Capstone_Project

December 8, 2023

0.1 CISD41 Capstone Project

by Yongsheng Lin, Jordan Uribe, Aaron Leang, and Ethan Bandong

0.2 Introduction

We are working with recorded data on video game sales . This dataset contains a list of video games (Titles, Platforms Publishers, Release year, Genres) with their sales distribution accross popular regions. It was generated by www.vgchartz.com and the data set could be found at https://www.kaggle.com/datasets/gregorut/videogamesales

0.3 We are going to ask the following questions:

We are going to ask the following questions:

- Using piviot tables, show the distribution of the top publishers and the generes of games which they published in 1993 aswell as the distribution of the top publishers and the platforms they published to in 2008 -Jordan
- Using Statistical measurements of data what is the distribution of game sales amongst the regions in the year 2007 whose region sales count was more than 100,000 -Jordan

1.What are the percentages of platforms recorded?- Jordan

2.What are the sales trends over time? -Jordan

3.Did the economic crisis in 2007 to 2008 has impact on sales of game industry -Yongsheng

4.What is best selling console as of 2016 by regions? -Yongsheng

5.Do regional differences have an impact on genre popularity in terms of sales?-Yongsheng

6.How do sales compare across different regions? Place Region in rows and Sum of Sales in values.-Aaron

7.What people like to play? analysis game sales by genre overall/ and by region.-Ethan

[1]:
```
# Added Libary need for the project
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

```
%matplotlib inline

import plotly.graph_objs as go
from plotly.offline import init_notebook_mode,iplot
init_notebook_mode(connected=True)

import warnings
warnings.filterwarnings('ignore')
#Jordan Uribe
```

[2]:
```
df=pd.read_csv('data/vgsales.csv',index_col=False)
#Jordan Uribe
```

0.4 Importing and Cleaning Data

We will load the data ,and clean it

[3]:
```
dfvgsales=df.rename(columns={'Name':'Game Title','NA_Sales':'NA Sales␣
↪(M)','EU_Sales':'EU Sales (M)','JP_Sales':'JP Sales (M)','Other_Sales':
↪'Other Sales (M)','Global_Sales':'Global Sales (M)'})
#Jordan Uribe
```

[4]:
```
dfvgsales #Jordan Uribe
```

[4]:

	Rank	Game Title	Platform	Year	Genre	Publisher	NA Sales (M)	EU Sales (M)
0	1	Wii Sports	Wii	2006.0	Sports	Nintendo	41.49	29.02
1	2	Super Mario Bros.	NES	1985.0	Platform	Nintendo	29.08	3.58
2	3	Mario Kart Wii	Wii	2008.0	Racing	Nintendo	15.85	12.88
3	4	Wii Sports Resort	Wii	2009.0	Sports	Nintendo	15.75	11.01
4	5	Pokemon Red/Pokemon Blue	GB	1996.0	Role-Playing	Nintendo	11.27	8.89
…	…	…	…	…	…	…	…	…
16593	16596	Woody Woodpecker in Crazy Castle 5	GBA	2002.0	Platform	Kemco	0.01	0.00
16594	16597	Men in Black II: Alien Escape	GC	2003.0	Shooter	Infogrames	0.01	0.00
16595	16598	SCORE International Baja 1000: The Official Game	PS2	2008.0	Racing	Activision	0.00	0.00
16596	16599	Know How 2	DS					
16597	16600	Spirits & Spells	GBA					

```
16596  2010.0        Puzzle    7G//AMES          0.00          0.01
16597  2003.0      Platform     Wanadoo          0.01          0.00

       JP Sales (M)  Other Sales (M)  Global Sales (M)
0              3.77             8.46             82.74
1              6.81             0.77             40.24
2              3.79             3.31             35.82
3              3.28             2.96             33.00
4             10.22             1.00             31.37
…                …                …                …
16593          0.00             0.00              0.01
16594          0.00             0.00              0.01
16595          0.00             0.00              0.01
16596          0.00             0.00              0.01
16597          0.00             0.00              0.01

[16598 rows x 11 columns]
```

[5]:
```
dfvgsales.head(200)
#Jordan Uribe
```

[5]:
```
     Rank                            Game Title Platform    Year         Genre  \
0       1                             Wii Sports      Wii  2006.0        Sports
1       2                    Super Mario Bros.        NES  1985.0      Platform
2       3                       Mario Kart Wii      Wii  2008.0        Racing
3       4                    Wii Sports Resort      Wii  2009.0        Sports
4       5              Pokemon Red/Pokemon Blue       GB  1996.0  Role-Playing
..    …                                     …      …     …            …
195   196                       Guitar Hero II      PS2  2006.0          Misc
196   197                     Resident Evil 5       PS3  2009.0        Action
197   198                  Grand Theft Auto V     XOne  2014.0        Action
198   199  Grand Theft Auto: Vice City Stories       PSP  2006.0        Action
199   200                       FIFA Soccer 11      PS3  2010.0        Sports

                Publisher  NA Sales (M)  EU Sales (M)  JP Sales (M)  \
0                Nintendo         41.49         29.02          3.77
1                Nintendo         29.08          3.58          6.81
2                Nintendo         15.85         12.88          3.79
3                Nintendo         15.75         11.01          3.28
4                Nintendo         11.27          8.89         10.22
..                    …             …             …             …
195            RedOctane          3.81          0.63          0.00
196              Capcom           1.96          1.43          1.08
197  Take-Two Interactive          2.66          2.01          0.00
198  Take-Two Interactive          1.70          2.02          0.16
199       Electronic Arts          0.60          3.29          0.06
```

```
     Other Sales (M)  Global Sales (M)
0               8.46             82.74
1               0.77             40.24
2               3.31             35.82
3               2.96             33.00
4               1.00             31.37
..               …                …
195             0.68              5.12
196             0.65              5.11
197             0.41              5.08
198             1.21              5.08
199             1.13              5.08

[200 rows x 11 columns]
```

[6]:
```
dfvgsales.head() #Top 5 video games as of 2016
#Jordan Uribe
```

[6]:
```
   Rank                Game Title 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 (M)  EU Sales (M)  JP Sales (M)  Other Sales (M)  Global Sales (M)
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]:
```
dfvgsales.info()
# Take a look of summary of data
#Jordan Uribe
```

```
<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   Game Title        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 (M)      16598 non-null  float64
```

```
 7   EU Sales (M)      16598 non-null  float64
 8   JP Sales (M)      16598 non-null  float64
 9   Other Sales (M)   16598 non-null  float64
 10  Global Sales (M)  16598 non-null  float64
dtypes: float64(6), int64(1), object(4)
memory usage: 1.4+ MB
```

[8]:
```
missing_values = dfvgsales.isnull().sum()
data_types = dfvgsales.dtypes
missing_values, data_types
#Jordan Uribe
```

[8]:
```
(Rank                  0
 Game Title            0
 Platform              0
 Year                271
 Genre                 0
 Publisher            58
 NA Sales (M)          0
 EU Sales (M)          0
 JP Sales (M)          0
 Other Sales (M)       0
 Global Sales (M)      0
 dtype: int64,
 Rank                  int64
 Game Title           object
 Platform             object
 Year                float64
 Genre                object
 Publisher            object
 NA Sales (M)        float64
 EU Sales (M)        float64
 JP Sales (M)        float64
 Other Sales (M)     float64
 Global Sales (M)    float64
 dtype: object)
```

[9]:
```
# Dropping rows where 'Year' is missing
dfvgsales = dfvgsales.dropna(subset=['Year'])
# Filling missing 'Publisher' values with 'Unknown'
dfvgsales['Publisher'] = dfvgsales['Publisher'].fillna('Unknown')
# Converting 'Year' to integer
dfvgsales['Year'] = dfvgsales['Year'].astype(int)
# Checking the dataset after cleaning
dfvgsales.isnull().sum(), dfvgsales.dtypes
#By Jordan Uribe
```

[9]:
```
(Rank                0
 Game Title          0
 Platform            0
 Year                0
 Genre               0
 Publisher           0
 NA Sales (M)        0
 EU Sales (M)        0
 JP Sales (M)        0
 Other Sales (M)     0
 Global Sales (M)    0
 dtype: int64,
 Rank                  int64
 Game Title           object
 Platform             object
 Year                  int32
 Genre                object
 Publisher            object
 NA Sales (M)        float64
 EU Sales (M)        float64
 JP Sales (M)        float64
 Other Sales (M)     float64
 Global Sales (M)    float64
 dtype: object)
```

[10]:
```
dfvgsales
```

[10]:

	Rank	Game Title	Platform	Year	\
0	1	Wii Sports	Wii	2006	
1	2	Super Mario Bros.	NES	1985	
2	3	Mario Kart Wii	Wii	2008	
3	4	Wii Sports Resort	Wii	2009	
4	5	Pokemon Red/Pokemon Blue	GB	1996	
…	…	…	…	…	
16593	16596	Woody Woodpecker in Crazy Castle 5	GBA	2002	
16594	16597	Men in Black II: Alien Escape	GC	2003	
16595	16598	SCORE International Baja 1000: The Official Game	PS2	2008	
16596	16599	Know How 2	DS	2010	
16597	16600	Spirits & Spells	GBA	2003	

	Genre	Publisher	NA Sales (M)	EU Sales (M)	JP Sales (M)	\
0	Sports	Nintendo	41.49	29.02	3.77	
1	Platform	Nintendo	29.08	3.58	6.81	
2	Racing	Nintendo	15.85	12.88	3.79	
3	Sports	Nintendo	15.75	11.01	3.28	
4	Role-Playing	Nintendo	11.27	8.89	10.22	
…	…	…	…	…	…	

```
16593      Platform       Kemco          0.01          0.00          0.00
16594       Shooter  Infogrames          0.01          0.00          0.00
16595        Racing  Activision          0.00          0.00          0.00
16596        Puzzle    7G//AMES          0.00          0.01          0.00
16597      Platform     Wanadoo          0.01          0.00          0.00

       Other Sales (M)  Global Sales (M)
0                 8.46             82.74
1                 0.77             40.24
2                 3.31             35.82
3                 2.96             33.00
4                 1.00             31.37
…                  …                 …
16593             0.00              0.01
16594             0.00              0.01
16595             0.00              0.01
16596             0.00              0.01
16597             0.00              0.01

[16327 rows x 11 columns]
```

[11]:
```
japansales=dfvgsales.sort_values(by=['JP Sales (M)'],ascending=False).head()
#Jordan Uribe
```

[12]:
```
japansales[['Rank','Game Title','JP Sales (M)']] #top 5 games in Japan
#Jordan Uribe
```

[12]:
```
    Rank                     Game Title  JP Sales (M)
4      5       Pokemon Red/Pokemon Blue         10.22
12    13    Pokemon Gold/Pokemon Silver          7.20
1      2              Super Mario Bros.          6.81
6      7          New Super Mario Bros.          6.50
20    21  Pokemon Diamond/Pokemon Pearl          6.04
```

[13]:
```
NAsales=dfvgsales.sort_values(by=['NA Sales (M)'],ascending=False).head()
#Jordan Uribe
```

[14]:
```
NAsales[['Game Title','NA Sales (M)']] #top 5 games in North America
#Jordan Uribe
```

[14]:
```
           Game Title  NA Sales (M)
0         Wii Sports         41.49
1  Super Mario Bros.         29.08
9          Duck Hunt         26.93
5             Tetris         23.20
2     Mario Kart Wii         15.85
```

[15]:
```
dfvgsales['Publisher'].value_counts().head(10) #Top 10 Publishers
#Jordan Uribe
```

