Samiyah Irfan - ICA Project

December 19, 2023

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
```

[4]:
```
df = pd.read_csv(r'C:\Users\Tariq\Downloads\vgsales.csv\vgsales.csv')
```

[5]:
```
df.shape
```

[5]:
```
(16598, 11)
```

[6]:
```
df.head()
```

[6]:
```
   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
```

[7]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 16598 entries, 0 to 16597
Data columns (total 11 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   Rank          16598 non-null  int64
 1   Name          16598 non-null  object
 2   Platform      16598 non-null  object
 3   Year          16327 non-null  float64
 4   Genre         16598 non-null  object
 5   Publisher     16540 non-null  object
 6   NA_Sales      16598 non-null  float64
 7   EU_Sales      16598 non-null  float64
 8   JP_Sales      16598 non-null  float64
 9   Other_Sales   16598 non-null  float64
 10  Global_Sales  16598 non-null  float64
dtypes: float64(6), int64(1), object(4)
memory usage: 1.4+ MB
```

```
[8]: pd.isnull(df).sum()
     #check for null values
```

```
[8]: 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
```

```
[9]: #drop null values
     df.dropna(inplace = True)
```

```
[10]: #change data type
      df['Year'] = df['Year'].astype('int')
```

```
[11]: df.columns
```

```
[11]: Index(['Rank', 'Name', 'Platform', 'Year', 'Genre', 'Publisher', 'NA_Sales',
              'EU_Sales', 'JP_Sales', 'Other_Sales', 'Global_Sales'],
             dtype='object')
```

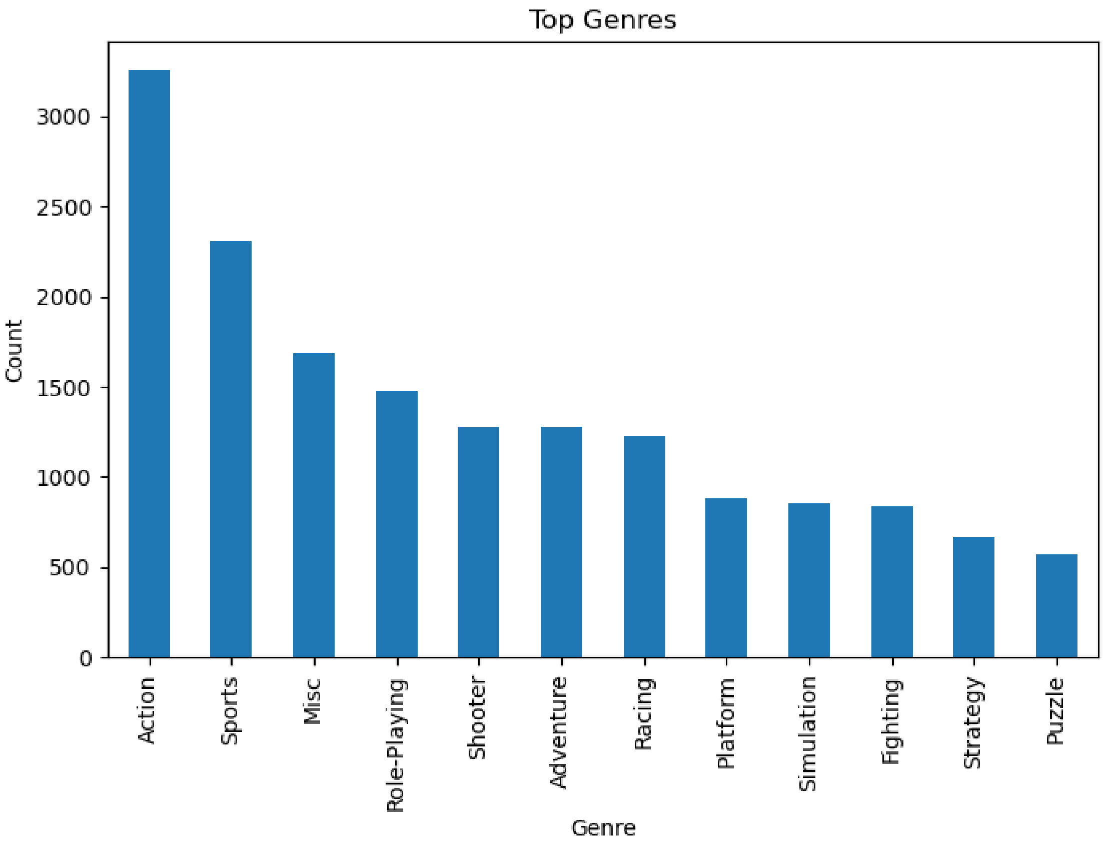
```
[12]: df.describe()
```

```
[12]:               Rank          Year      NA_Sales      EU_Sales      JP_Sales  \
      count  16291.000000  16291.000000  16291.000000  16291.000000  16291.000000
      mean    8290.190228   2006.405561      0.265647      0.147731      0.078833
      std     4792.654450      5.832412      0.822432      0.509303      0.311879
      min        1.000000   1980.000000      0.000000      0.000000      0.000000
      25%     4132.500000   2003.000000      0.000000      0.000000      0.000000
```

```
50%     8292.000000   2007.000000      0.080000      0.020000      0.000000
75%    12439.500000   2010.000000      0.240000      0.110000      0.040000
max    16600.000000   2020.000000     41.490000     29.020000     10.220000

        Other_Sales  Global_Sales
count  16291.000000  16291.000000
mean       0.048426      0.540910
std        0.190083      1.567345
min        0.000000      0.010000
25%        0.000000      0.060000
50%        0.010000      0.170000
75%        0.040000      0.480000
max       10.570000     82.740000
```

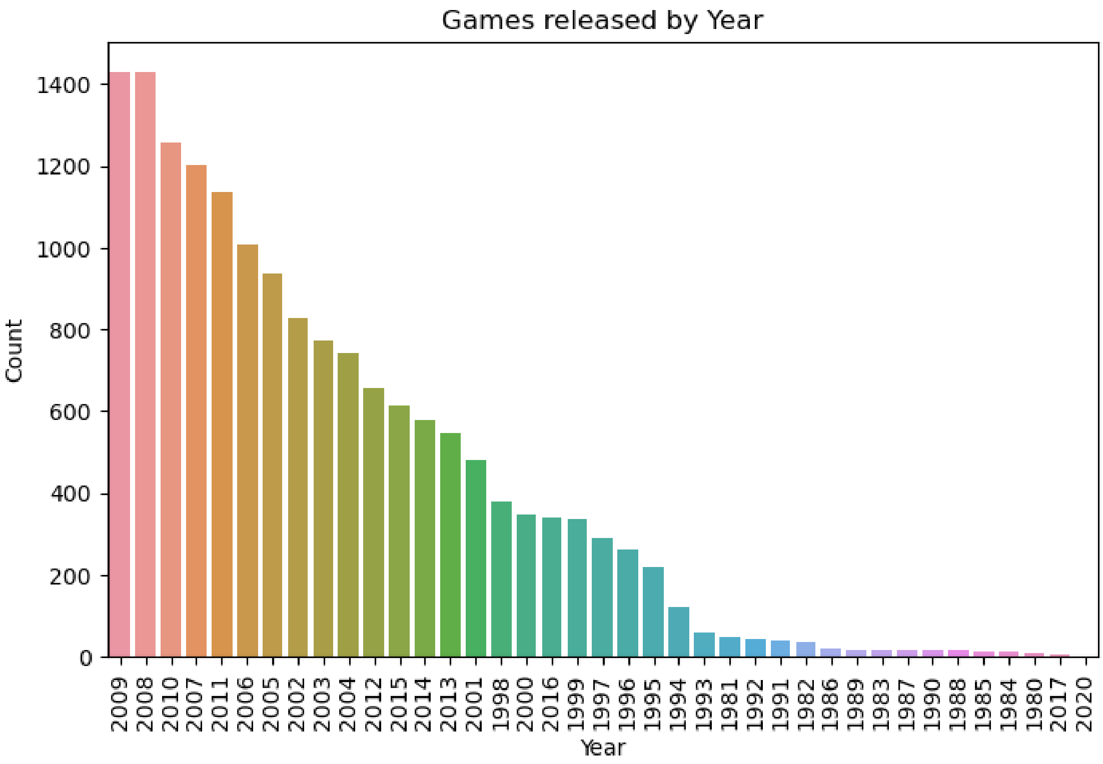
[13]:
```
numerical_vars = ['Rank', 'Year', 'NA_Sales', 'EU_Sales', 'JP_Sales',␣
 ↪'Other_Sales', 'Global_Sales']
```

