ', f"${na:,.2f}")
print('Average Sales in Japan : ', f"${jp:,.2f}")
print('Average Sales in Europe : ', f"${eu:,.2f}")
print('Average Sales in Other Regions : ', f"${ot:,.2f}")
print('Average Sales Globally : ', f"${gl:,.2f}")
```

```
Average Sales in North America :  $264,667.43
Average Sales in Japan :  $77,781.66
Average Sales in Europe :  $146,652.01
Average Sales in Other Regions :  $48,063.02
Average Sales Globally :  $537,440.66
```

We can plot a bar chart to visualize the region wise sales

[ ]:

```
bar_chart = go.Figure(data=[go.Bar(
    y=['Other','Japan','Europe','North America','Global'],
    x=[ot, jp, eu, na, gl],
    orientation='h',
)])
bar_chart.update_layout(title_text='Highest sales regions on average')
bar_chart.update_xaxes(title='Average Sales')
bar_chart.update_yaxes(title='Regions')
```



0.1.3 3. What are the best selling consoles?

[ ]:

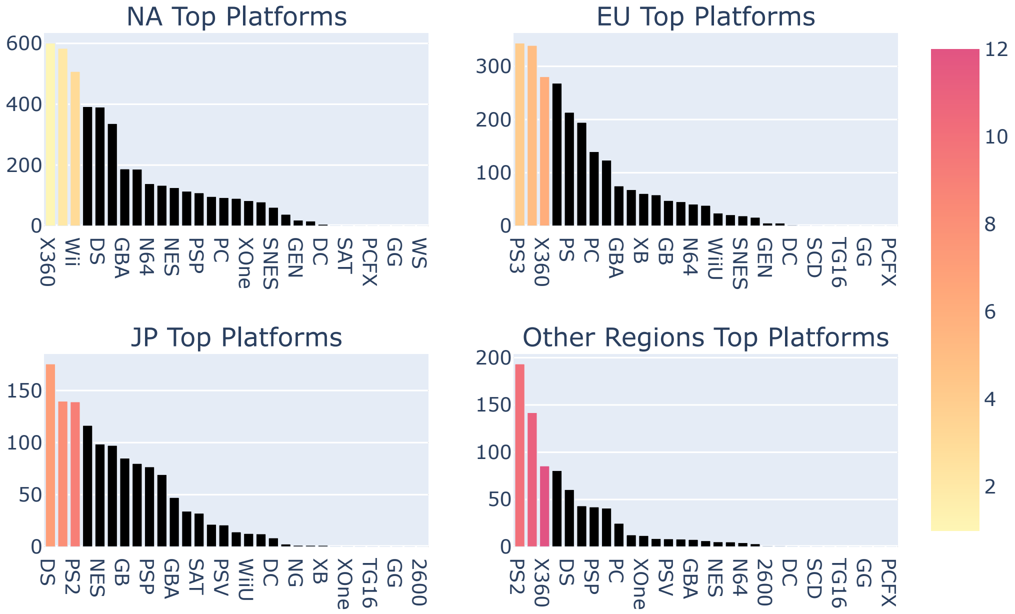
```
#For this analysis we'll group the individual sale with sales in specific␣
 ↪region(s)

na_plat_sales = pd.DataFrame(df.groupby("Platform")[["NA_Sales"]].sum().
 ↪sort_values(by=['NA_Sales'],ascending=[False]).reset_index())
na_plat_sales.rename(columns = {'Platform':'NA Platform'}, inplace = True)

eu_plat_sales = pd.DataFrame(df.groupby("Platform")[["EU_Sales"]].sum().
 ↪sort_values(by=['EU_Sales'],ascending=[False]).reset_index())
```