[15]:
```
Publisher
Electronic Arts                 1339
Activision                       966
Namco Bandai Games               928
Ubisoft                          918
Konami Digital Entertainment     823
THQ                              712
Nintendo                         696
Sony Computer Entertainment      682
Sega                             632
Take-Two Interactive             412
Name: count, dtype: int64
```

[16]:
```
dfvgsales['Platform'].value_counts().head(10) #Platform sorted by number of␣
 ↪games
#Jordan Uribe
```

[16]:
```
Platform
DS      2133
PS2     2127
PS3     1304
Wii     1290
X360    1235
PSP     1197
PS      1189
PC       943
GBA      811
XB       803
Name: count, dtype: int64
```

[17]:
```
sum(dfvgsales['Platform'].value_counts()) #number of games across platforms
#Jordan Uribe
```

[17]:
```
16327
```

We will begin answer our questions

0.4.1 Using pivot tables, show the distribution of the top publishers and the generes of games which they published in 1993 aswell as the distribution of the top publishers and the platforms they published to in 2008 -Jordan

[18]:
```
#table that we will be using but first we want to know stuff about the dataset
genre_counts = dfvgsales['Genre'].value_counts()
plat_counts = dfvgsales['Platform'].value_counts()
```

```
year_counts = dfvgsales['Year'].value_counts()
pub_counts = dfvgsales['Publisher'].value_counts()
print(genre_counts,'\n\n')
print(plat_counts,'\n\n')
print(year_counts,'\n\n')
print(pub_counts,'\n\n')
#Jordan Uribe
```

```
Genre
Action          3253
Sports          2304
Misc            1710
Role-Playing    1471
Shooter         1282
Adventure       1276
Racing          1226
Platform         876
Simulation       851
Fighting         836
Strategy         671
Puzzle           571
Name: count, dtype: int64


Platform
DS      2133
PS2     2127
PS3     1304
Wii     1290
X360    1235
PSP     1197
PS      1189
PC       943
GBA      811
XB       803
GC       542
3DS      500
PSV      412
PS4      336
N64      316
SNES     239
XOne     213
SAT      173
WiiU     143
2600     116
NES       98
GB        97
DC        52
```

```
GEN       27
NG        12
SCD        6
WS         6
3DO        3
TG16       2
GG         1
PCFX       1
Name: count, dtype: int64
```

```
Year
2009    1431
2008    1428
2010    1259
2007    1202
2011    1139
2006    1008
2005     941
2002     829
2003     775
2004     763
2012     657
2015     614
2014     582
2013     546
2001     482
1998     379
2000     349
2016     344
1999     338
1997     289
1996     263
1995     219
1994     121
1993      60
1981      46
1992      43
1991      41
1982      36
1986      21
1989      17
1983      17
1990      16
1987      16
1988      15
1985      14
1984      14
```

```
1980       9
2017       3
2020       1
Name: count, dtype: int64


Publisher
Electronic Arts                 1339
Activision                       966
Namco Bandai Games               928
Ubisoft                          918
Konami Digital Entertainment     823
                                 …
Detn8 Games                        1
Pow                                1
Navarre Corp                       1
MediaQuest                         1
UIG Entertainment                  1
Name: count, Length: 576, dtype: int64
```

Exploring publisher and game genres from the year 1993

[19]:
```
df1993=dfvgsales[dfvgsales['Year']==1993] #filters data frame y the year 1993,␣
 ↪picked because thats when games took off
df1993.head(10)
#Jordan Uribe
```

[19]:
```
      Rank               Game Title Platform  Year         Genre  \
57      58    Super Mario All-Stars     SNES  1993      Platform
472    473                Star Fox     SNES  1993       Shooter
849    851  Super Street Fighter II     SNES  1993      Fighting
887    889         Mortal Kombat II     SNES  1993      Fighting
948    950           Secret of Mana     SNES  1993  Role-Playing
1009  1011         Disney's Aladdin     SNES  1993      Platform
1010  1012        Kirby's Adventure      NES  1993      Platform
1054  1056          Super Puyo Puyo     SNES  1993        Puzzle
1261  1263                Sonic CD      SCD  1993      Platform
1325  1327            Dragon Ball Z     SNES  1993      Fighting

                  Publisher  NA Sales (M)  EU Sales (M)  JP Sales (M)  \
57                 Nintendo          5.99          2.15          2.12
472                Nintendo          1.61          0.51          0.80
849                Nintendo          0.52          0.16          1.29
887   Acclaim Entertainment          1.48          0.39          0.00
948              SquareSoft          0.25          0.07          1.49
1009                Capcom          0.94          0.34          0.21
```

```
1010               Nintendo          0.79          0.14          0.80
1054              Banpresto          0.00          0.00          1.69
1261                   Sega          1.00          0.36          0.09
1325     Namco Bandai Games          0.00          0.00          1.45

      Other Sales (M)  Global Sales (M)
57               0.29             10.55
472              0.07              2.99
849              0.03              2.00
887              0.06              1.93
948              0.02              1.83
1009             0.27              1.75
1010             0.02              1.75
1054             0.01              1.70
1261             0.05              1.50
1325             0.00              1.45
```

[20]:
```
df1993=dfvgsales[dfvgsales['Year']==1993][['Publisher','Genre']] #only want␣
↪publisher and genre
df1993.head(10)
#Jordan Uribe
```

[20]:
```
                  Publisher         Genre
57                 Nintendo      Platform
472                Nintendo       Shooter
849                Nintendo      Fighting
887   Acclaim Entertainment      Fighting
948              SquareSoft  Role-Playing
1009                Capcom      Platform
1010               Nintendo      Platform
1054              Banpresto        Puzzle
1261                   Sega      Platform
1325     Namco Bandai Games      Fighting
```

[21]:
```
publishercount = df1993['Publisher'].value_counts() #filter by the value counts␣
↪of game per publisher
publishercount.head(10)
#Jordan Uribe
```

[21]:
```
Publisher
Nintendo                      9
Namco Bandai Games            8
Capcom                        7
Sega                          6
Konami Digital Entertainment  3
Hudson Soft                   3
SquareSoft                    2
```

```
SNK                             2
Tecmo Koei                      2
Titus                           1
Name: count, dtype: int64
```

[22]:
```
these=['Nintendo','Namco Bandai Games','Capcom','Sega' ] #got the names to␣
 ↪filter out
df1993filtered=df1993[df1993['Publisher'].isin(these)]
df1993filtered.head(10)
#Jordan Uribe
```

[22]:
```
               Publisher     Genre
57              Nintendo  Platform
472             Nintendo   Shooter
849             Nintendo  Fighting
1009              Capcom  Platform
1010            Nintendo  Platform
1261                Sega  Platform
1325  Namco Bandai Games  Fighting
1674  Namco Bandai Games  Fighting
1751              Capcom  Platform
2033              Capcom    Action
```

[23]:
```
pd.pivot_table(df1993filtered, index='Publisher', columns='Genre',␣
 ↪aggfunc='size', fill_value=0) #game genre distribution #Jordan Uribe
```

[23]:
```
Genre               Action  Adventure  Fighting  Platform  Puzzle  Racing  \
Publisher
Capcom                   2          0         1         3       0       0
Namco Bandai Games       1          0         5         1       0       0
Nintendo                 0          0         1         2       2       1
Sega                     1          1         0         2       0       0

Genre               Role-Playing  Shooter  Sports  Strategy
Publisher
Capcom                         0        0       1         0
Namco Bandai Games             0        0       1         0
Nintendo                       1        1       1         0
Sega                           1        0       0         1
```

Exploring Publisher and platforms/consoles in the year 2008

[24]:
```
df2008=dfvgsales[dfvgsales['Year']==2008][['Publisher','Platform']]  #filters␣
 ↪data frame by  the year 2008, picked because second most game titles ␣
 ↪#Jordan Uribe
```

[25]:
```
publishercount2008 = df2008['Publisher'].value_counts() #filter by the value␣
 ↪counts of game per publisher #Jordan Uribe
```

```
publishercount2008
```

[25]:
```
Publisher
Electronic Arts                 120
Ubisoft                         112
Activision                       88
Sega                             67
Konami Digital Entertainment     64
                                 …
Ivolgamus                         1
2D Boy                            1
HMH Interactive                   1
Mamba Games                       1
Russel                            1
Name: count, Length: 165, dtype: int64
```

[26]:
```
these2008=['Electronic Arts','Ubisoft','Activision','Sega'] #got the names to␣
 ↪filter out #Jordan Uribe
df2008filtered=df2008[df2008['Publisher'].isin(these2008)]
df2008filtered
```

[26]:
```
              Publisher Platform
98           Activision     X360
166          Activision      PS3
189                Sega       DS
324          Activision     X360
343          Activision      Wii
…                   …      …
16384   Electronic Arts       PC
16444        Activision       PC
16514           Ubisoft       DS
16525              Sega       DS
16595        Activision      PS2

[387 rows x 2 columns]
```

[27]:
```
pd.pivot_table(df2008filtered, index='Publisher', columns='Platform',␣
 ↪aggfunc='size', fill_value=0) #game platforms distribution #jordan Uribe
```

[27]:
```
Platform         DS  PC  PS2  PS3  PSP  Wii  X360  XB
Publisher
Activision       17   6   14   13    3   22    13   0
Electronic Arts  18  16   13   21    8   18    25   1
Sega             17   2    9   12    4   13    10   0
Ubisoft          53   7    2   10    4   26    10   0
```

Using Statistical measurements of data what is the distribution of game sales amongst the regions in the year 2007 whose region sales count was more than 100,000

In this portion we will describe the quantitative insights of our data set by calculating: - Mean -Median -Standard deviation -Precentiles -Box and whiskers plots

By Jordan Uribe

[28]:
```
dfvgsales.describe() #overview of mean, std min, etc. but something doesnt look␣
↪right ;/... number are in their decimal format  #jordan Uribe
```

[28]:

	Rank	Year	NA Sales (M)	EU Sales (M)	JP Sales (M)	\
count	16327.000000	16327.000000	16327.000000	16327.000000	16327.000000	
mean	8292.868194	2006.406443	0.265415	0.147554	0.078661	
std	4792.669778	5.828981	0.821591	0.508766	0.311557	
min	1.000000	1980.000000	0.000000	0.000000	0.000000	
25%	4136.500000	2003.000000	0.000000	0.000000	0.000000	
50%	8295.000000	2007.000000	0.080000	0.020000	0.000000	
75%	12441.500000	2010.000000	0.240000	0.110000	0.040000	
max	16600.000000	2020.000000	41.490000	29.020000	10.220000	

	Other Sales (M)	Global Sales (M)
count	16327.000000	16327.000000
mean	0.048325	0.540232
std	0.189885	1.565732
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

[29]:
```
salesdb=dfvgsales[['NA Sales (M)',        'EU Sales (M)',        'JP Sales␣
↪(M)',        'Other Sales (M)'        ,'Global Sales (M)']]*1000000 #new␣
↪data frame converting for change decimals to accurate ints #jordan Uribe
```

[30]:
```
salesdb.describe() #jordan Uribe
```

[30]:

	NA Sales (M)	EU Sales (M)	JP Sales (M)	Other Sales (M)	\
count	1.632700e+04	1.632700e+04	1.632700e+04	1.632700e+04	
mean	2.654150e+05	1.475544e+05	7.866111e+04	4.832547e+04	
std	8.215909e+05	5.087657e+05	3.115570e+05	1.898854e+05	
min	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	
25%	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	
50%	8.000000e+04	2.000000e+04	0.000000e+00	1.000000e+04	
75%	2.400000e+05	1.100000e+05	4.000000e+04	4.000000e+04	
max	4.149000e+07	2.902000e+07	1.022000e+07	1.057000e+07	