[14]:
```
import matplotlib.pyplot as plt

bars = df['Genre'].value_counts()

# Plot the bar chart
bars.plot(kind="bar", title='Top Genres', figsize=(8, 5))
plt.xlabel('Genre')
plt.ylabel('Count')
plt.show()
```



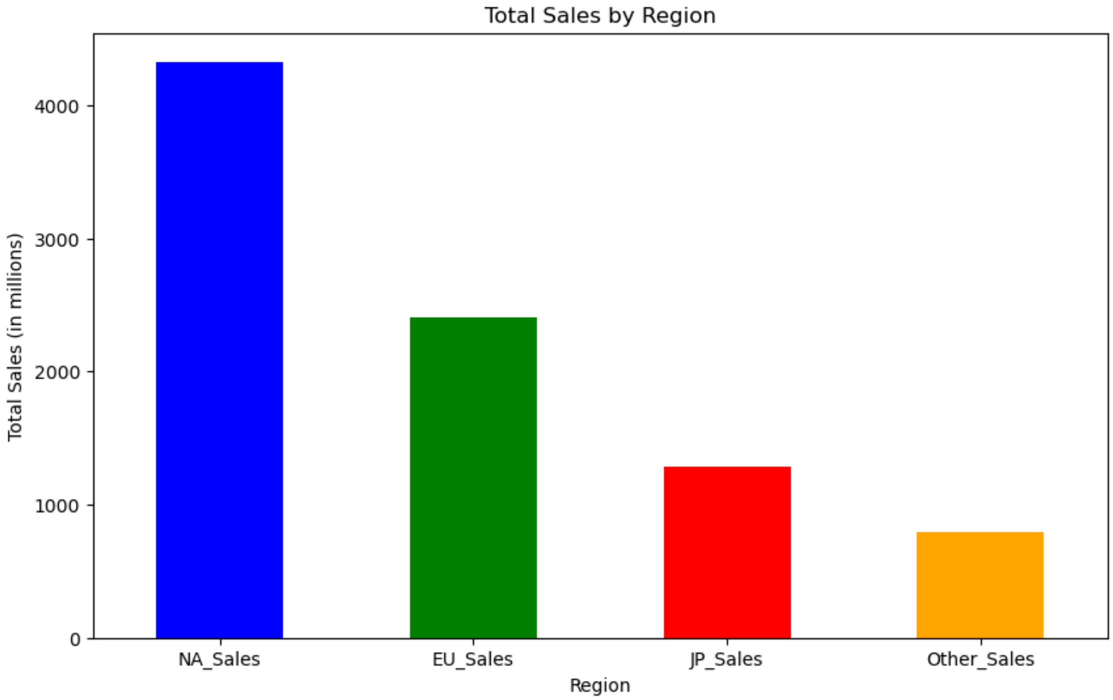
[15]:

```
plt.figure(figsize=(8, 5))
sns.countplot(x="Year", data=df, order=df.groupby(by=['Year'])['Name'].count().
  ↪sort_values(ascending=False).index)
plt.xticks(rotation='vertical')
plt.title('Games released by Year')
plt.ylabel('Count')
plt.xlabel('Year')
plt.show()
```



[16]:

```
regions = ['NA_Sales', 'EU_Sales', 'JP_Sales', 'Other_Sales']
region_sales = df[regions].sum()
plt.figure(figsize=(10, 6))
region_sales.plot(kind='bar', color=['blue', 'green', 'red', 'orange'])
plt.xlabel('Region')
plt.ylabel('Total Sales (in millions)')
plt.title('Total Sales by Region')
plt.xticks(rotation=0)
plt.show()
```



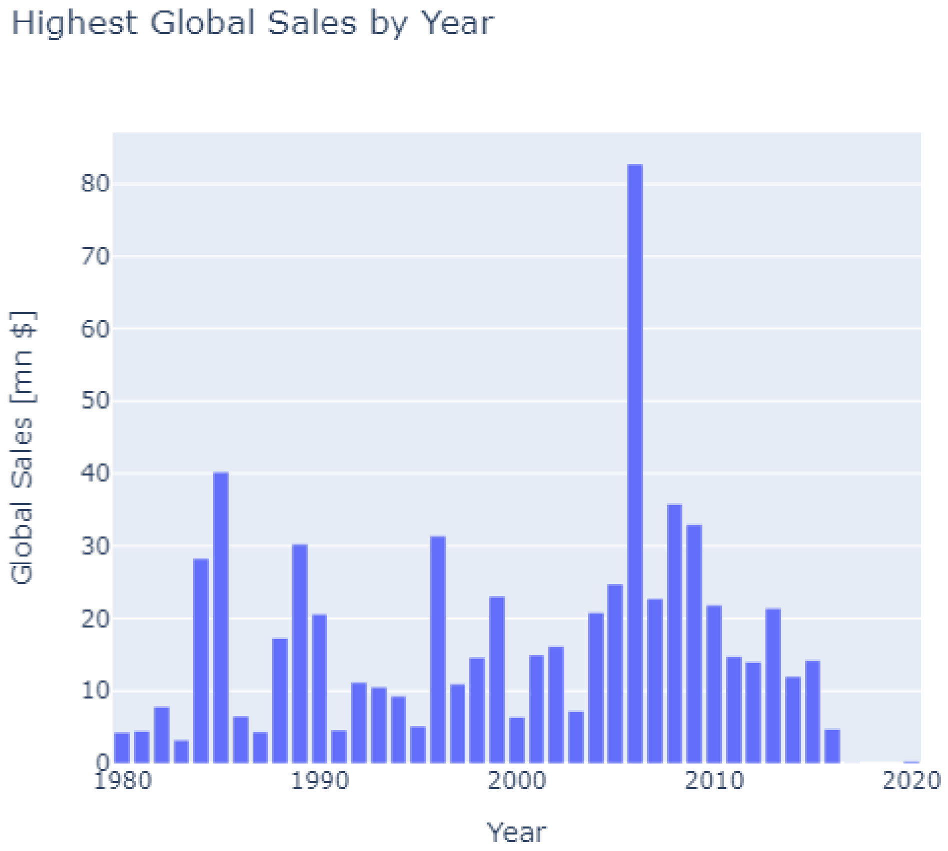
[17]:

```
vgsales_by_year= df.groupby('Year')['Global_Sales'].sum()
Year_Of_Highest_Sales= vgsales_by_year.idxmax()
print(Year_Of_Highest_Sales)
```

```
2008
```

[20]:

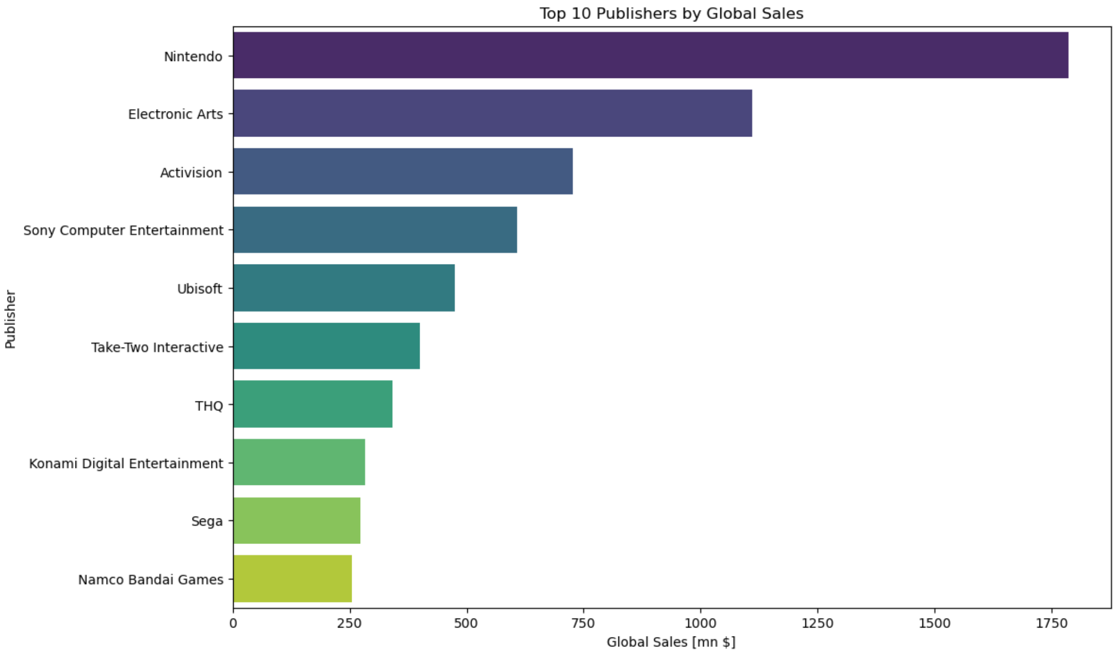
```
import pandas as pd
import plotly.express as px

df = pd.read_csv(r'C:\Users\Tariq\Downloads\vgsales.csv\vgsales.csv')

highest_sales_by_year = df.groupby('Year')['Global_Sales'].max().reset_index()

fig = px.bar(highest_sales_by_year, x='Year', y='Global_Sales', title='Highest␣
 ↪Global Sales by Year',
             labels={'Global_Sales': 'Global Sales [mn $]'}, height=500)

fig.show()
```



[23]:

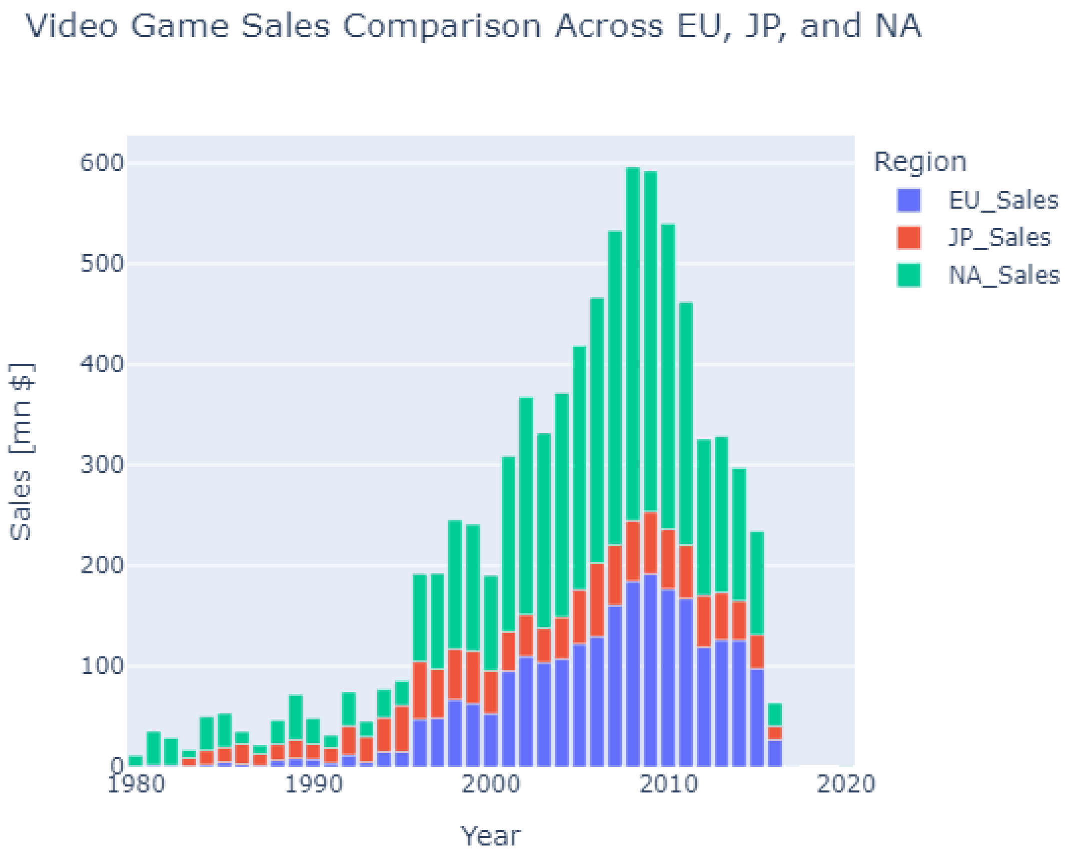
```
import pandas as pd
import seaborn as sns

df = pd.read_csv(r'C:\Users\Tariq\Downloads\vgsales.csv\vgsales.csv')

publisher_sales = df.groupby('Publisher')[['NA_Sales', 'EU_Sales', 'JP_Sales',␣
 ↪'Other_Sales', 'Global_Sales']].sum()

publisher_sales['Total_Sales'] = publisher_sales['Global_Sales']

top_publishers = publisher_sales.sort_values(by='Total_Sales', ascending=False).
 ↪head(10)

plt.figure(figsize=(12, 8))
sns.barplot(x='Total_Sales', y=top_publishers.index, data=top_publishers,␣
 ↪palette='viridis')
```

```
plt.title('Top 10 Publishers by Global Sales')
plt.xlabel('Global Sales [mn $]')
plt.ylabel('Publisher')
plt.show()
```