```
eu_plat_sales.rename(columns = {'Platform':'EU Platform'}, inplace = True)

jp_plat_sales = pd.DataFrame(df.groupby("Platform")[["JP_Sales"]].sum().
 ↪sort_values(by=['JP_Sales'],ascending=[False]).reset_index())
jp_plat_sales.rename(columns = {'Platform':'JP Platform'}, inplace = True)

ot_plat_sales = pd.DataFrame(df.groupby("Platform")[["Other_Sales"]].sum().
 ↪sort_values(by=['Other_Sales'],ascending=[False]).reset_index())
ot_plat_sales.rename(columns = {'Platform':'Other Platform'}, inplace = True)

data=pd.concat([na_plat_sales,eu_plat_sales,jp_plat_sales,ot_plat_sales],axis=1)
data.head(3)
```

```
[ ]:   NA Platform  NA_Sales EU Platform  EU_Sales JP Platform  JP_Sales  \
     0        X360    601.05         PS3    343.71          DS    175.57
     1         PS2    583.84         PS2    339.29          PS    139.82
     2         Wii    507.71        X360    280.58         PS2    139.20

       Other Platform  Other_Sales
     0            PS2       193.44
     1            PS3       141.93
     2           X360        85.54
```

As we can see the output, it is a little difficult to analyze the result. So we can plot the result using line chart and visualize it better

```
[ ]: line_chart = make_subplots(rows=2, cols=2,subplot_titles=("NA Top␣
      ↪Platforms","EU Top Platforms","JP Top Platforms","Other Regions Top␣
      ↪Platforms"))

     line_chart.add_trace(go.Bar(x=data['NA Platform'], y=data['NA_Sales'],
                          marker=dict(color=[1, 2, 3],
                                      coloraxis="coloraxis")),1, 1)

     line_chart.add_trace(go.Bar(x=data['EU Platform'], y=data['EU_Sales'],
                          marker=dict(color=[4, 5, 6],
                                      coloraxis="coloraxis")),1, 2)

     line_chart.add_trace(go.Bar(x=data['JP Platform'], y=data['JP_Sales'],
                          marker=dict(color=[7, 8, 9],
                                      coloraxis="coloraxis")),2, 1)

     line_chart.add_trace(go.Bar(x=data['Other Platform'], y=data['Other_Sales'],
                          marker=dict(color=[10, 11, 12],
                                      coloraxis="coloraxis")),2, 2)

     line_chart.update_layout(coloraxis=dict(colorscale='Pinkyl'), showlegend=False)
     line_chart.show()
```



0.2 What are the Top Selling Games in every region?

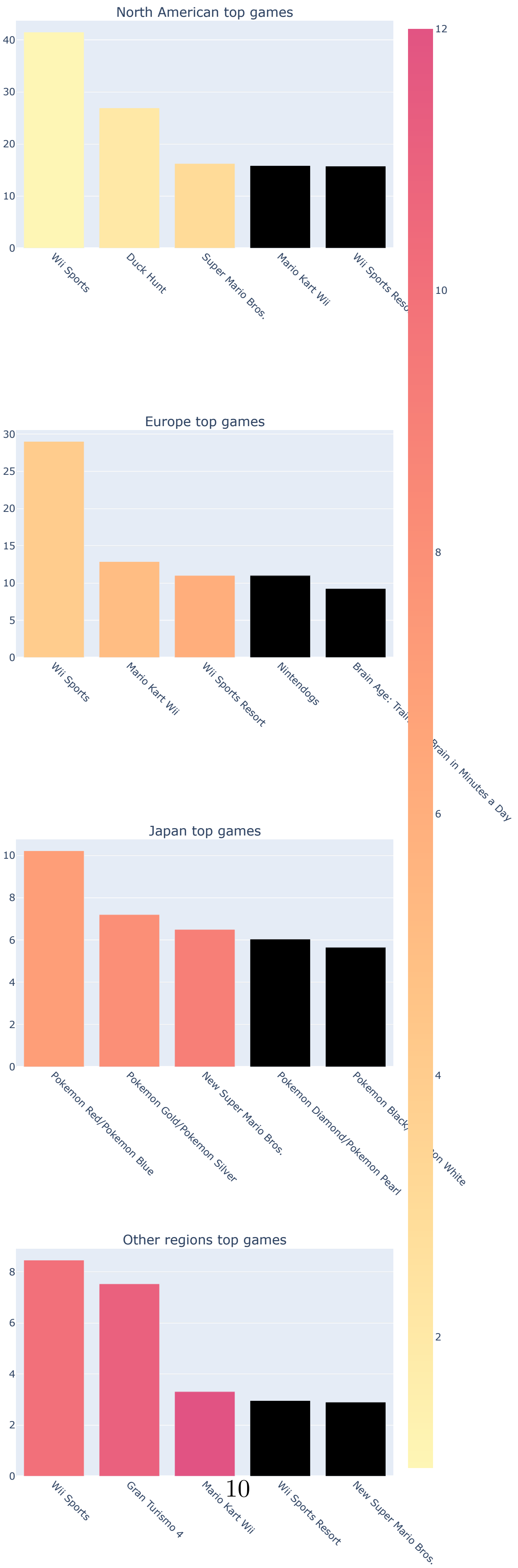
[ ]:

```
na_top_games = pd.DataFrame(df.groupby("Name")['NA_Sales'].mean().
  ↪sort_values(ascending=False).reset_index())
na_top_games.rename(columns = {'Name':'NA_Game'}, inplace = True)

eu_top_games = pd.DataFrame(df.groupby("Name")['EU_Sales'].mean().
  ↪sort_values(ascending=False).reset_index())
eu_top_games.rename(columns = {'Name':'EU_Game'}, inplace = True)

jp_top_games = pd.DataFrame(df.groupby("Name")['JP_Sales'].mean().
  ↪sort_values(ascending=False).reset_index())
jp_top_games.rename(columns = {'Name':'JP_Game'}, inplace = True)

ot_top_games = pd.DataFrame(df.groupby("Name")['Other_Sales'].mean().
  ↪sort_values(ascending=False).reset_index())
ot_top_games.rename(columns = {'Name':'Other_Game'}, inplace = True)

top_games_df=pd.
  ↪concat([na_top_games,eu_top_games,jp_top_games,ot_top_games],axis=1)
```

0.2.1 Visualization Of Top Selling Games

[ ]:

```
top_games_bar = make_subplots(rows=4, cols=1,subplot_titles=("North American␣
 ↪top games","Europe top games", "Japan top games","Other regions top games"))

top_games_bar.add_trace(go.Bar(x=top_games_df['NA_Game'][:5],␣
 ↪y=top_games_df['NA_Sales'][:5],marker=dict(color=[1, 2,␣
 ↪3],coloraxis="coloraxis")),1, 1)
top_games_bar.add_trace(go.Bar(x=top_games_df['EU_Game'][:5],␣
 ↪y=top_games_df['EU_Sales'][:5],marker=dict(color=[4, 5, 6],␣
 ↪coloraxis="coloraxis")), 2, 1)
top_games_bar.add_trace(go.Bar(x=top_games_df['JP_Game'][:5],␣
 ↪y=top_games_df['JP_Sales'][:5],marker=dict(color=[7, 8, 9],␣
 ↪coloraxis="coloraxis")),3, 1)
top_games_bar.add_trace(go.Bar(x=top_games_df['Other_Game'][:5],␣
 ↪y=top_games_df['Other_Sales'][:5],marker=dict(color=[10, 11, 12],␣
 ↪coloraxis="coloraxis")),4, 1)