	Global Sales (M)
count	1.632700e+04
mean	5.402315e+05
std	1.565732e+06

```
min         1.000000e+04
25%         6.000000e+04
50%         1.700000e+05
75%         4.800000e+05
max         8.274000e+07
```

[31]:
```
salesdb=salesdb.astype(int) #jordan Uribe
```

[32]:
```
years=dfvgsales['Year'] #jordan Uribe
```

[33]:
```
statsdb=pd.concat([years,salesdb],axis=1) #jordan Uribe
```

[34]:
```
statsdb #jordan Uribe
```

[34]:
```
        Year  NA Sales (M)  EU Sales (M)  JP Sales (M)  Other Sales (M)  \
0       2006      41490000      29020000       3770000          8460000
1       1985      29080000       3580000       6810000           770000
2       2008      15850000      12880000       3790000          3310000
3       2009      15750000      11010000       3280000          2960000
4       1996      11270000       8890000      10220000          1000000
…        …            …             …             …                …
16593   2002         10000             0             0                0
16594   2003         10000             0             0                0
16595   2008             0             0             0                0
16596   2010             0         10000             0                0
16597   2003         10000             0             0                0

        Global Sales (M)
0               82740000
1               40240000
2               35820000
3               33000000
4               31370000
…                    …
16593              10000
16594              10000
16595              10000
16596              10000
16597              10000

[16327 rows x 6 columns]
```

[35]:
```
filtered=statsdb[statsdb['Year']==2007] #filtering using only games with␣
↪minimum 100000 global sales, using the first 100 games in series #jordan␣
↪Uribe
filterednа=filtered[filtered['NA Sales (M)']>=100000]['NA Sales (M)'].head(100)
filteredjp=filtered[filtered['JP Sales (M)']>=100000]['JP Sales (M)'].head(100)
```

```
filteredeu=filtered[filtered['EU Sales (M)']>=100000]['EU Sales (M)'].head(100)
filteredot=filtered[filtered['Other Sales (M)']>=100000]['Other Sales (M)'].
 ↪head(100)
```

[36]:
```
##Average sales of all regions
na_mean=np.mean(filteredna)
eu_mean=np.mean(filteredjp)
jp_mean=np.mean(filteredeu)
other_mean=np.mean(filteredot)

print(f'North America game sales average:{na_mean} ')
print(f'Europe game sales average:{eu_mean} ')
print(f'Japan game sales average:{jp_mean} ')
print(f'Un named regions game sales average:{other_mean} ')
#jordan Uribe
```

```
North America game sales average:1591899.99
Europe game sales average:441200.0
Japan game sales average:1111399.99
Un named regions game sales average:481700.0
```

[37]:
```
##Median sales of all regions
na_med=np.median(filteredna)
eu_med=np.median(filteredeu)
jp_med=np.median(filteredjp)
other_med=np.median(filteredot)

print(f'North America game sales median:{na_med} ')
print(f'Europe game sales median:{eu_med} ')
print(f'Japan game sales median:{jp_med} ')
print(f'Un named region game  sales median:{other_med} ')
#jordan Uribe
```

```
North America game sales median:1155000.0
Europe game sales median:875000.0
Japan game sales median:290000.0
Un named region game  sales median:315000.0
```

[38]:
```
##STD sales of all regions
na_std=np.std(filteredna)
eu_std=np.std(filteredeu)
jp_std=np.std(filteredjp)
other_std=np.std(filteredot)

print(f'North America game sales Standard Deviation:{na_std} ')
print(f'Europe game sales Standard Deviation:{eu_std} ')
print(f'Japan game sales Standard Deviation:{jp_std} ')
print(f'Un named region game sales Standard Deviation:{other_std} ')
```

```
#jordan Uribe
```

```
North America game sales Standard Deviation:1476022.1480851872
Europe game sales Standard Deviation:961736.9191353786
Japan game sales Standard Deviation:484258.77379764634
Un named region game sales Standard Deviation:503611.0701722114
```

[39]:
```
#percentiles of game sales in all regions (25th 50th 75th) #jordan Uribe
pt=[25,50,75]
```

[40]:
```
na_pt=np.percentile(filteredna,pt)
eu_pt=np.percentile(filteredeu,pt)
jp_pt=np.percentile(filteredjp,pt)
other_pt=np.percentile(filteredot,pt)

print(f'North America game sales at the 25th, 50th and 75th percentiles:{na_pt}␣
 ↪')
print(f'Europe game sales at the 25th, 50th and 75th percentile:{eu_pt}')
print(f'Japan game sales at the 25th, 50th and 75th percentile:{jp_pt} ')
print(f'Un named region game sales at the 25th, 50th and 75th percentile:
 ↪{other_pt} ') #jordan Uribe
```

```
North America game sales at the 25th, 50th and 75th percentiles:[ 690000.
1155000. 1902500.]
Europe game sales at the 25th, 50th and 75th percentile:[ 540000.  875000.
1282500.]
Japan game sales at the 25th, 50th and 75th percentile:[190000. 290000. 510000.]
Un named region game sales at the 25th, 50th and 75th percentile:[177500.
315000. 497500.]
```

[41]:
```
filteredna_striped=filteredna.reset_index(drop=True)
filteredeu_striped=filteredeu.reset_index(drop=True)
filteredjp_striped=filteredjp.reset_index(drop=True)
filteredot_striped=filteredot.reset_index(drop=True)

all_filtered=pd.DataFrame({'NA Sales':filteredna_striped,
                           'EU Sales':filteredeu_striped,
                           'JP Sales':filteredjp_striped,
                           'Other Sales':filteredot_striped})
all_filtered #jordan Uribe
```

[41]:

	NA Sales	EU Sales	JP Sales	Other Sales
0	8940000	8029999	3600000	2150000
1	7970000	2830000	130000	1210000
2	6160000	3400000	1200000	760000
3	5910000	2380000	130000	900000
4	4460000	1880000	1980000	700000
..	…	…	…	…

```
95    620000    250000    190000        140000
96    710000    580000    110000        120000
97    690000    390000    190000        220000
98    390000    330000    190000        100000
99    540000   1120000    180000        130000

[100 rows x 4 columns]
```

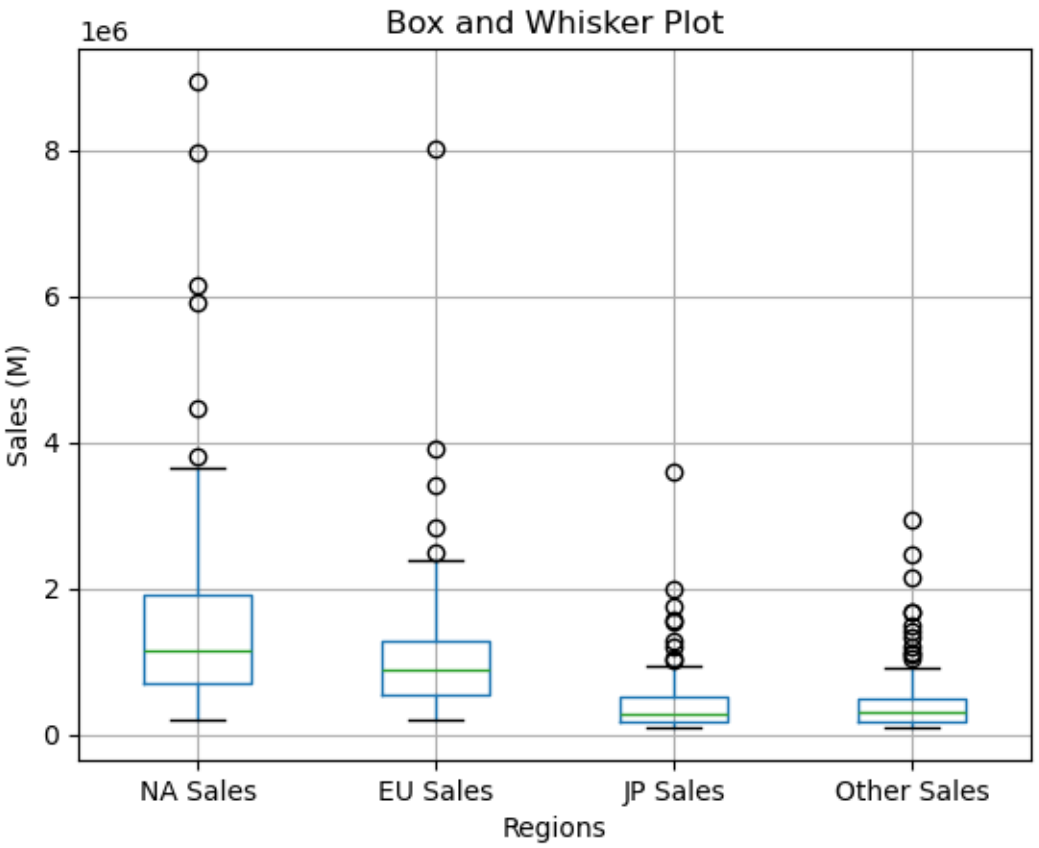
[42]:
```
all_filtered.describe()
#jordan Uribe
```

[42]:

	NA Sales	EU Sales	JP Sales	Other Sales
count	1.000000e+02	1.000000e+02	1.000000e+02	1.000000e+02
mean	1.591900e+06	1.111400e+06	4.412000e+05	4.817000e+05
std	1.483458e+06	9.665820e+05	4.866984e+05	5.061482e+05
min	2.000000e+05	2.000000e+05	1.000000e+05	1.000000e+05
25%	6.900000e+05	5.400000e+05	1.900000e+05	1.775000e+05
50%	1.155000e+06	8.750000e+05	2.900000e+05	3.150000e+05
75%	1.902500e+06	1.282500e+06	5.100000e+05	4.975000e+05
max	8.940000e+06	8.029999e+06	3.600000e+06	2.930000e+06