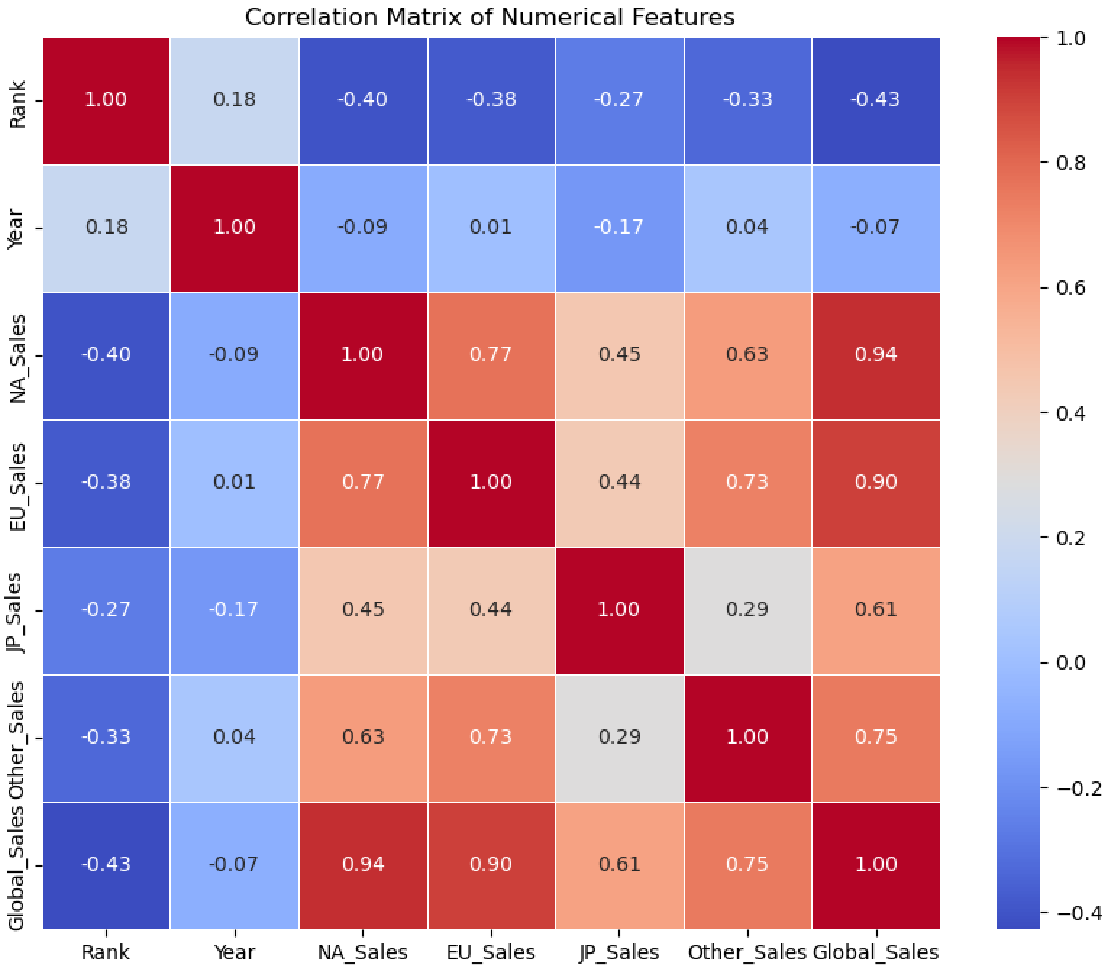


[25]:

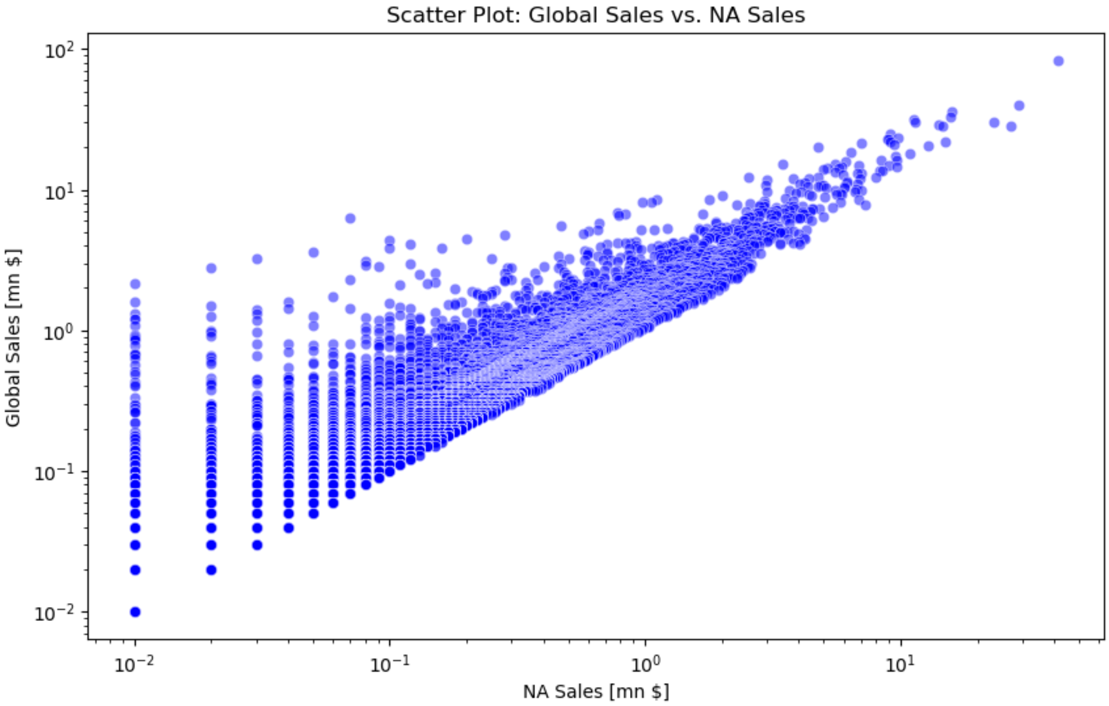
```
import pandas as pd
import plotly.express as px

df = pd.read_csv(r'C:\Users\Tariq\Downloads\vgsales.csv\vgsales.csv')

sales_by_region = df.groupby('Year')[['EU_Sales', 'JP_Sales', 'NA_Sales']].
  ↪sum().reset_index()

fig = px.bar(sales_by_region, x='Year', y=['EU_Sales', 'JP_Sales', 'NA_Sales'],
             title='Video Game Sales Comparison Across EU, JP, and NA',
             labels={'value': 'Sales [mn $]', 'variable': 'Region'}, height=500)

fig.show()
```

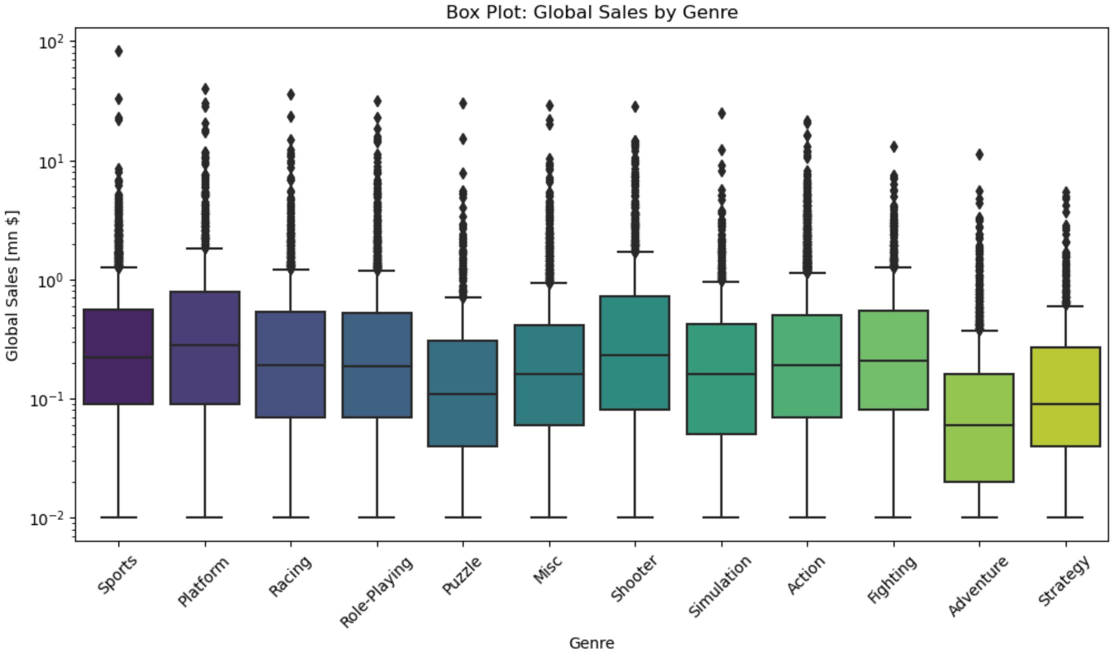


[26]:
```
numerical_columns = ['Rank', 'Year', 'NA_Sales', 'EU_Sales', 'JP_Sales',␣
  ↪'Other_Sales', 'Global_Sales']
#plotting correlation matrix as heat map
correlation_matrix = df[numerical_columns].corr()

plt.figure(figsize=(10, 8))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', fmt=".2f",␣
  ↪linewidths=.5)
plt.title('Correlation Matrix of Numerical Features')
plt.show()
```



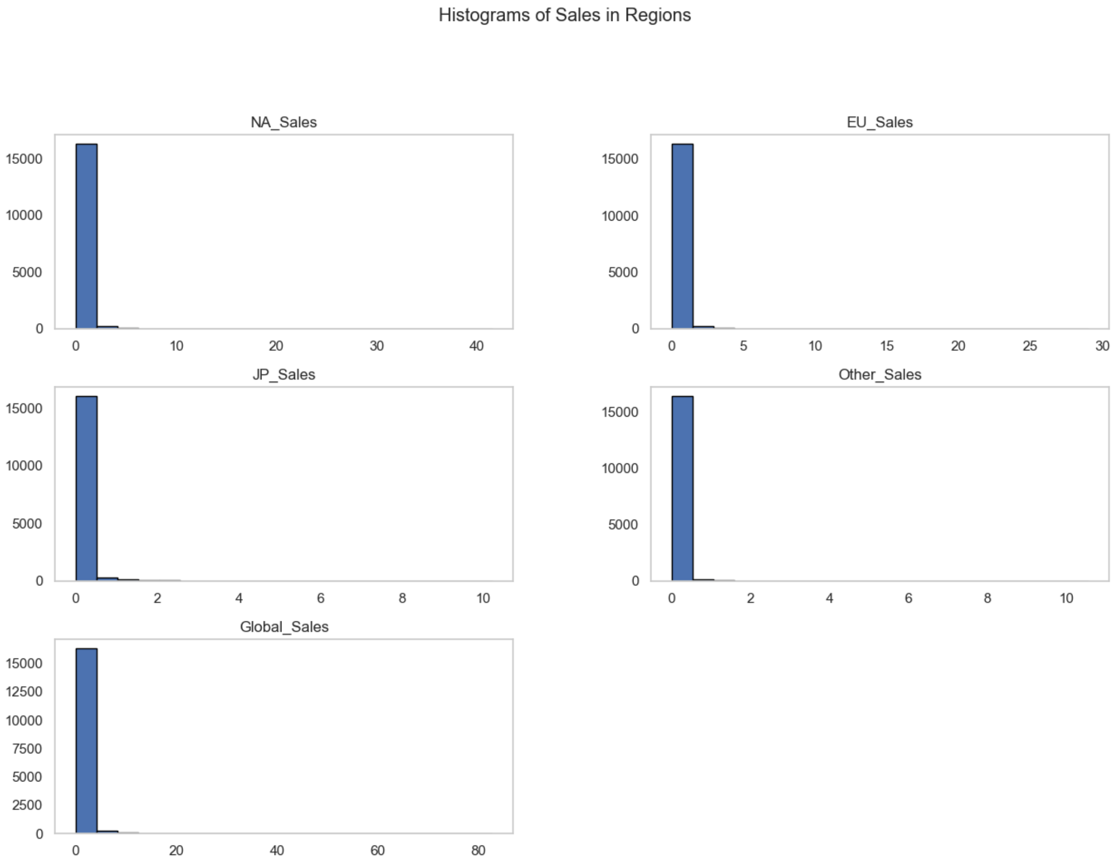
[28]:
```
plt.figure(figsize=(10, 6))
sns.scatterplot(x='NA_Sales', y='Global_Sales', data=df, alpha=0.5,␣
  ↪color='blue')
plt.title('Scatter Plot: Global Sales vs. NA Sales')
plt.xlabel('NA Sales [mn $]')
plt.ylabel('Global Sales [mn $]')
plt.xscale('log')
plt.yscale('log')
plt.show()

# Box Plot: Global Sales by Genre
plt.figure(figsize=(12, 6))
sns.boxplot(x='Genre', y='Global_Sales', data=df, palette='viridis')
plt.title('Box Plot: Global Sales by Genre')
plt.xlabel('Genre')
plt.ylabel('Global Sales [mn $]')
plt.xticks(rotation=45)
plt.yscale('log')
plt.show()
```





[31]:

```
sns.set(style='whitegrid')

numeric_columns = ['NA_Sales', 'EU_Sales', 'JP_Sales', 'Other_Sales',␣
 ↪'Global_Sales']

df[numeric_columns].hist(bins=20, figsize=(15, 10), edgecolor='black',␣
 ↪grid=False)
plt.suptitle('Histograms of Sales in Regions', y=1.02)
plt.show()

sns.set(style='whitegrid', rc={'figure.figsize':(15,10)})

numeric_columns = ['NA_Sales', 'EU_Sales', 'JP_Sales', 'Other_Sales',␣
 ↪'Global_Sales']

# Create box plots with modified scale
ax = sns.boxplot(data=df[numeric_columns], orient='v', palette='Set2', width=0.
 ↪6)
ax.set_yscale('log')  # Modify the scale to logarithmic for better␣
 ↪visualization of the data

plt.title('Box Plot of NA, EU, JP, Other and Global Sales (log scale)')
plt.show()
```


Histograms of Sales in Regions

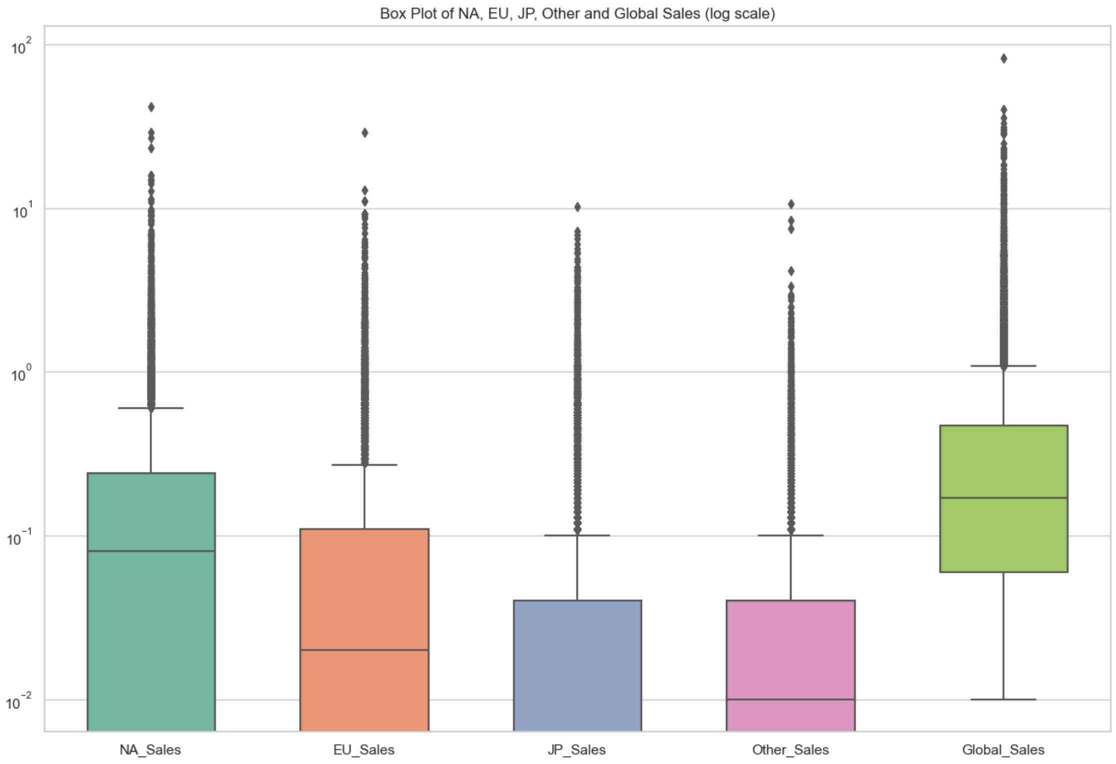
NA_Sales

EU_Sales

JP_Sales

Other_Sales

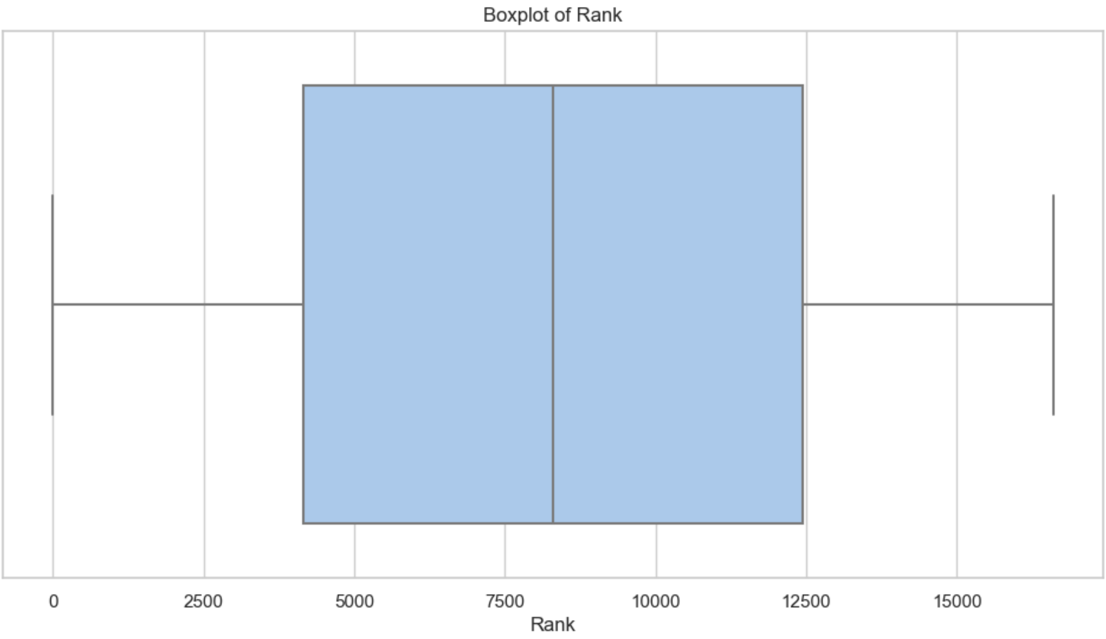
Global_Sales

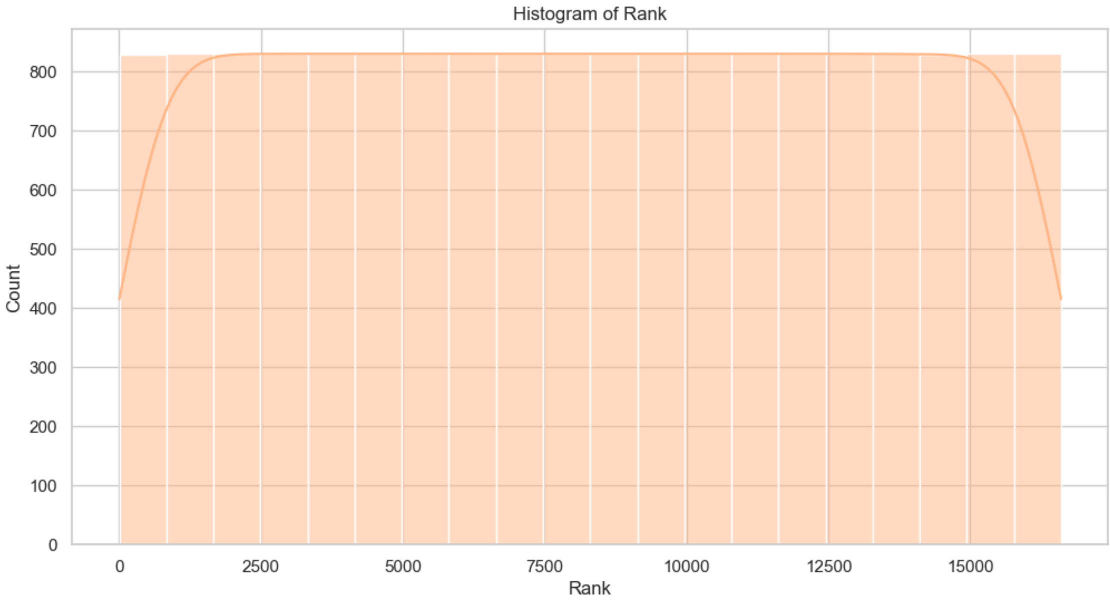


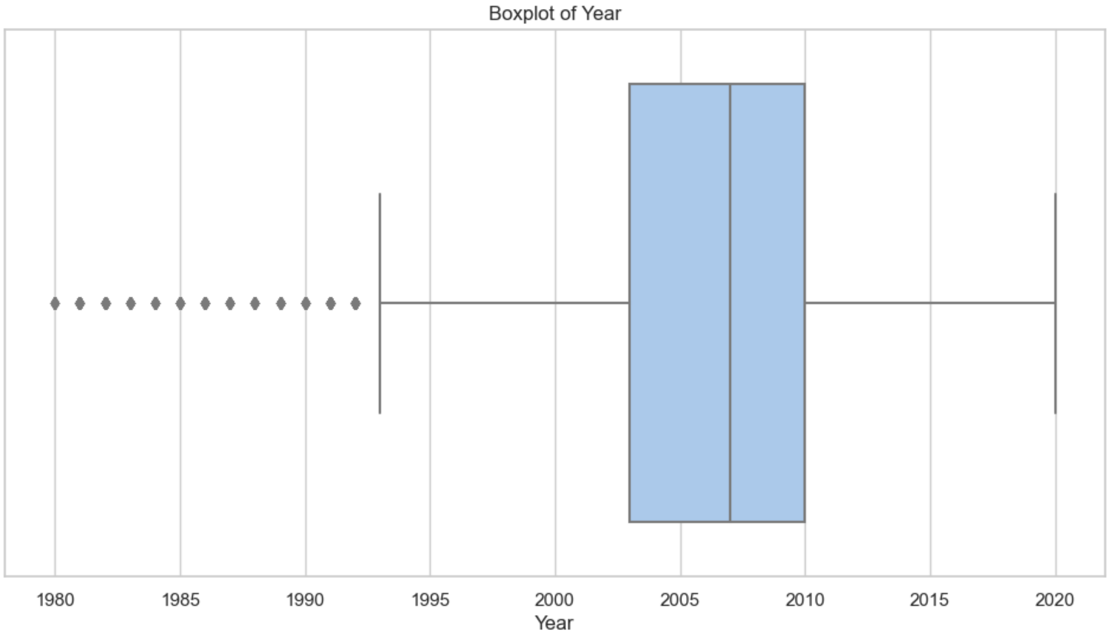
[32]:

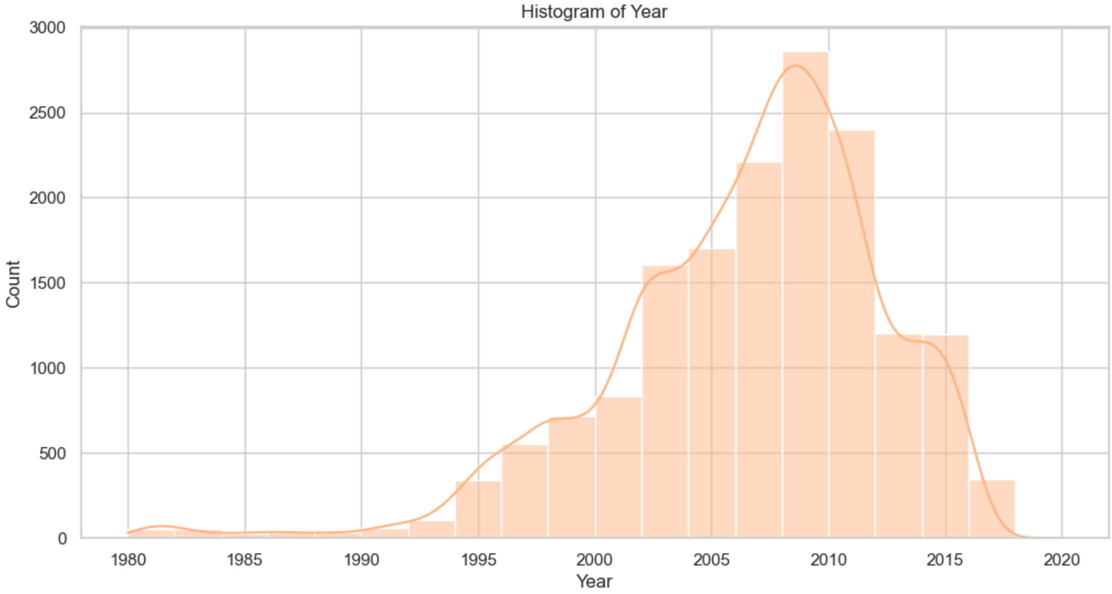
```
boxplot_color = sns.color_palette("pastel")[0]
histogram_color = sns.color_palette("pastel")[1]

# Box Plot for 'Rank'
plt.figure(figsize=(12, 6))
sns.boxplot(x='Rank', data=df, color=boxplot_color)
plt.title('Boxplot of Rank')
plt.show()

# Histogram for 'Rank'
plt.figure(figsize=(12, 6))
sns.histplot(df['Rank'].dropna(), kde=True, color=histogram_color, bins=20)
plt.title('Histogram of Rank')
plt.show()

# Box Plot and Histogram for 'Year'
plt.figure(figsize=(12, 6))
sns.boxplot(x='Year', data=df, color=boxplot_color)
plt.title('Boxplot of Year')
plt.show()

plt.figure(figsize=(12, 6))
sns.histplot(df['Year'].dropna(), kde=True, color=histogram_color, bins=20)
```

```
plt.title('Histogram of Year')
plt.show()
```

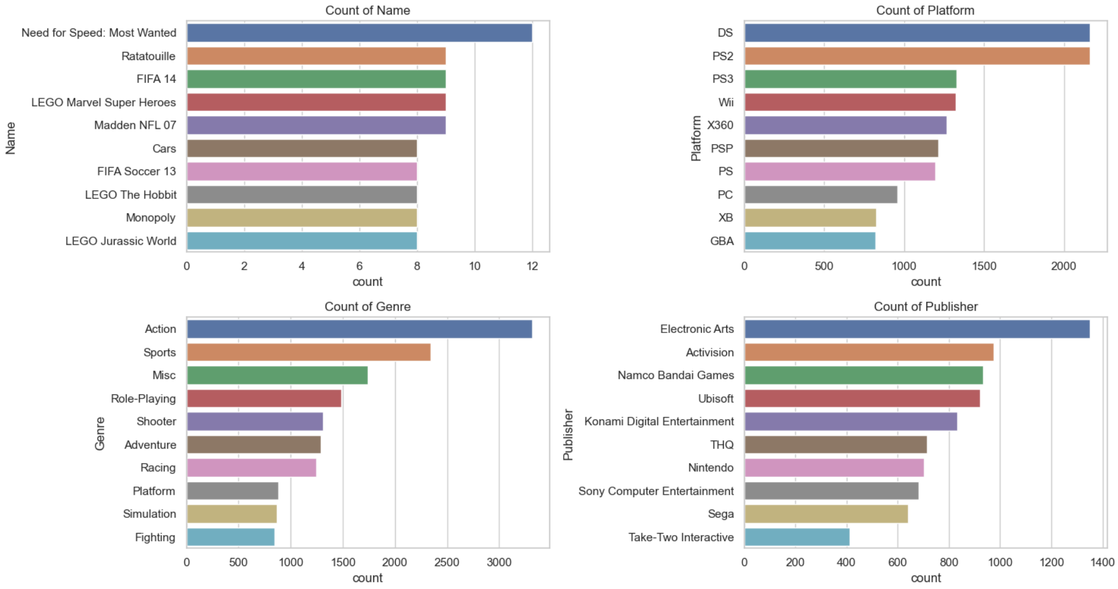


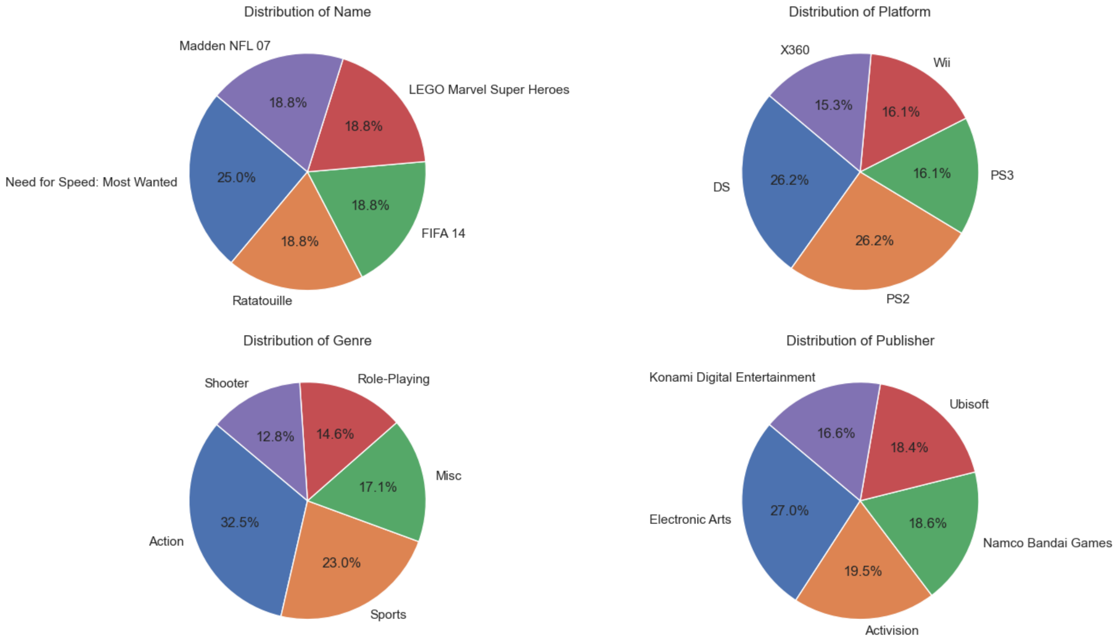






[33]:
```
# Categorical variables
categorical_vars = ['Name', 'Platform', 'Genre', 'Publisher']

# Count plots
plt.figure(figsize=(15, 8))
for i, var in enumerate(categorical_vars, 1):
    plt.subplot(2, 2, i)
    sns.countplot(y=var, data=df, order=df[var].value_counts().index[:10])
    plt.title(f'Count of {var}')

plt.tight_layout()
plt.show()

# Pie charts for the top categories
plt.figure(figsize=(15, 8))
for i, var in enumerate(categorical_vars, 1):
    plt.subplot(2, 2, i)
    top_categories = df[var].value_counts().index[:5]
    sizes = df[var].value_counts(normalize=True).loc[top_categories]
    plt.pie(sizes, labels=top_categories, autopct='%1.1f%%', startangle=140)
    plt.title(f'Distribution of {var}')

plt.tight_layout()
plt.show()
```

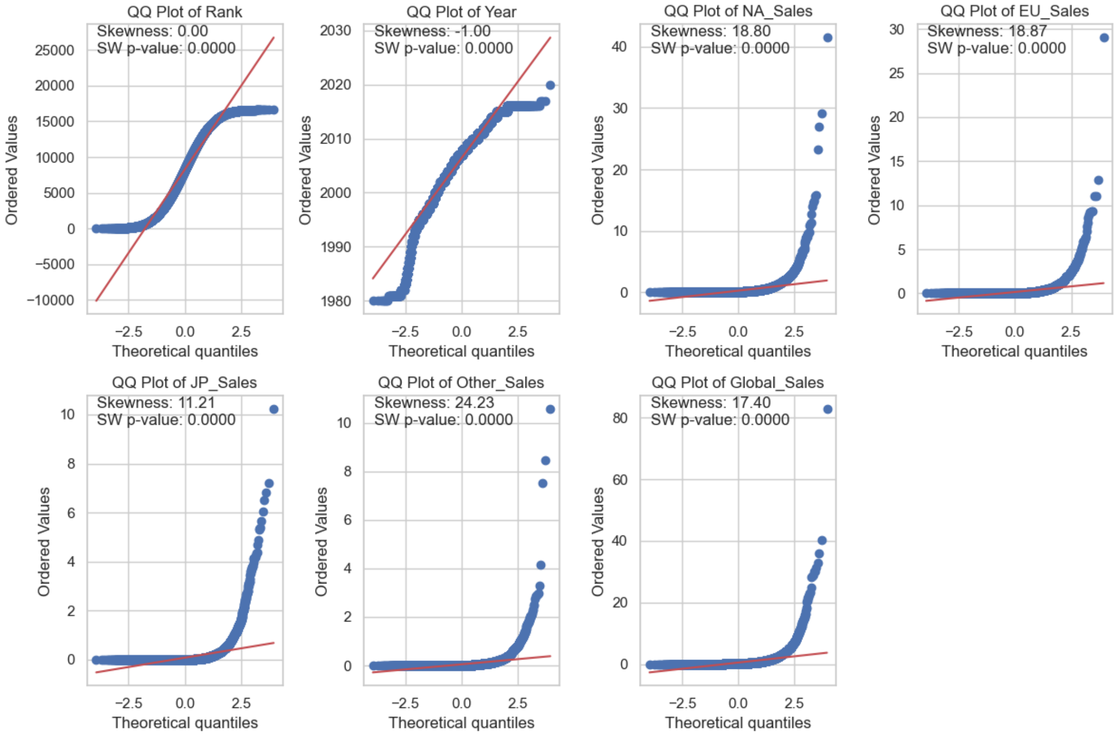




[35]:

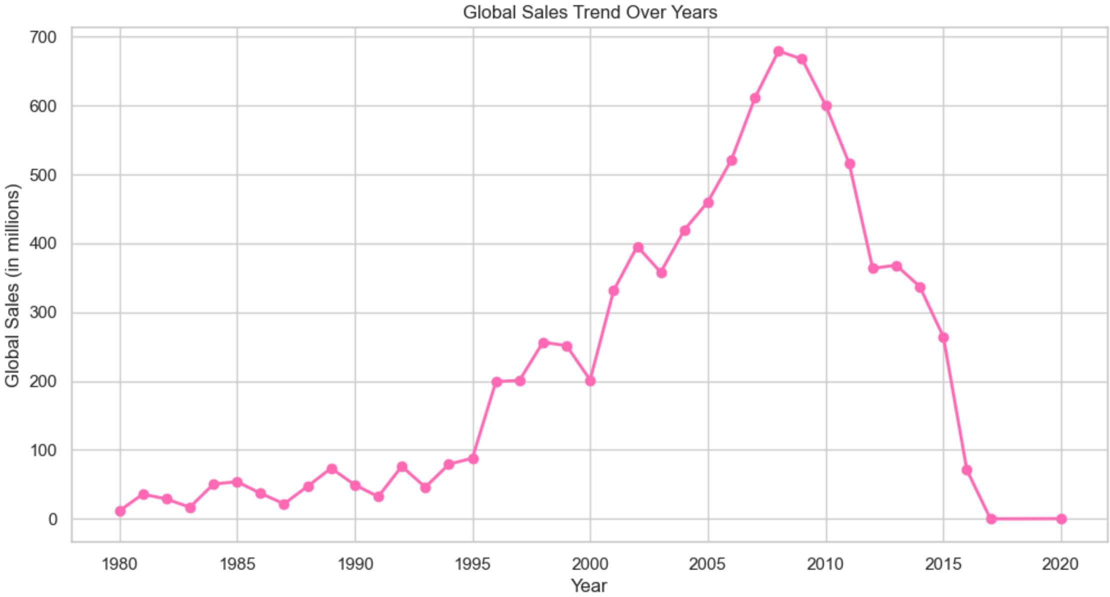
```
from scipy.stats import probplot, skew, shapiro

plt.figure(figsize=(12, 8))

for i, var in enumerate(numerical_vars, 1):
    plt.subplot(2, 4, i)

    probplot(df[var].dropna(), plot=plt)

    skewness = skew(df[var].dropna())

    _, p_value = shapiro(df[var].dropna())

    plt.text(0.05, 0.9, f'Skewness: {skewness:.2f}\nSW p-value: {p_value:.4f}',
             transform=plt.gca().transAxes)

    plt.title(f'QQ Plot of {var}')

plt.tight_layout()
plt.show()
```

```
C:\Users\Tariq\anaconda3\Lib\site-packages\scipy\stats\_morestats.py:1882:
UserWarning:

p-value may not be accurate for N > 5000.
```



[36]:

```
import matplotlib.pyplot as plt
import pandas as pd


df_filtered = df.dropna(subset=['Year'])

sales_trend = df_filtered.groupby('Year')['Global_Sales'].sum()

plt.figure(figsize=(12, 6))
plt.plot(sales_trend.index, sales_trend.values, marker='o', linestyle='-',␣
  ↪color='hotpink', linewidth=2)
plt.title('Global Sales Trend Over Years')
plt.xlabel('Year')
plt.ylabel('Global Sales (in millions)')
plt.grid(True)
plt.show()
```


Global Sales Trend Over Years
Global Sales (in millions)
700
600
500
400
300
200
100
0
1980
1985
1990
1995
2000
2005
2010
2015
2020
Year

```
[ ]:
```