top_games_bar.update_xaxes(tickangle=45)
top_games_bar.update_layout(height=2000,coloraxis=dict(colorscale='Pinkyl'),␣
 ↪showlegend=False)
top_games_bar.show()
```


North American top games
0
10
20
30
40
Wii Sports
Duck Hunt
Super Mario Bros.
Mario Kart Wii
Wii Sports Reso
Europe top games
0
5
10
15
20
25
30
Wii Sports
Mario Kart Wii
Wii Sports Resort
Nintendogs
Brain Age: Trai
Brain in Minutes a Day
Japan top games
0
2
4
6
8
10
Pokemon Red/Pokemon Blue
Pokemon Gold/Pokemon Silver
New Super Mario Bros.
Pokemon Diamond/Pokemon Pearl
Pokemon Black
on White
Other regions top games
0
2
4
6
8
Wii Sports
Gran Turismo 4
Mario Kart Wii
Wii Sports Resort
New Super Mario Bros.
12
10
8
6
4
2

0.3 What are the region wise top publishers?

[ ]:

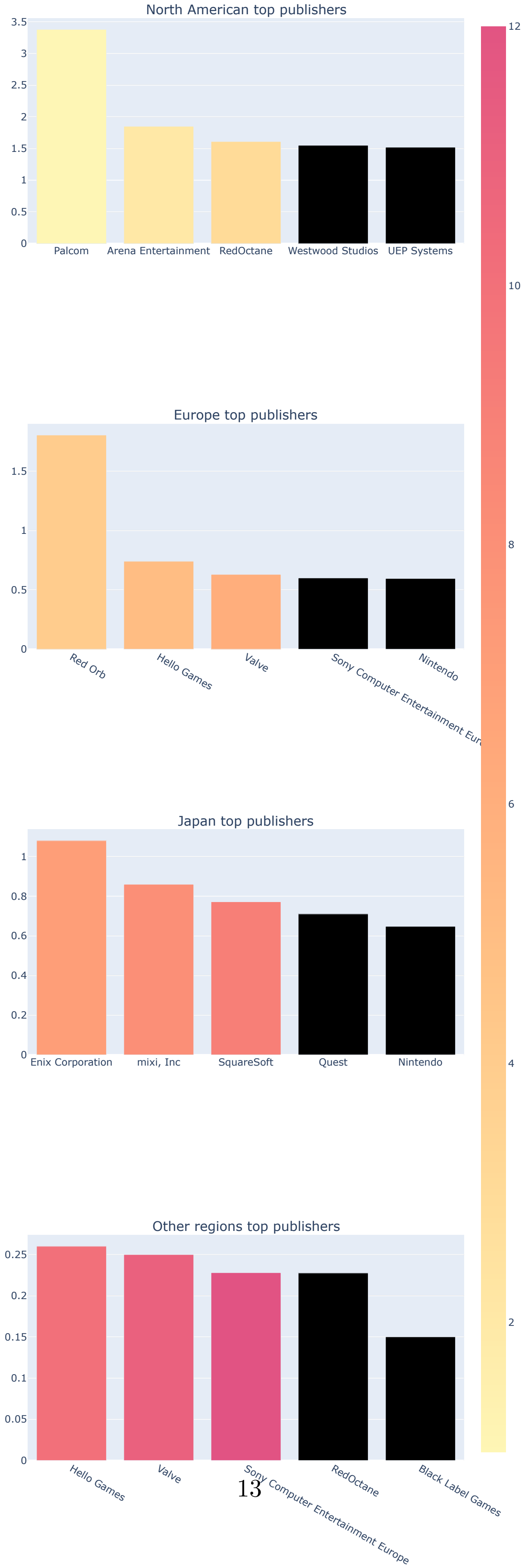
```
#We can group the data by publishers and different regions for analyzing, just␣
 ↪like above
na_top_publishers = pd.DataFrame(df.groupby("Publisher")['NA_Sales'].mean().
 ↪sort_values(ascending=False).reset_index())
na_top_publishers.rename(columns = {'Publisher':'NA_Publisher'}, inplace = True)

eu_top_publishers = pd.DataFrame(df.groupby("Publisher")['EU_Sales'].mean().
 ↪sort_values(ascending=False).reset_index())
eu_top_publishers.rename(columns = {'Publisher':'EU_Publisher'}, inplace = True)

jp_top_publishers = pd.DataFrame(df.groupby("Publisher")['JP_Sales'].mean().
 ↪sort_values(ascending=False).reset_index())
jp_top_publishers.rename(columns = {'Publisher':'JP_Publisher'}, inplace = True)

ot_top_publishers = pd.DataFrame(df.groupby("Publisher")['Other_Sales'].mean().
 ↪sort_values(ascending=False).reset_index())
ot_top_publishers.rename(columns = {'Publisher':'Other_Publisher'}, inplace =␣
 ↪True)


top_publishers_df=pd.
 ↪concat([na_top_publishers,eu_top_publishers,jp_top_publishers,ot_top_publishers],axis=1)
```

0.3.1 We can visualise it just like top games region wise

[ ]:

```
top_publishers_bar = make_subplots(rows=4, cols=1,subplot_titles=("North␣
 ↪American top publishers","Europe top publishers", "Japan top␣
 ↪publishers","Other regions top publishers"))

top_publishers_bar.add_trace(go.Bar(x=top_publishers_df['NA_Publisher'][:5],␣
 ↪y=top_publishers_df['NA_Sales'][:5],marker=dict(color=[1, 2,␣
 ↪3],coloraxis="coloraxis")),1, 1)
top_publishers_bar.add_trace(go.Bar(x=top_publishers_df['EU_Publisher'][:5],␣
 ↪y=top_publishers_df['EU_Sales'][:5],marker=dict(color=[4, 5, 6],␣
 ↪coloraxis="coloraxis")), 2,1)
top_publishers_bar.add_trace(go.Bar(x=top_publishers_df['JP_Publisher'][:5],␣
 ↪y=top_publishers_df['JP_Sales'][:5],marker=dict(color=[7, 8, 9],␣
 ↪coloraxis="coloraxis")),3,1)
top_publishers_bar.add_trace(go.Bar(x=top_publishers_df['Other_Publisher'][:5],␣
 ↪y=top_publishers_df['Other_Sales'][:5],marker=dict(color=[10, 11, 12],␣
 ↪coloraxis="coloraxis")),4,1)
```

```
top_publishers_bar.
 ↪update_layout(height=2000,coloraxis=dict(colorscale='Pinkyl'),␣
 ↪showlegend=False)
top_publishers_bar.show()
```


North American top publishers
0
0.5
1
1.5
2
2.5
3
3.5
Palcom
Arena Entertainment
RedOctane
Westwood Studios
UEP Systems
Europe top publishers
0
0.5
1
1.5
Red Orb
Hello Games
Valve
Sony Computer Entertainment Eur
Nintendo
Japan top publishers
0
0.2
0.4
0.6
0.8
1
Enix Corporation
mixi, Inc
SquareSoft
Quest
Nintendo
Other regions top publishers
0
0.05
0.1
0.15
0.2
0.25
Hello Games
Valve
Sony Computer Entertainment Europe
RedOctane
Black Label Games
12
10
8
6
4
2

##Games that are released before year 2000 and are making very high sales!

[ ]:
```
bef_2000 = df.query("Year<2000")
bef_2000['Year'].shape
```

[ ]:
```
(1974,)
```

###As we can see there are 1974 games that were released before 2000, so now games that are released before 2000 and are sold top 1% among all of them, are the one's we are targetting here, so we can find 99th percentile and games crossing those many global sales, are higher than 99 percentile games

[ ]:
```
bef_2000_99p = bef_2000['Global_Sales'].quantile(0.99)
print('99th Percentile : ',bef_2000_99p)

top_old_games = bef_2000.query(f"Global_Sales>{bef_2000_99p}")
top_old_games = top_old_games[["Name", "Genre", "Global_Sales"]]

top_old_games_output = top_old_games.style.format({
    "Year": "{:,.0f}",
    "Global_Sales": "${:.2f}M"
}).hide(axis="index")

print(display(top_old_games_output))
```

```
99th Percentile :  7.823499999999999
```

```
<pandas.io.formats.style.Styler at 0x1f636356e90>
```

```
None
```