Lets visualize this

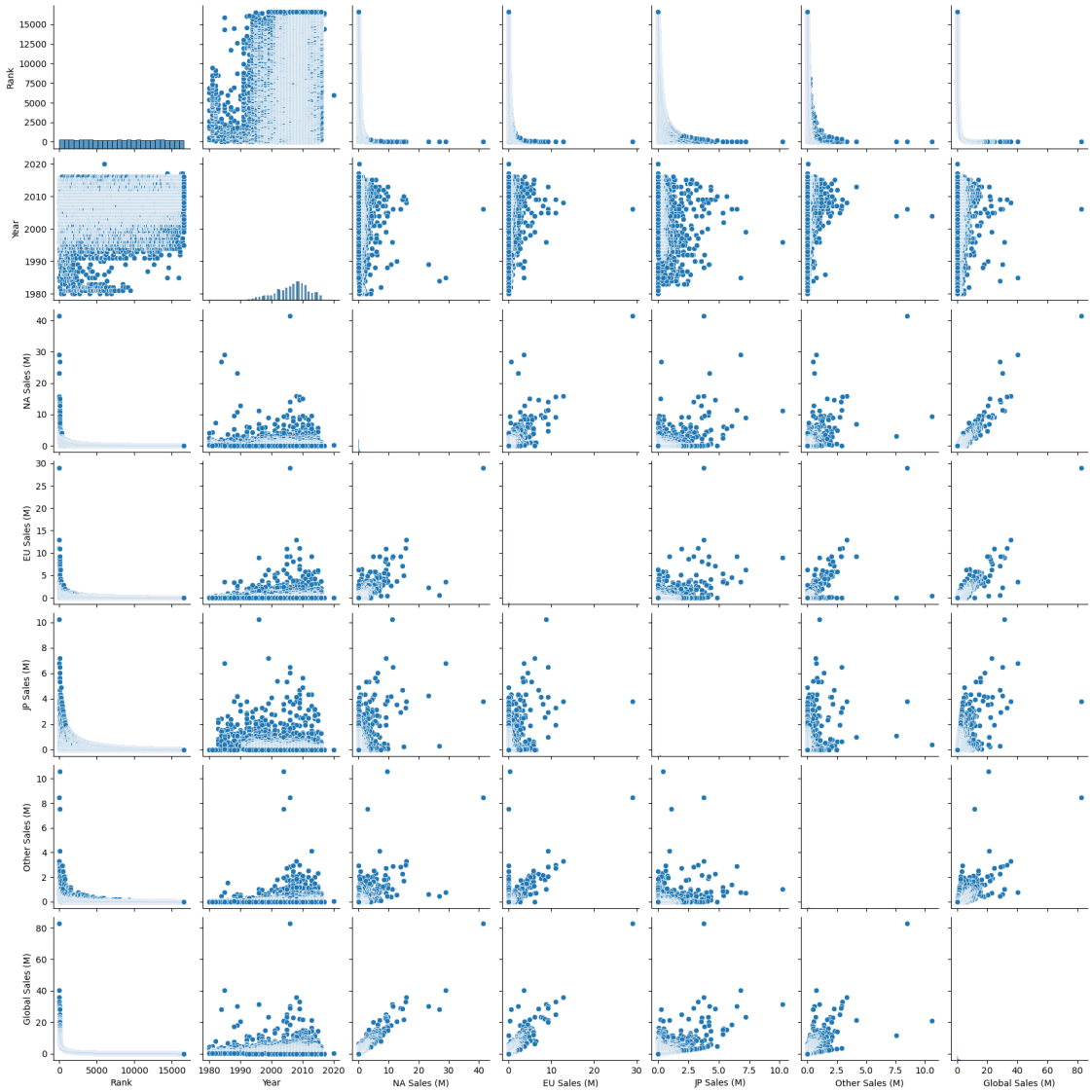
[43]:
```
all_filtered.boxplot()
plt.xlabel('Regions')
plt.ylabel('Sales (M)')
plt.title('Box and Whisker Plot')

# Show the plot
plt.show()
#jordan Uribe
```



Using pairplot to show relationship across the entire dataframe

[44]:
```
sns.pairplot(dfvgsales)
#Yongsheng
```

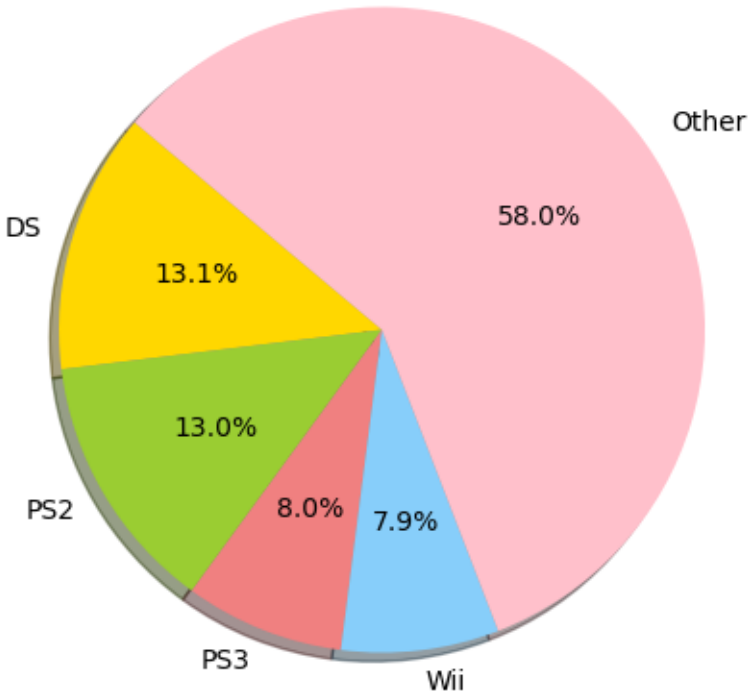
[44]:
```
<seaborn.axisgrid.PairGrid at 0x1f1f1746790>
```



0.5 What are the percentages of platforms recorded?

[45]:
```
# Data to plot
labels = 'DS', 'PS2', 'PS3', 'Wii','Other'
ds=dfvgsales['Platform'].value_counts().loc['DS']
ps2=dfvgsales['Platform'].value_counts().loc['PS2']
ps3=dfvgsales['Platform'].value_counts().loc['PS3']
wii=dfvgsales['Platform'].value_counts().loc['Wii']
other=(sum(dfvgsales['Platform'].value_counts()))-ds-ps2-ps3-wii

sizes = [ds, ps2, ps3, wii,other]
colors = ['gold', 'yellowgreen', 'lightcoral', 'lightskyblue','pink']
```

```
explode = (0, 0, 0, 0,0)  # explode 1st slice         #IN OUR PRESENTATION WE␣
 ↪COULD EXLPLODE SLICES TO EMPHESIZE
#autopct --add the percentage to the slices
#labels specify from where to get the lables

# Plot
plt.pie(sizes, explode=explode, labels=labels, colors=colors,autopct='%1.1f%%'
, shadow=True, startangle=140)

plt.axis('equal')
plt.show()
#Jordan Uribe
```



0.6 What are the game sales trends over time?

[46]:
```
sales_trends = dfvgsales.groupby('Year').agg({
    'NA Sales (M)': 'sum',
    'EU Sales (M)': 'sum',
    'JP Sales (M)': 'sum',
    'Other Sales (M)': 'sum',
    'Global Sales (M)': 'sum'
}).reset_index()
```

```
sales_trends.tail(10)
#jordan Uribe
```

[46]:

	Year	NA Sales (M)	EU Sales (M)	JP Sales (M)	Other Sales (M)	Global Sales (M)
29	2009	338.85	191.59	61.89	74.77	667.30
30	2010	304.24	176.73	59.49	59.90	600.45
31	2011	241.06	167.44	53.04	54.39	515.99
32	2012	154.96	118.78	51.74	37.82	363.54
33	2013	154.77	125.80	47.59	39.82	368.11
34	2014	131.97	125.65	39.46	40.02	337.05
35	2015	102.82	97.71	33.72	30.01	264.44
36	2016	22.66	26.76	13.70	7.75	70.93
37	2017	0.00	0.00	0.05	0.00	0.05
38	2020	0.27	0.00	0.00	0.02	0.29

[47]:
```
sales_trends.drop(index=[36,37,38], axis=1, inplace=True) #removed because ends␣
↪abruptly, misrepresenting data
sales_trends.tail(10)
#jordan Uribe
```

[47]:

	Year	NA Sales (M)	EU Sales (M)	JP Sales (M)	Other Sales (M)	Global Sales (M)
26	2006	263.12	129.24	73.73	54.43	521.04
27	2007	312.05	160.50	60.29	77.60	611.13
28	2008	351.44	184.40	60.26	82.39	
29	2009	338.85	191.59	61.89	74.77	
30	2010	304.24	176.73	59.49	59.90	
31	2011	241.06	167.44	53.04	54.39	
32	2012	154.96	118.78	51.74	37.82	
33	2013	154.77	125.80	47.59	39.82	
34	2014	131.97	125.65	39.46	40.02	
35	2015	102.82	97.71	33.72	30.01	

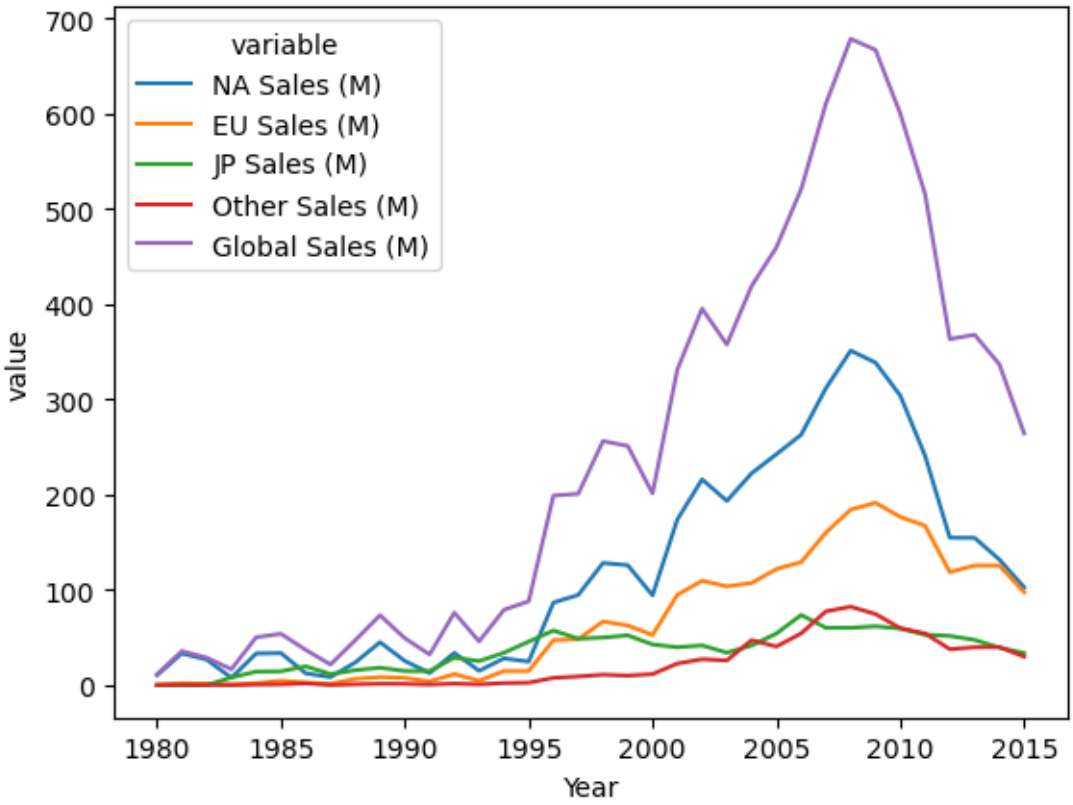
```
28            678.90
29            667.30
30            600.45
31            515.99
32            363.54
33            368.11
34            337.05
35            264.44
```

[48]:
```
pd.melt(sales_trends, ['Year']) #data that will be used when line plotting␣
↪#jordan Uribe
```

[48]:
```
     Year           variable   value
0    1980      NA Sales (M)   10.59
1    1981      NA Sales (M)   33.40
2    1982      NA Sales (M)   26.92
3    1983      NA Sales (M)    7.76
4    1984      NA Sales (M)   33.28
..    …                …      …
175  2011  Global Sales (M)  515.99
176  2012  Global Sales (M)  363.54
177  2013  Global Sales (M)  368.11
178  2014  Global Sales (M)  337.05
179  2015  Global Sales (M)  264.44

[180 rows x 3 columns]
```

[49]:
```
sns.lineplot(x='Year', y='value', hue='variable',
             data=pd.melt(sales_trends, ['Year'])) #jordan Uribe
```

[49]:
```
<Axes: xlabel='Year', ylabel='value'>
```



0.7 Did the economic crisis in 2007 to 2008 has impact on sales of game industry?

[50]:
```
# Filtering data for the years 2007 to 2010 specific sales trend period
sales_2007 = dfvgsales[dfvgsales['Year'] == 2007]['Global Sales (M)'].sum()
sales_2008 = dfvgsales[dfvgsales['Year'] == 2008]['Global Sales (M)'].sum()
sales_2009 = dfvgsales[dfvgsales['Year'] == 2009]['Global Sales (M)'].sum()
sales_2010 = dfvgsales[dfvgsales['Year'] == 2010]['Global Sales (M)'].sum()

sales_comparison = pd.DataFrame({'Year': ['2007','2008', '2009', '2010'],␣
 ↪'Global Sales': [sales_2007,sales_2008, sales_2009 , sales_2010]})
sales_comparison
# BY YONGSHENG LIN
```

[50]:

	Year	Global Sales
0	2007	611.13
1	2008	678.90
2	2009	667.30
3	2010	600.45

Add the top publishers for these year to compare. Which big company are making money during

these years?

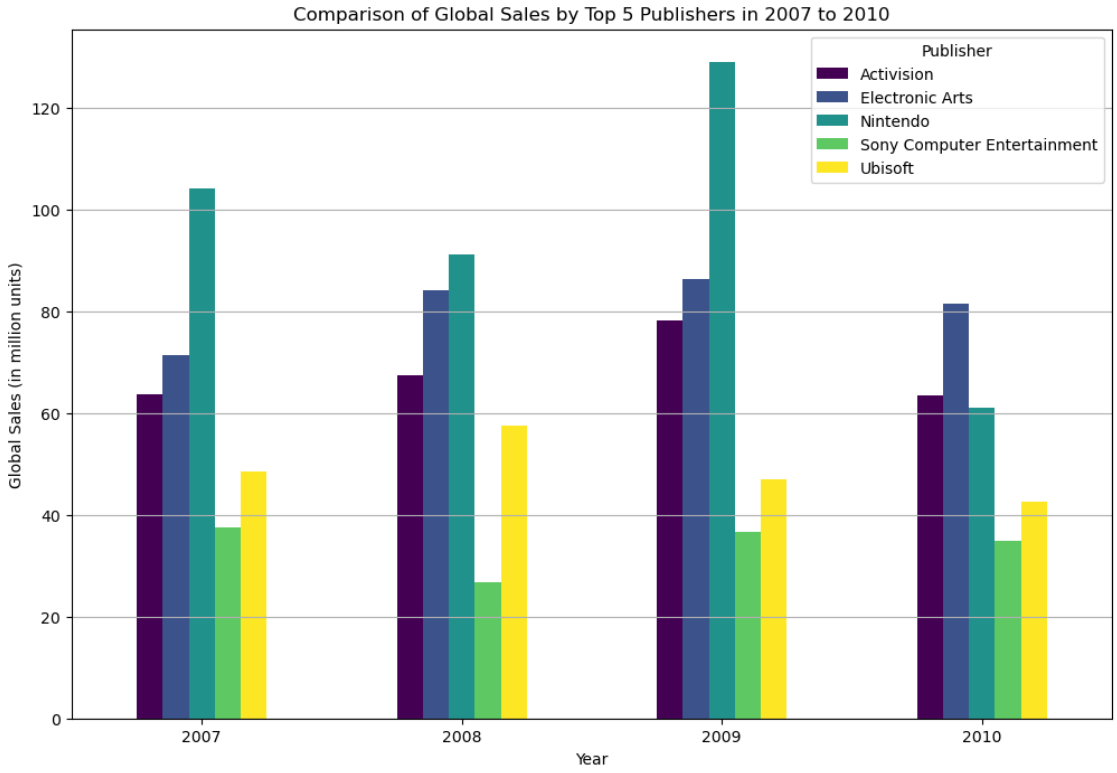
[51]:
```
# Since we want to find out which publishers are leading in sales as of 2016,
# we need to aggregate the sales data by publisher and then sort them.

# Summing up the global sales for each publisher
publisher_sales = dfvgsales.groupby('Publisher')['Global Sales (M)'].sum().
 ↪sort_values(ascending=False)

top_5_publishers = publisher_sales.head(10)
top_5_publishers = top_5_publishers.head(5).index

# Creating a DataFrame for comparison including the top 5 publishers
sales_comparison = dfvgsales[(dfvgsales['Year'].isin([2007,2008,2009,2010])) &␣
 ↪(dfvgsales['Publisher'].isin(top_5_publishers))]
sales_comparison_grouped = sales_comparison.groupby(['Year',␣
 ↪'Publisher'])['Global Sales (M)'].sum().unstack().fillna(0)

sales_comparison_grouped
# BY YONGSHENG LIN
```

[51]:
```
Publisher  Activision  Electronic Arts  Nintendo  Sony Computer Entertainment  \
Year
2007            63.57            71.33    104.18                        37.54
2008            67.41            84.12     91.22                        26.64
2009            78.06            86.20    128.89                        36.53
2010            63.39            81.38     61.07                        34.89

Publisher  Ubisoft
Year
2007         48.60
2008         57.44
2009         47.01
2010         42.62
```

[52]:
```
# Plotting the comparison global sales from 2007 to 2010 for the top 5␣
 ↪publishers
plt.figure(figsize=(8, 6))
sales_comparison_grouped.plot(kind='bar', stacked=False, colormap='viridis',␣
 ↪figsize=(12,8))
plt.title('Comparison of Global Sales by Top 5 Publishers in 2007 to 2010')
plt.xlabel('Year')
plt.ylabel('Global Sales (in million units)')
plt.xticks(rotation=0)
plt.grid(axis='y')

plt.show()
```

```
# BY YONGSHENG LIN
```

```
<Figure size 800x600 with 0 Axes>
```

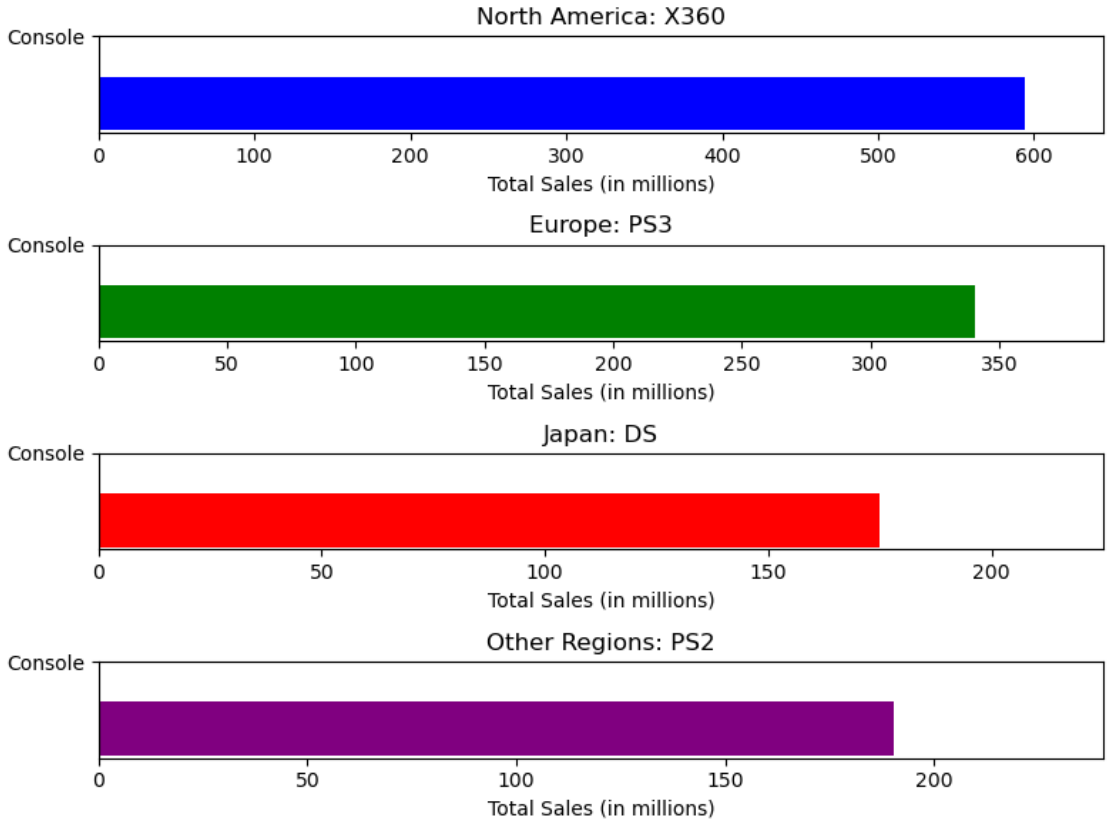


0.8 What is best selling console as of 2016 by regions?

[53]:
```
vgsales_upto_2016 = dfvgsales[dfvgsales['Year'] <= 2016]
# Filter the entire data up to 2016
platform_sales_by_region = vgsales_upto_2016.groupby('Platform').sum().loc[:,␣
 ↪'NA Sales (M)':'Other Sales (M)']
best_selling_consoles_by_region = platform_sales_by_region.idxmax()
# Group by platform and sum up regional sales (Slice used here)
best_selling_consoles_by_region
#Identify the best selling console in each region by finding the platform with␣
 ↪the maximum sales, and print
# BY YONGSHENG LIN
```

[53]:
```
NA Sales (M)       X360
EU Sales (M)        PS3
JP Sales (M)         DS
Other Sales (M)     PS2
dtype: object
```

[54]:
```
fig, axes = plt.subplots(4, 1, figsize=(8, 6))
colors = ['blue', 'green', 'red', 'purple']
# North America
axes[0].barh('North America',
             platform_sales_by_region.loc[best_selling_consoles_by_region['NA␣
 ↪Sales (M)'], 'NA Sales (M)'],
             color=colors[0])
axes[0].set_title(f'North America: {best_selling_consoles_by_region["NA Sales␣
 ↪(M)"]}')
axes[0].set_xlim(0, platform_sales_by_region['NA Sales (M)'].max() + 50)

# Europe
axes[1].barh('Europe',
             platform_sales_by_region.loc[best_selling_consoles_by_region['EU␣
 ↪Sales (M)'], 'EU Sales (M)'],
             color=colors[1])
axes[1].set_title(f'Europe: {best_selling_consoles_by_region["EU Sales (M)"]}')
axes[1].set_xlim(0, platform_sales_by_region['EU Sales (M)'].max() + 50)

# Japan
axes[2].barh('Japan',
             platform_sales_by_region.loc[best_selling_consoles_by_region['JP␣
 ↪Sales (M)'], 'JP Sales (M)'],
             color=colors[2])
axes[2].set_title(f'Japan: {best_selling_consoles_by_region["JP Sales (M)"]}')
axes[2].set_xlim(0, platform_sales_by_region['JP Sales (M)'].max() + 50)

# Other Regions
axes[3].barh('Other Regions',
             platform_sales_by_region.
 ↪loc[best_selling_consoles_by_region['Other Sales (M)'], 'Other Sales (M)'],
             color=colors[3])
axes[3].set_title(f'Other Regions: {best_selling_consoles_by_region["Other␣
 ↪Sales (M)"]}')
axes[3].set_xlim(0, platform_sales_by_region['Other Sales (M)'].max() + 50 )

#Set the labels
for ax in axes:
    ax.set_xlabel('Total Sales (in millions)')
    ax.set_yticks(["Console"])
#Display
plt.tight_layout()
plt.show()

# BY YONGSHENG LIN
```



Hypothesis Questions:

0.9 Do regional differences have an impact on genre popularity in terms of sales?

To test the hypothesis that the popularity of certain game genres differs significantly between regions, we can use a chi-square test of independence. Let's take look of game genre and region (North America, Europe, Japan, and Other).

[55]:
```
# Defining a function to count unique titles per genre in each region
from scipy.stats import chi2_contingency

def count_titles_above_sales_threshold(df, sales_column, threshold=0.1):
    """ Count the number of titles in each genre with sales above a certain␣
 ↪threshold in a given region. """
    filtered_df = df[df[sales_column] > threshold]
    return filtered_df.groupby('Genre')['Game Title'].count()

# Applying the function to each region's sales column
na_titles = count_titles_above_sales_threshold(dfvgsales, 'NA Sales (M)')
eu_titles = count_titles_above_sales_threshold(dfvgsales, 'EU Sales (M)')
```

```
jp_titles = count_titles_above_sales_threshold(dfvgsales, 'JP Sales (M)')
other_titles = count_titles_above_sales_threshold(dfvgsales, 'Other Sales (M)')

contingency_table = pd.DataFrame({
    'North America': na_titles,
    'Europe': eu_titles,
    'Japan': jp_titles,
    'Other': other_titles
})

chi2, p, dof, expected = chi2_contingency(contingency_table)

contingency_table, (chi2, p)

#Yongsheng
```

[55]:
```
(              North America  Europe  Japan  Other
 Genre
 Action                 1593     979    377    391
 Adventure               238     135    114     29
 Fighting                373     228    199     91
 Misc                    727     385    190    144
 Platform                503     305    165    122
 Puzzle                  185      96     94     24
 Racing                  589     401     77    151
 Role-Playing            489     296    540    114
 Shooter                 686     502     95    230
 Simulation              352     173    116     68
 Sports                 1186     610    307    260
 Strategy                135      93    133     21,
 (1017.2077612938004, 2.308194968804138e-192))
```

Given the extremely small p-value, we can reject the null hypothesis, which stated that genre popularity is independent of the region. This result suggests that there is a statistically significant association between game genre and region, indicating that the popularity of certain genres does indeed differ significantly between regions.

1 How do sales compare across different regions?

Data chart showing Video Game Sales by Region.

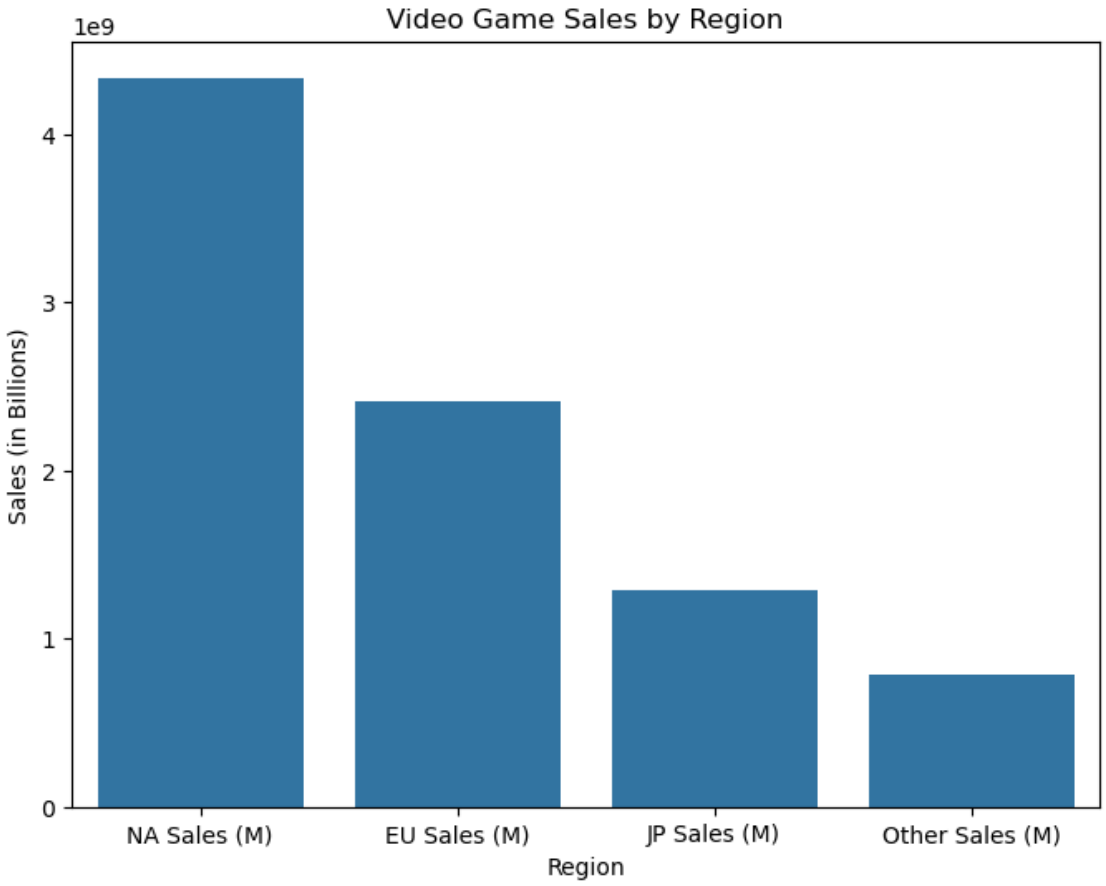
[56]:
```
salesdb #previouly made dataframe  # Aaron Leang
```

[56]:
```
       NA Sales (M)  EU Sales (M)  JP Sales (M)  Other Sales (M)  \
0          41490000      29020000       3770000          8460000
1          29080000       3580000       6810000           770000
2          15850000      12880000       3790000          3310000
```

```
3          15750000       11010000        3280000           2960000
4          11270000        8890000       10220000           1000000
…                 …              …              …                 …
16593         10000              0              0                 0
16594         10000              0              0                 0
16595             0              0              0                 0
16596             0          10000              0                 0
16597         10000              0              0                 0

       Global Sales (M)
0              82740000
1              40240000
2              35820000
3              33000000
4              31370000
…                 …
16593             10000
16594             10000
16595             10000
16596             10000
16597             10000

[16327 rows x 5 columns]
```

Bar graph showing Video Game Sales by Region

[57]:
```
regional_sales=salesdb.drop(columns=['Global Sales (M)']).sum()

# Plotting the regional sales data
plt.figure(figsize=(8, 6))
sns.barplot(x=regional_sales.index, y=regional_sales.values)
plt.title('Video Game Sales by Region')
plt.xlabel('Region')
plt.ylabel('Sales (in Billions)')
plt.show()

# Aaron Leang
```



[58]:
```
regional_sales # Aaron Leang
```

[58]:
```
NA Sales (M)       4333429977
EU Sales (M)       2409119988
JP Sales (M)       1284299997
Other Sales (M)     789009996
dtype: int64
```

2 What people like to play? Game sales by genre overall/and by region?

[59]:
```
vgsalesregion=dfvgsales.groupby('Genre')[['NA Sales (M)','JP Sales (M)','EU␣
↪Sales (M)','Other Sales (M)']].sum()
vgsalesregion
#Ethan Bandong
```

[59]:
```
              NA Sales (M)  JP Sales (M)  EU Sales (M)  Other Sales (M)
Genre
```

```
Action              861.80        158.66        516.48          184.92
Adventure           102.06         52.01         63.79           16.70
Fighting            220.74         87.15        100.00           36.19
Misc                402.48        106.67        213.82           74.02
Platform            445.99        130.65        200.67           51.51
Puzzle              122.01         56.68         50.53           12.47
Racing              356.93         56.61        236.32           76.68
Role-Playing        326.50        350.29        187.58           59.38
Shooter             575.16         38.18        310.45          101.90
Simulation          181.78         63.54        113.20           31.36
Sports              670.09        134.76        371.34          132.65
Strategy             67.89         49.10         44.94           11.23
```

[60]:
```
vgsalesregion['NA Sales (M)'].sort_values(ascending=False) #Highest to lowest␣
↪selling NA genres #Ethan Bandong
```

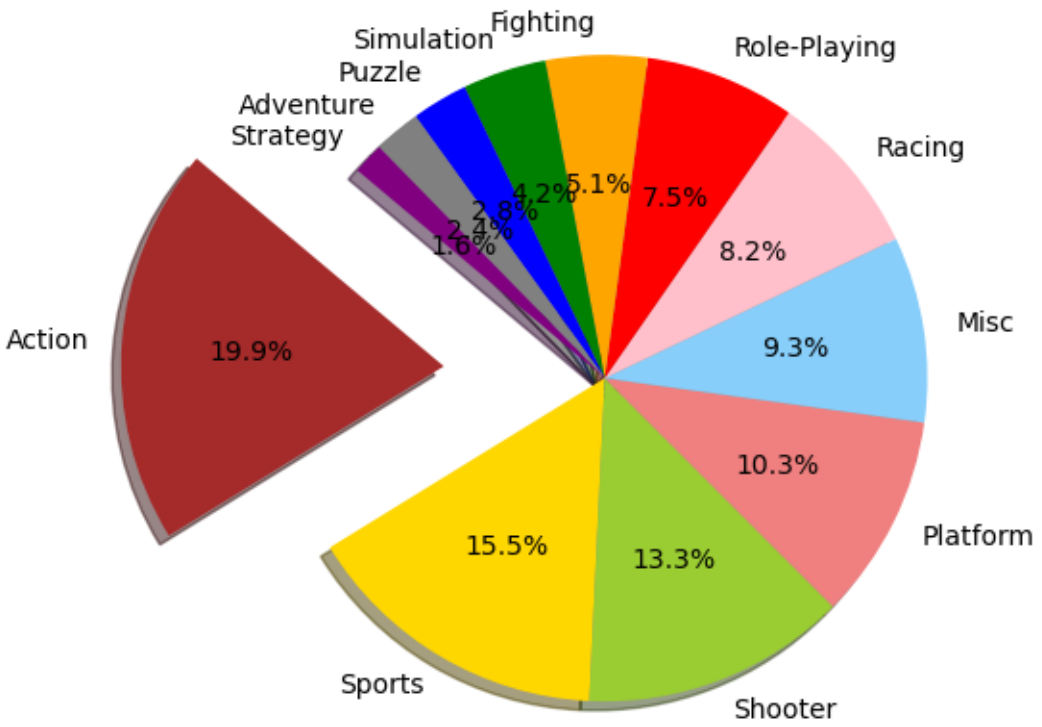
[60]:
```
Genre
Action          861.80
Sports          670.09
Shooter         575.16
Platform        445.99
Misc            402.48
Racing          356.93
Role-Playing    326.50
Fighting        220.74
Simulation      181.78
Puzzle          122.01
Adventure       102.06
Strategy         67.89
Name: NA Sales (M), dtype: float64
```

[61]:
```
vgsalesregion['NA Sales (M)'] #Jordan Uribe, series used to keep  genre slices␣
↪consistant
```

[61]:
```
Genre
Action          861.80
Adventure       102.06
Fighting        220.74
Misc            402.48
Platform        445.99
Puzzle          122.01
Racing          356.93
Role-Playing    326.50
Shooter         575.16
Simulation      181.78
Sports          670.09
Strategy         67.89
```

```
Name: NA Sales (M), dtype: float64
```

[62]:
```
import matplotlib.pyplot as plt

# Data to plot
labels = 'Action','Sports', 'Shooter', 'Platform', 'Misc', 'Racing',␣
 ↪'Role-Playing', 'Fighting', 'Simulation', 'Puzzle', 'Adventure', 'Strategy'
act=vgsalesregion['NA Sales (M)'][0]

sp=vgsalesregion['NA Sales (M)'][10]
sho=vgsalesregion['NA Sales (M)'][8]
plat=vgsalesregion['NA Sales (M)'][4]
misc=vgsalesregion['NA Sales (M)'][3]
racing=vgsalesregion['NA Sales (M)'][6]
rp=vgsalesregion['NA Sales (M)'][7]
fi=vgsalesregion['NA Sales (M)'][2]
sim=vgsalesregion['NA Sales (M)'][9]
puz=vgsalesregion['NA Sales (M)'][5]
ad=vgsalesregion['NA Sales (M)'][1]
strat=vgsalesregion['NA Sales (M)'][11]

sizes = [act,sp,sho,plat,misc,racing,rp,fi,sim,puz,ad,strat]
colors = ['brown','gold', 'yellowgreen', 'lightcoral',␣
 ↪'lightskyblue','pink','red','orange','green','blue','grey','purple']
explode = (.5,0, 0, 0, 0,0,0,0,0,0,0,0)  # explode 1st slice         #IN OUR␣
 ↪PRESENTATION WE COULD EXLPLODE SLICES TO EMPHESIZE
#autopct --add the percentage to the slices
#labels specify from where to get the lables

# Plot
plt.pie(sizes, explode=explode, labels=labels, colors=colors,autopct='%1.1f%%'
, shadow=True, startangle=140)

plt.axis('equal')
plt.show()
#Jordan Uribe
```



[63]:
```
vgsalesregion['JP Sales (M)'].sort_values(ascending=False)#Highest to lowest␣
↪selling JP genres #Ethan Bandong
```

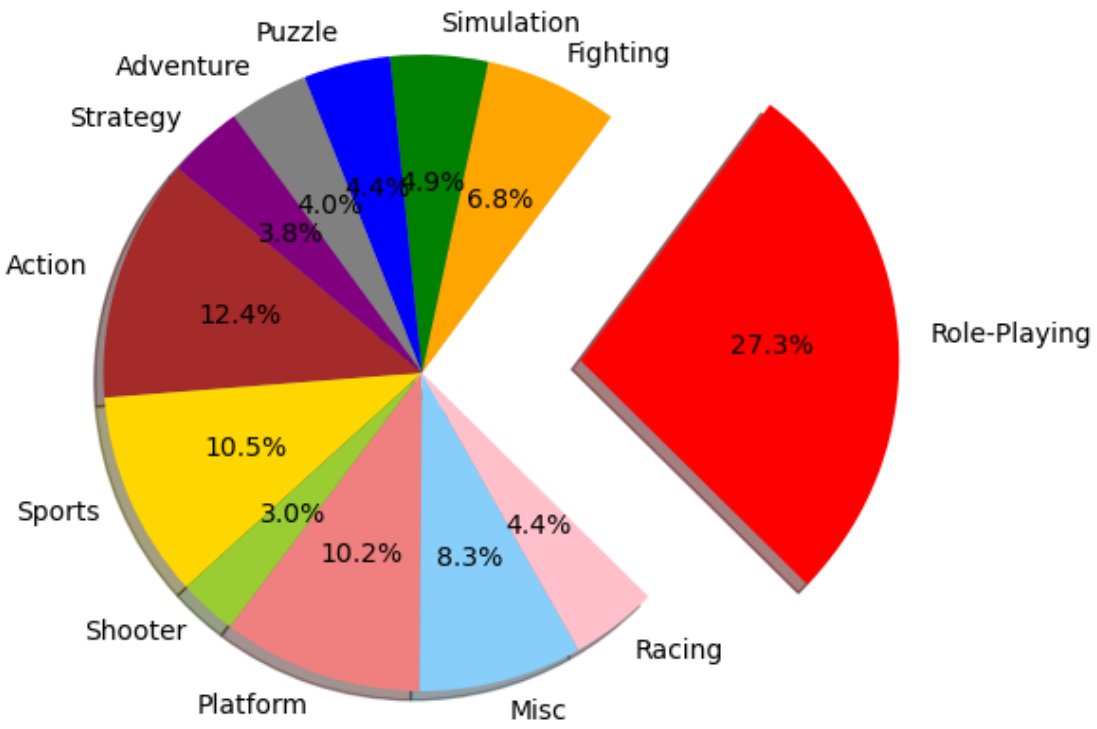
[63]:
```
Genre
Role-Playing    350.29
Action          158.66
Sports          134.76
Platform        130.65
Misc            106.67
Fighting         87.15
Simulation       63.54
Puzzle           56.68
Racing           56.61
Adventure        52.01
Strategy         49.10
Shooter          38.18
Name: JP Sales (M), dtype: float64
```

[64]:
```
vgsalesregion['JP Sales (M)'] #Jordan Uribe, series used to keep  genre slices␣
↪consistant
```

[64]:
```
Genre
Action          158.66
```

```
Adventure        52.01
Fighting         87.15
Misc            106.67
Platform        130.65
Puzzle           56.68
Racing           56.61
Role-Playing    350.29
Shooter          38.18
Simulation       63.54
Sports          134.76
Strategy         49.10
Name: JP Sales (M), dtype: float64
```

[65]:
```
import matplotlib.pyplot as plt

# Data to plot
labels = 'Action','Sports', 'Shooter', 'Platform', 'Misc', 'Racing',␣
 ↪'Role-Playing', 'Fighting', 'Simulation', 'Puzzle', 'Adventure', 'Strategy'
act=vgsalesregion['JP Sales (M)'][0]

sp=vgsalesregion['JP Sales (M)'][10]
sho=vgsalesregion['JP Sales (M)'][8]
plat=vgsalesregion['JP Sales (M)'][4]
misc=vgsalesregion['JP Sales (M)'][3]
racing=vgsalesregion['JP Sales (M)'][6]
rp=vgsalesregion['JP Sales (M)'][7]
fi=vgsalesregion['JP Sales (M)'][2]
sim=vgsalesregion['JP Sales (M)'][9]
puz=vgsalesregion['JP Sales (M)'][5]
ad=vgsalesregion['JP Sales (M)'][1]
strat=vgsalesregion['JP Sales (M)'][11]

sizes = [act,sp,sho,plat,misc,racing,rp,fi,sim,puz,ad,strat]
colors = ['brown','gold', 'yellowgreen', 'lightcoral',␣
 ↪'lightskyblue','pink','red','orange','green','blue','grey','purple']
explode = (0,0, 0, 0, 0,0,0.5,0,0,0,0,0)  # explode 1st slice         #IN OUR␣
 ↪PRESENTATION WE COULD EXLPLODE SLICES TO EMPHESIZE
#autopct --add the percentage to the slices
#labels specify from where to get the lables

# Plot
plt.pie(sizes, explode=explode, labels=labels, colors=colors,autopct='%1.1f%%'
, shadow=True, startangle=140)

plt.axis('equal')
plt.show()
#Jordan Uribe
```



[66]:
```
vgsalesregion['EU Sales (M)'].sort_values(ascending=False) #Highest to lowest␣
↪selling EU genres #Ethan Bandong
```

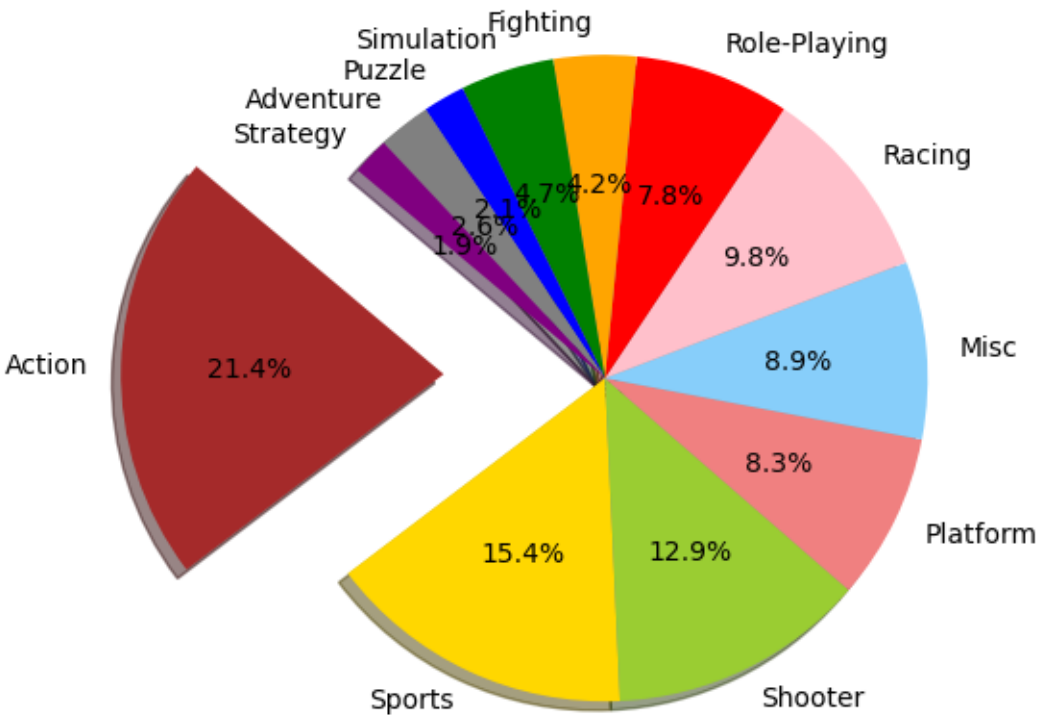
[66]:
```
Genre
Action          516.48
Sports          371.34
Shooter         310.45
Racing          236.32
Misc            213.82
Platform        200.67
Role-Playing    187.58
Simulation      113.20
Fighting        100.00
Adventure        63.79
Puzzle           50.53
Strategy         44.94
Name: EU Sales (M), dtype: float64
```

[67]:
```
vgsalesregion['EU Sales (M)']#Jordan Uribe, series used to keep  genre slices␣
↪consistant
```

[67]:
```
Genre
Action          516.48
```

```
Adventure        63.79
Fighting        100.00
Misc            213.82
Platform        200.67
Puzzle           50.53
Racing          236.32
Role-Playing    187.58
Shooter         310.45
Simulation      113.20
Sports          371.34
Strategy         44.94
Name: EU Sales (M), dtype: float64
```

[68]:
```
import matplotlib.pyplot as plt

# Data to plot
labels = 'Action','Sports', 'Shooter', 'Platform', 'Misc', 'Racing',␣
 ↪'Role-Playing', 'Fighting', 'Simulation', 'Puzzle', 'Adventure', 'Strategy'
act=vgsalesregion['EU Sales (M)'][0]

sp=vgsalesregion['EU Sales (M)'][10]
sho=vgsalesregion['EU Sales (M)'][8]
plat=vgsalesregion['EU Sales (M)'][4]
misc=vgsalesregion['EU Sales (M)'][3]
racing=vgsalesregion['EU Sales (M)'][6]
rp=vgsalesregion['EU Sales (M)'][7]
fi=vgsalesregion['EU Sales (M)'][2]
sim=vgsalesregion['EU Sales (M)'][9]
puz=vgsalesregion['EU Sales (M)'][5]
ad=vgsalesregion['EU Sales (M)'][1]
strat=vgsalesregion['EU Sales (M)'][11]

sizes = [act,sp,sho,plat,misc,racing,rp,fi,sim,puz,ad,strat]
colors = ['brown','gold', 'yellowgreen', 'lightcoral',␣
 ↪'lightskyblue','pink','red','orange','green','blue','grey','purple']
explode = (.5,0, 0, 0, 0,0,0,0,0,0,0,0)  # explode 1st slice         #IN OUR␣
 ↪PRESENTATION WE COULD EXLPLODE SLICES TO EMPHESIZE
#autopct --add the percentage to the slices
#labels specify from where to get the lables

# Plot
plt.pie(sizes, explode=explode, labels=labels, colors=colors,autopct='%1.1f%%'
, shadow=True, startangle=140)

plt.axis('equal')
plt.show()
#Jordan Uribe
```



[69]:
```
vgsalesregion['Other Sales (M)'].sort_values(ascending=False) #Highest to␣
↪lowest selling  genres in unspecfied regions #Ethan Bandong
```

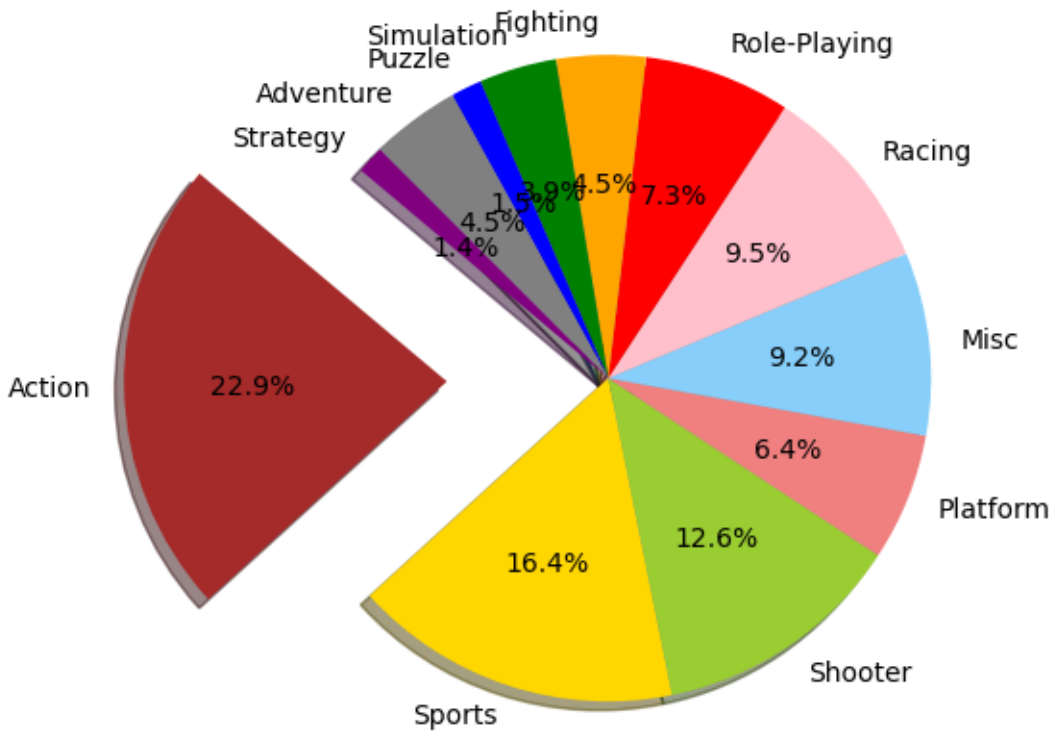
[69]:
```
Genre
Action          184.92
Sports          132.65
Shooter         101.90
Racing           76.68
Misc             74.02
Role-Playing     59.38
Platform         51.51
Fighting         36.19
Simulation       31.36
Adventure        16.70
Puzzle           12.47
Strategy         11.23
Name: Other Sales (M), dtype: float64
```

[70]:
```
vgsalesregion['Other Sales (M)'] #Jordan Uribe, series used to keep  genre␣
↪slices consistant
```

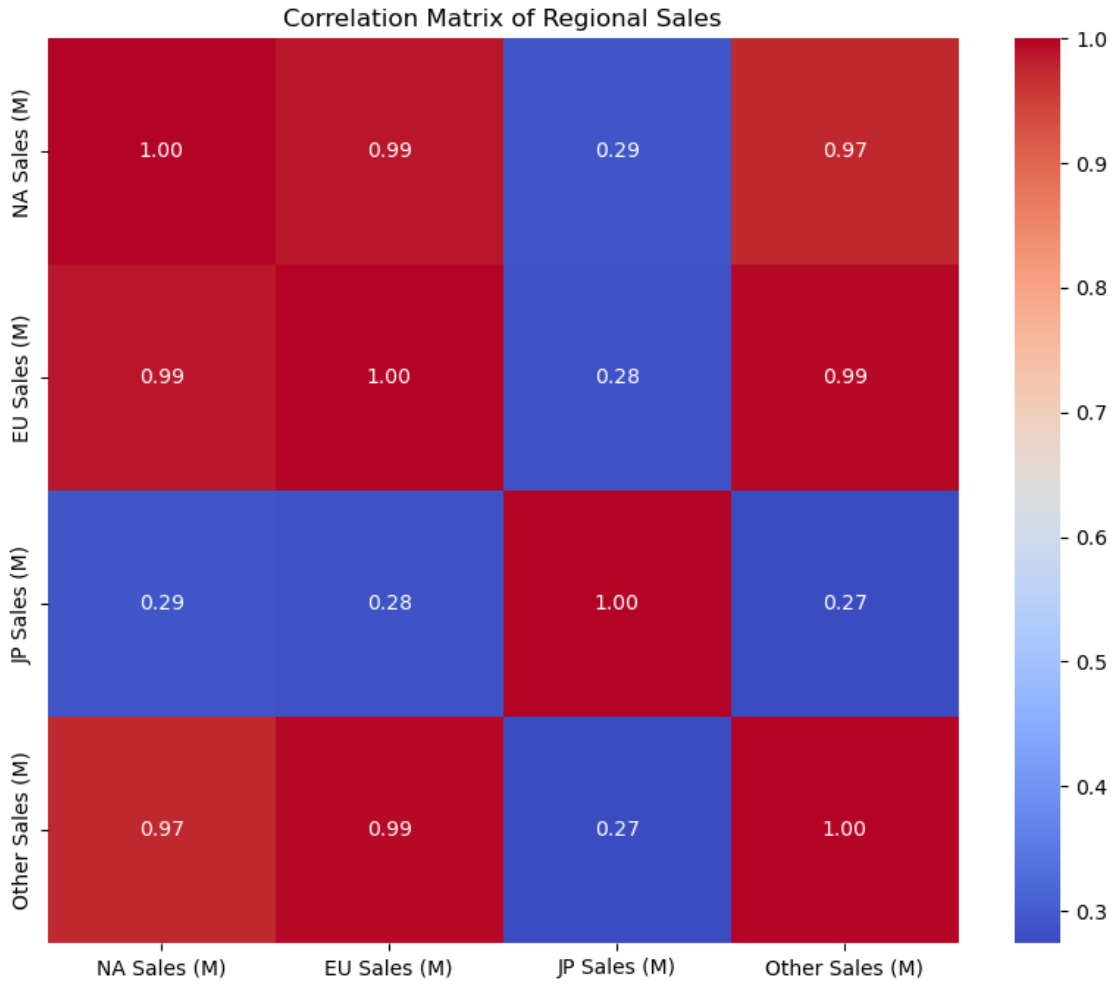
[70]:
```
Genre
Action          184.92
```

```
Adventure        16.70
Fighting         36.19
Misc             74.02
Platform         51.51
Puzzle           12.47
Racing           76.68
Role-Playing     59.38
Shooter         101.90
Simulation       31.36
Sports          132.65
Strategy         11.23
Name: Other Sales (M), dtype: float64
```

[71]:
```
import matplotlib.pyplot as plt

# Data to plot
labels = 'Action','Sports', 'Shooter', 'Platform', 'Misc', 'Racing',␣
 ↪'Role-Playing', 'Fighting', 'Simulation', 'Puzzle', 'Adventure', 'Strategy'
act=vgsalesregion['Other Sales (M)'][0]

sp=vgsalesregion['Other Sales (M)'][10]
sho=vgsalesregion['Other Sales (M)'][8]
plat=vgsalesregion['Other Sales (M)'][4]
misc=vgsalesregion['Other Sales (M)'][3]
racing=vgsalesregion['Other Sales (M)'][6]
rp=vgsalesregion['Other Sales (M)'][7]
fi=vgsalesregion['Other Sales (M)'][2]
sim=vgsalesregion['Other Sales (M)'][9]
puz=vgsalesregion['Other Sales (M)'][5]
ad=vgsalesregion['Other Sales (M)'][2]
strat=vgsalesregion['Other Sales (M)'][11]

sizes = [act,sp,sho,plat,misc,racing,rp,fi,sim,puz,ad,strat]
colors = ['brown','gold', 'yellowgreen', 'lightcoral',␣
 ↪'lightskyblue','pink','red','orange','green','blue','grey','purple']
explode = (.5,0, 0, 0, 0,0,0,0,0,0,0,0)  # explode 1st slice         #IN OUR␣
 ↪PRESENTATION WE COULD EXLPLODE SLICES TO EMPHESIZE
#autopct --add the percentage to the slices
#labels specify from where to get the lables

# Plot
plt.pie(sizes, explode=explode, labels=labels, colors=colors,autopct='%1.1f%%'
, shadow=True, startangle=140)

plt.axis('equal')
plt.show()
#Jordan Uribe
```



[78]:
```
genre_sales = dfvgsales.groupby('Genre')[['NA Sales (M)', 'EU Sales (M)', 'JP␣
↪Sales (M)', 'Other Sales (M)']].sum()

# Calculating the correlation matrix
correlation_matrix = genre_sales.corr()
# Plotting the heatmap
plt.figure(figsize=(10, 8))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', fmt='.2f')
plt.title('Correlation Matrix of Regional Sales')
plt.show()
#Yongsheng
```



These correlations reinforce the idea that while there are certain global trends in genre popularity, regional differences still exist, most notably with Japan, which has a distinctly different pattern of genre preference compared to North America and Europe.

2.1 Conclusion and Summary

1.What are the percentages of platforms recorded?

The result was surprise that "other" is actually taking big portion of the pie which meaning beside the well known console brand there is still other platform that were doing good at that time.

2.What are the sales trends over time?

The graph shown that game sales increase yearly since 1993 and reach to spike at 2009 and drop back down.

3.Did the economic crisis in 2007 to 2008 has impact on sales of game industry?

This is following up the previous question, further analysis that 2007 to 2009 was peak of game sales globally. Then decrease sharply afterward. This can be some evidence that when economic is

bad people like to play game.

4.What is best selling console as of 2016 by regions?

We can see North America like to play xbox360, Europe like PS3, Japan loves DS, and rest of the world still playing PS2.

5.Do regional differences have an impact on genre popularity in terms of sales?

The result was clear. Giving small p-value, we can reject the null hypothesis, which stated that genre popularity is independent of the region.There is a statistically significant association between game genre and region.

6.How do sales compare across different regions?

Independently North America has the most sales.

7.What people like to play? analysis game sales by genre overall/ and by region?

We have compare regionally about what people like to play in their market? Results are Most people in North America and Europe like to play action games, Japan like to play RPG, and others likes to play action and sports.

[ ]: