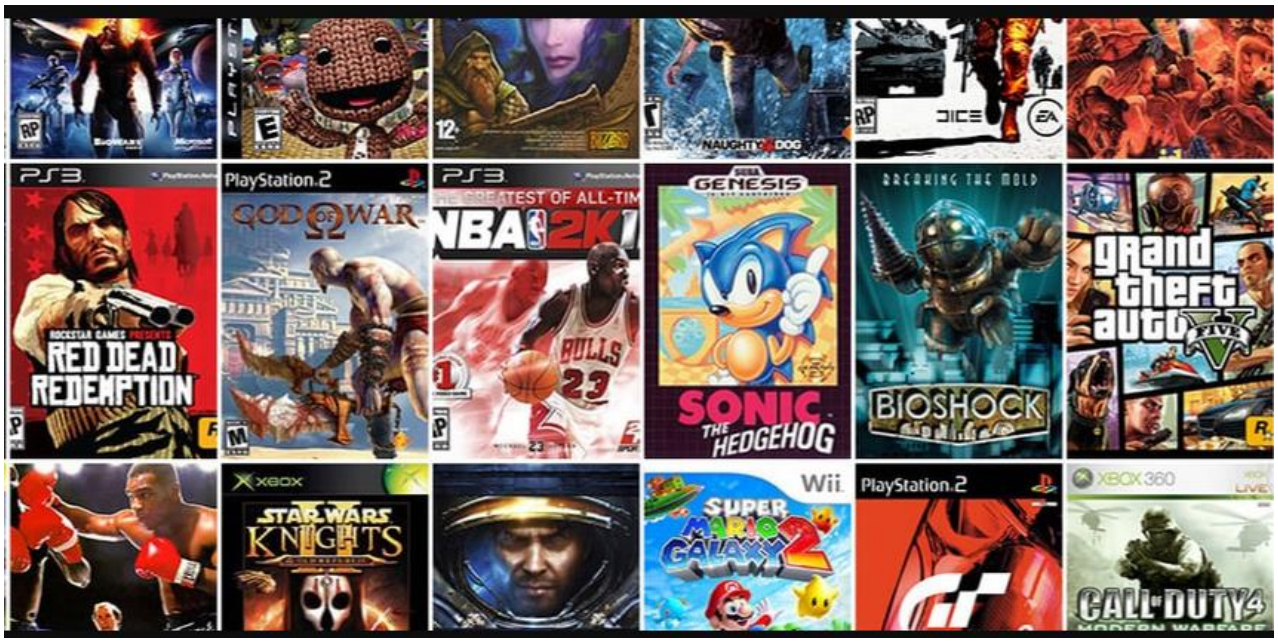
Investigating the factors that influence the Sale of Video Games

Saacid Ali



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1. Introduction

The video game industry has been a multi-billion dollar industry for many years now with recorded sales of $137.9 billion in 2018 and it is estimated to grow to $180.1 billion by the end of 2021 (1). The industry is booming, and business has never been better. Companies such as EA, Sony and Microsoft are seeing profits increase year on year (2). Consumers have many platforms to pick from such as Xbox, PlayStation, PC and Nintendo. They also have an abundance of game genres to pick from such as sport, shooting, fighting, racing etc. There are many factors that have contributed to the exponential growth of the gaming industry such as the innovations in technology which now allow consumers to buy games online as opposed to in-store and the rise of in-game item purchases (3).

However, the video game industry has faced backlash with reports suggesting that it affects children's development as It hinders their active play and it can have negative effects on how children perform in school due to the addictive nature of video games (4). Politicians have spoken about the perceived negative effects of video games. Donald Trump claims that the violence and mass shootings which occur in the United States are a direct result of the "glorification of violence in society" which is portrayed in "gruesome and grisly video games".(5).

Although many studies have examined video game sales and the rise of the gaming industry. There have not been many studies which have analysed what makes some games huge success and why others are not as popular. The data being analysed in this study is from 2013 to 2017 as there was no readily available data for 2018-2020.

The aims of this project are to understand what makes a game successful. To see if the genre of a game has an influence on the success of a game and if the platform a game is released on makes a difference. Also, the aim of this study is to find out what the biggest influence on the success of a video game is.

2. Literature Review

The demand for video games is a market which includes both hardware and software. The hardware consists of the gaming platform such as PlayStation or Xbox and the software consists of the game. However, the games can only be played on the system they were designed for e.g. you cannot play a PlayStation game on an Xbox console (6). This leads to companies releasing their games on multiple platforms to enjoy the most possible sales. The two main consoles currently are the PlayStation 4 and Xbox One both were released in Q4 of 2013. As of 2020, the PS4 has sold 110 million units and the Xbox One has sold approximately 46 million units.

Charles and Ohashi have suggested the notion that if there are many popular games that are exclusive to one platform, more consumers will buy that platform. This will lead to game developers releasing more titles on that platform as the potential for sales is higher as opposed to other platforms. This is known as the bandwagon effect (7).

With the enhancements in technology, this has allowed consumers to play their friends from the comfort of their homes using the internet. Video games have become part of people's everyday life's and many people are buying games on multiple platforms such as on their mobile phones (8). "The average 2-17 year old plays video game for 7 hr per week" (9).However, video games are not just played by young people, it is an activity which is enjoyed by people of all ages. In the united states, 68% of households play video games and 43% of online US game players are female (10).

One of the main aspects that makes video games successful is due to the fact that consumers receive value for money and more. On average consumers paid $60 for Grand Theft Auto IV per copy and enjoyed the game for up to 100 hours (11).

Video games have faced their fair share of criticism. The “explicit violent nature” of games such as Call of Duty and Grand Theft Auto cause increases in aggressive behaviour and aggressive thoughts (12). Studies have shown that violent video games have more of an effect on individuals as opposed to violent films (13). The violence in video games reduces empathy amongst gamers and desensitizes them to other’s pain (14). Yet, critics of the link between video games and acts of violence have claimed that “long-term exposure effects are spurious, masking the effects of some unmeasured third variable, such as hostile personality” (15)

3. Data Retrieval

The dataset being analysed was collected from Kaggle. The Data was readily available online and was easy to download meaning that the data retrieval process was hassle free. The dataset used was both of **PS4_GameSales.csv and XboxOne_GameSales.csv** . In this dataset there are 9 columns and their names are the following:

- **“Name”** - Name of the game
- “Year_of_Release” - Year of the game released
- “Genre” - Game's category
- “Publisher” - Publisher
- “NA_Sales” - Game sales in North America (in millions of units)
- “EU_Sales” - Game sales in the European Union (in millions of units)
- “JP_Sales” - Game sales in Japan (in millions of units)
- “Other_Sales” - Game sales in the rest of the world, i.e. Africa, Asia excluding Japan, Australia, Europe excluding the E.U. and South America (in millions of units)
- “Global_Sales” - Total sales in the world (in millions of units)

Prior to the datasets being used, the two data sets were combined in excel and the column platform was added. As the dataset was in a CSV format, it was shown as a Pandas DataFrame. Below is a sample of the dataset.

Figure 1 **Vgsales.csv** as a DataFrame

```
VGS.head(10)
```

	Name	Platform	Year_of_Release	Genre	Publisher	NA_Sales	EU_Sales	JP_Sales	Other_Sales	Global_Sales
0	Grand Theft Auto V	PS4	2014	Action	Rockstar Games	6.06	9.71	0.60	3.02	19.39
1	Call of Duty: Black Ops 3	PS4	2015	Shooter	Activision	6.18	6.05	0.41	2.44	15.09
2	Call of Duty: WWII	PS4	2017	Shooter	Activision	4.67	6.21	0.40	2.12	13.40
3	FIFA 18	PS4	2017	Sports	EA Sports	1.27	8.64	0.15	1.73	11.80
4	FIFA 17	PS4	2016	Sports	Electronic Arts	1.26	7.95	0.12	1.61	10.94
5	Uncharted PS4	PS4	2016	Action	Sony Interactive Entertainment	4.49	3.93	0.21	1.70	10.33
6	Grand Theft Auto V	XOne	2014	Action	Rockstar Games	4.70	3.25	0.01	0.76	8.72
7	Call of Duty: Infinite Warfare	PS4	2016	Shooter	Activision	3.11	3.83	0.19	1.36	8.48
8	Fallout 4	PS4	2015	Role-Playing	Bethesda Softworks	2.91	3.97	0.27	1.34	8.48
9	FIFA 16	PS4	2015	Sports	EA Sports	1.15	5.77	0.07	1.23	8.22

4. Data Representation

Python3 was picked as the principle language to lead our examination as it has extremely valuable and amazing libraries and bundles. The accompanying bundles were used:

- Pandas
- Numpy
- Matplotlib

- Plotly
- Scikit-learn

5. Data Cleaning

Data cleaning is the process of recognising and remedying degenerate or off base records from a record set, table, or database and alludes to recognizing deficient, off base, superfluous or unessential pieces of the information and afterward supplanting, altering, or erasing the messy or coarse information (16).

The process used involves dealing with missing values, removing duplicates, transforming data, and removing redundant data.

5.1. Removing Redundant Data

Once the data was retrieved, it was realised that there was some redundant data in the file. The aim of this project is to predict future video game sales. In the data file, there is sales information for games on platforms such as PS2, N64 and the Wii. These platforms have been discontinued therefore it would be meaningless to project sales on these platforms. The only active platforms which have not been discontinued are the PS4, XOne and PC. The data for game sales in the year 2018 were removed as there were not enough games released and the data was recorded in early 2018.

The sales data for PC was removed as the sales data spans too far back and there are not enough sales made on PC. PC is not the main platform for video game enthusiasts. The redundant data was removed on Microsoft Excel as the process was simple and swift.

5.2. Removing duplicates

The data was checked for duplicate entries as this would skew the data. Duplicates is a common human error when it comes to inserting data in datasets. Duplicate data was removed using the drop_duplicates() function.

5.3. Dealing with missing values

Missing data can decrease the factual intensity of a study and can create one-sided estimates, prompting invalid assumptions and decisions. Missing values were checked for by using isnull(). As can be seen below, there was no missing values found in any of the 11 columns.

Figure 2 **Finding Null Values**

```
VGS_miss_values = VGS.isnull().sum()
VGS_miss_values
```

```
Name              0
Platform          0
Year_of_Release   0
Genre             0
Publisher         0
NA_Sales          0
EU_Sales          0
JP_Sales          0
Other_Sales       0
Global_Sales      0
dtype: int64
```

5.4. Transforming Data

Categorical vairables in some cases were characterised in a single group in numerous ways. Therefore, there needs to be replacement so that there is one consistent representation in each single group. An example of this is the publisher column. Some publishers operate using different names in different countries. Sony Interactive Entertainment operate with two different names in America and Japan but it is the some company. Some companies act as subsidieres, such as 2k Sports and Rockstar Games being subsidiers of Take-Two Interactive, hence the need for transforming the data. The data was transformed using the mask () function.

Figure 3 **Game Publishers**

```
VGS.Publisher.unique()

array(['Rockstar Games', 'Activision', 'EA Sports', 'Electronic Arts',
       'Sony Interactive Entertainment', 'Bethesda Softworks',
       'Sony Computer Entertainment', 'Microsoft Studios',
       'Namco Bandai Games', 'Square Enix', 'Blizzard Entertainment',
       'Ubisoft', 'Warner Bros. Interactive', '2K Sports',
       'Warner Bros. Interactive Entertainment', 'Capcom',
       'Konami Digital Entertainment', '2K Games', 'Hello Games',
       '505 Games', 'Deep Silver', 'Take-Two Interactive',
       'Bandai Namco Games', 'Sega', 'Tecmo Koei', 'Gearbox Software',
       'Mojang', 'Focus Home Interactive', 'Disney Interactive Studios',
       'Studio Wildcard', 'Codemasters', 'Harmonix Music Systems',
       'Koch Media', 'Rebellion Developments', 'Gun Media',
       'Telltale Games', 'Kalypso Media', 'City Interactive',
       'NIS America', 'Sold Out', 'PQube', 'Tripwire Interactive',
       'Astragon', 'Milestone S.r.l.', 'Nordic Games',
       'Majesco Entertainment', 'THQ Nordic', 'Frontier Developments',
       'Marvelous Interactive', 'Milestone', 'Arc System Works',
       'Paradox InteractiveÊ', 'Milestone S.r.l', 'System 3',
       'Dusenberry Martin Racing', 'Insomniac Games',
       'Idea Factory International', 'Little Orbit', 'Yacht Club Games',
       'Maximum Games', 'Nihon Falcom Corporation', 'Atlus',
       'Bigben Interactive', 'Tru Blu Entertainment', 'Acquire',
       'Ravenscourt', 'GameTrust', 'Grey Box', 'D3Publisher',
       'Devolver Digital', 'Soedesco', 'Funbox Media', 'Gaijinworks',
       'Badland Studio', 'GameMill', 'Microids', 'Xseed Games',
       'Aksys Games', 'MLB.com', 'Nippon Ichi Software', 'Atari',
       'Games Workshop', 'Revolution Software', 'Nicalis',
       'Ready at Dawn', 'Big Ben Interactive', 'Accolade',
       'Outright Games', 'Introversion Software', 'Nighthawk Interactive',
       'Rising Star Games', 'Team17 Digital Ltd', 'CokeM Interactive',
       'Compile Heart', 'GameMill Entertainment', 'Merge Games',
       'Perp Games', 'Alternative Software', 'Avanquest', 'Spb',
       'Kadokawa Games', 'Sprite', 'UFO Interactive', 'Wired Productions',
       'Stainless Games', 'Yeti', 'PM Studios', 'Rebellion',
       'Gunho Online Entertainment', 'Mediascape', 'Active Gaming Media',
       'GungHo', 'Techland', '11 bit studios', 'M2', 'Team Meat',
       'Team17 Software', 'UIG Entertainment', 'TopWare Interactive',
       'Rain Games'], dtype=object)
```

6. Data Analysis

6.1. Video Games Released Yearly

Figure 4 shows the number of video games released each year on PS4 and Xbox One. The number of games released has increased year on year. The explanation as to why the number of video games released in 2013 are extremely low is because both Consoles were released in Q4 of 2013.

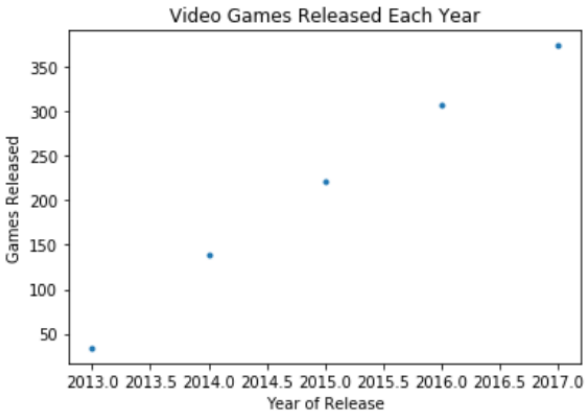

Figure 4 **Video Games Released Yearly**

Despite the fact that the number of video games being released has increased year on year, the number of sales globally have actually been on a decline in 2016 and 2017 as shown in the figure below.

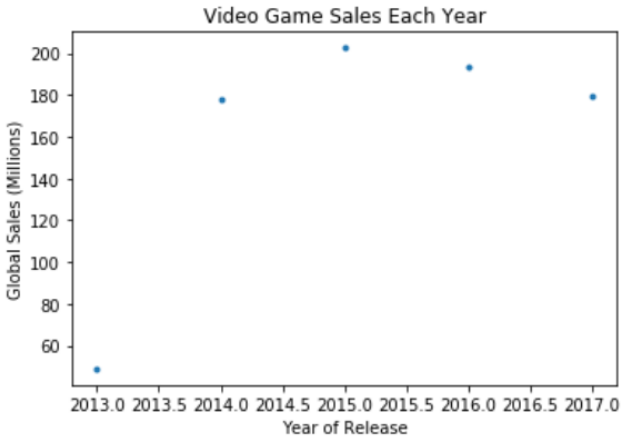

Figure 5 **Video Games Sales Yearly**

6.2. Top Selling Video Games

Figure 6 shows the top 15 selling video games by global sales. The game with the highest sales is Grand Theft Auto V, which was released on PS4, followed closely by Call of Duty: Black Ops 3, which was also released on PS4. Interestingly, there were also the only two video games to make the top 15 with sales from both PS4 and Xbox One. Grand Theft Auto V made 19 million global sales on PS4 and almost 9 million global sales on Xbox One. The FIFA franchise has 3 different games making the top 15 with FIFA 16, 17 and 18.

Having a look at the top 15 video game sales can give an explanation as to why the global sales have been on a decline for games released recently. This is probably because individuals in 2017 are still buying games which were released in 2015 such as Call of Duty: Black Ops 3 as it is a popular game and Call of Duty is not a game which is released yearly and every edition is different. However, video games such as FIFA are released yearly with each being an improvement on the last. These yearly editions sales drop drastically after the new edition is released. Breaking the top 15 video games sold by genre, 14 out of the 15 falls under either the Action, Shooter or Sports genre, with Fallout 4 being the only exception as it comes under the Role-Playing genre.

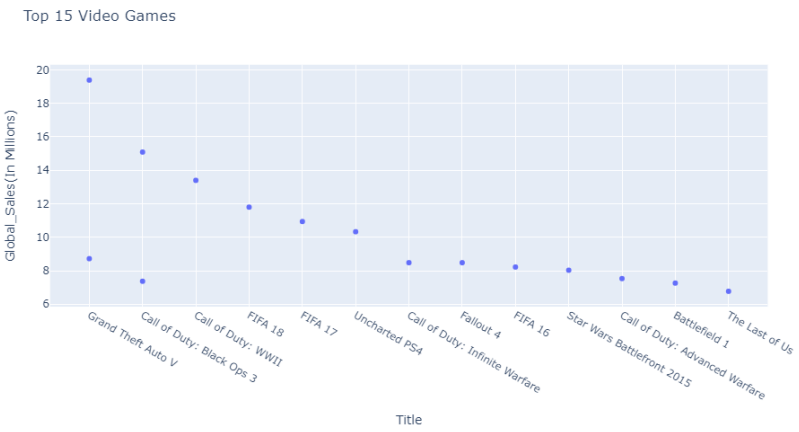

Figure 6 **Top 15 Video Games by Sales**

The PS4 is the console which has made the most video game sales and it mad 32% more sales than the Xbox One. In total, the PS4 sold 314 million PS4 games as opposed to the

Xbox One selling 159 million Xbox One games. This probably explains why only 2 Xbox One games made the top 15 list.

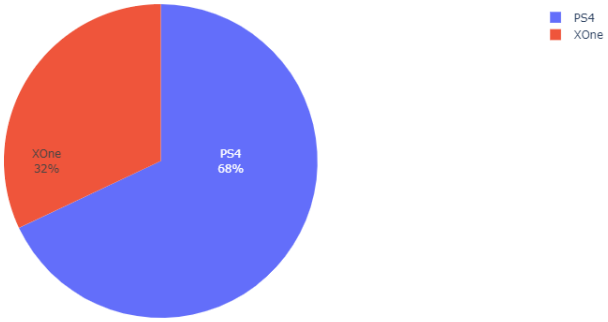

Figure 7 **Video Games Sales by Platform**

6.3. Video Games Sales by Genre

In the dataset the video games are categorised by genre and it includes some of the following genres, Action, Sports, Shooter and Racing. The bar chart below shows the total number of video games sales by each genre. It is evident that the shooter genre has made the most global sales, closely followed by the shooter genre. There is then a large drop off to the action genre. The genre which sold the least was visual novel. The figure below displays this data.

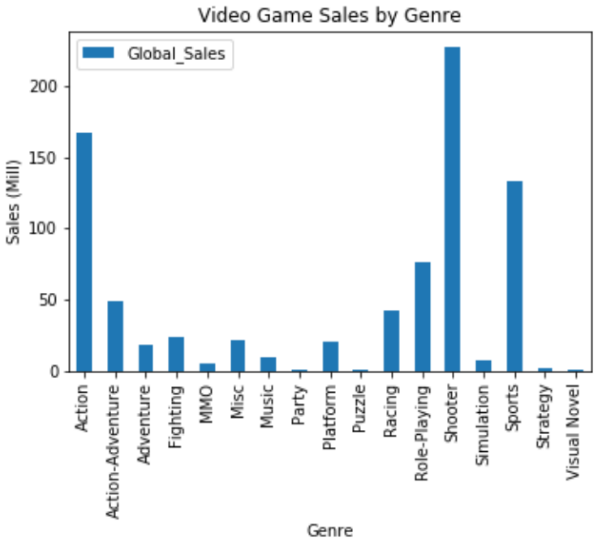

Figure 8 **Video Games Sales by Genre**

Whilst we see in figure 8 that the shooter genre makes the most global sales, the data for the sales by each genre in different regions is not shown. Figure 9 below shows the sales of each genre broken down by regions.

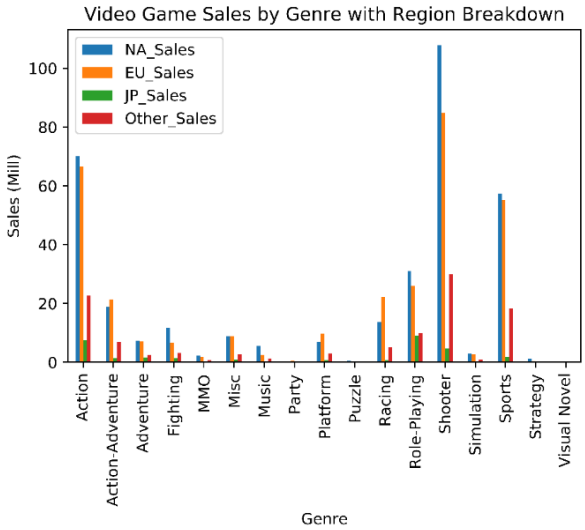

Figure 9 **Video Games Sales by Genre with Region Breakdown**

The genre Shooter is within the top 3 genres sold in the 4 different regions as well as the Action genre. The Racing genre sales almost double the amount in the EU region than it does North America. Surprisingly, the Role-Playing genre makes the highest sales in Japan. The Visual Novel genre is the lowest selling genre in global sales and in each region.

6.4. Video Games Sales by Publisher

114 publishers released video games on Xbox One and PS4. This includes publishers such as Microsoft Game Studios, Konami, and Sega. Even though there are 114 publishers, the market is dominated by 5 gargantuan publishers, as shown in the figure below, and they are Electronic Arts (EA), Activision, Ubisoft, Sony Interactive Entertainment and Take-Two Interactive. Combined they have made 496 million sales globally which is 61% of the total sales made by all the publishers combined globally. The video gaming industry is clearly dominated by these 5 publishers.

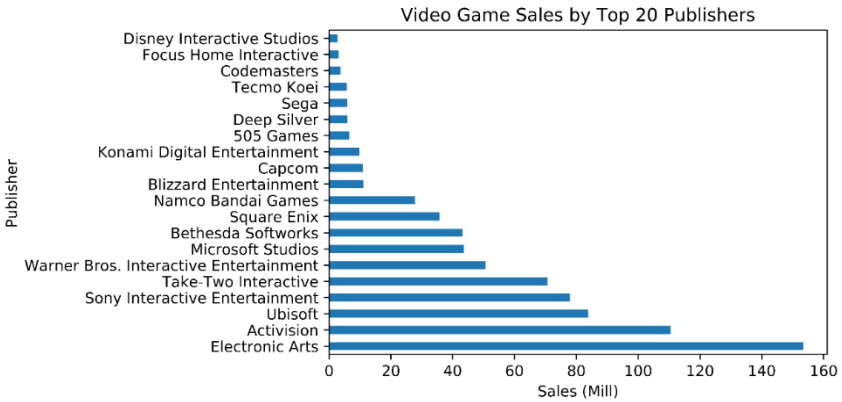

Figure 10 **Video Games Sales by Top 20 Publishers**

6.5. Games Released by Top 5 Publishers with Genre Breakdowns

As mentioned above the video game industry is dominated by 5 publishers. They enjoy a lion share of video game sales. Figure 11 below shows the games that have been released by the top 5 publishers with a genre breakdown. EA have released the most sports games compared to the other 4 publishers and enjoyed 85 million sales globally. They clearly

dominate the sports market when it comes to games released and sales made. Some of their high selling sports games include the FIFA, Madden, and NHL franchises.
The shooter and action genres are more tightly contested with Activision and Ubisoft making the most games, respectively.

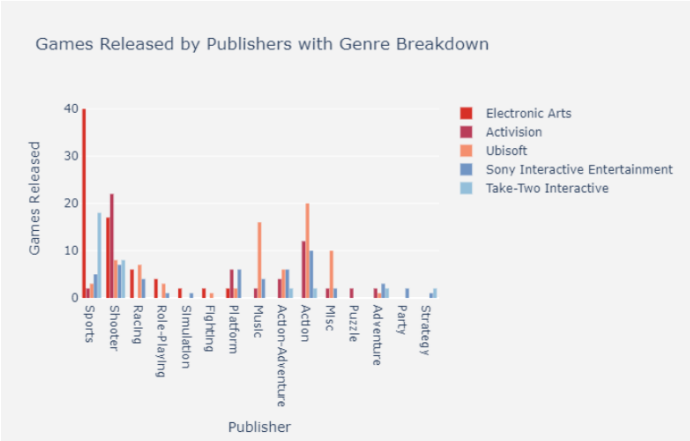

Figure 11 **Video Games Released by Top 5 Publishers with Genre Breakdown**

Despite the fact that Activision only made 5 more shooter game than EA, they made almost double the amount of sales compared to EA with million sales. These is largely in part to the successful Call of Duty Franchise.

6.6. Genre Breakdown by Platform

Figure 12 shows the breakdown of games released by genre on both PS4 and Xbox One. PS4 have released more games in total, so it is not surprising to see it leading in most categories. The shooter and sports genre are tightly contested with PS4 only releasing 10 more games in both categories. However, it comes as a surprise that there have been 73 more Action games released on PS4 compared to Xbox. The Action genre is the genre which has made the second most sales globally. This shows that Microsoft may have failed to capitalise on the popularity of the genre due to the lack of games released on Xbox One.

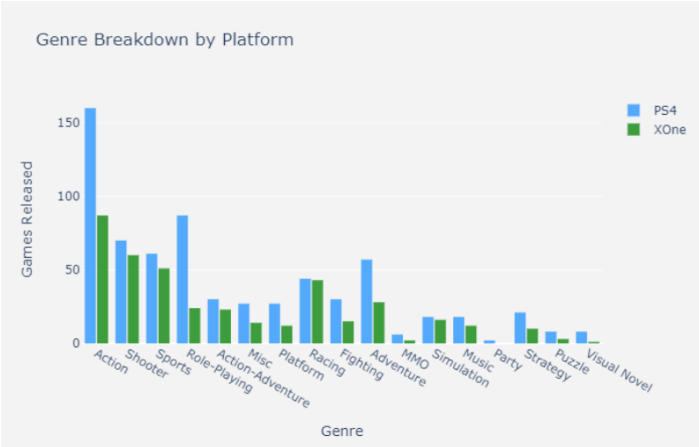

Figure 12 **Video Games Released on Platforms with Genre Breakdown**

7. Successes, Challenges and Limitations

This study has accomplished the aims it set out to achieve. With the use of data analysis techniques, this study has identified interesting trends and patterns when it comes to what makes a video game successful. This study identified interesting trends and patterns on different attributes of video games such as the genre of video games and the platform using various visualisation techniques. It is evident from this study that the success of a video game is influenced by its genre, the platform it is released on and the publisher. This study also found that the biggest influence on the sale of a video game is the genre and this study was also made predictions of the sale of video games based on genre.

However, there is the belief that there is no escape from bias and this study may have also been affected by bias. This could be to some extent to the expulsion of things in data cleaning or the data retrieved could have been biased since it was recorded by people. A case of such bias is 'Genre' attribute in the data set. This attribute is subjective, for example some games which were recorded as action could have been recorded as a shooter game by others. It is difficult to escape this sort of bias.

The limitations of this study include the exclusion of revenue of each game as this data was not possible to be obtained. Some games may have sold more copies globally, but this does not necessarily mean that the game has more revenue than games that have sold less copies. Another limitation is there are some games which are free to play such as Fortnite which make money. Fortnite made $1.8 billion in 2019 which made it the top grossing video game of the year in 2019 and all of its revenue came from microtransactions in the form of in game purchases (17). A new feature of video games is now the increase of in game purchases. As mentioned above Fortnite makes all of its revenue from in game purchases but the use of in game purchases is not exclusive to free to play games. Video games that cost money also make use of in game purchases such as the FIFA franchise and NBA 2K franchise. In 2019, Ultimate team, a microtransaction service for the FIFA franchise, made up 28% of EA's revenue which is substantially more than FIFA sales which only accounted for 14% of EA's revenue in 2019 (18). The exclusion of this data is a huge limitation of the study because even if a game is not the highest grossing in terms of sales, it can still make a great deal with the use of in game purchases.

8. Business Applications

The results of this study show that game developers should consider the genre and platform when releasing future games as it is evident, they are the biggest influences on the potential sales of new video games. The main genres they should focus on are the Shooter, Sports and Action genre as they reap the most rewards globally in terms of sales. However, in the Japan region, it would be wiser to release Role-Playing games as they make the most sales in that region. It would also be wise of game developers to release their game on PS4 as opposed to Xbox one as more PS4 units have been sold, meaning the potential to make more sales is higher.

9. Conclusion

The key findings of this study based on video game sales between 2013 and 2018 are as follows:

- The PS4 is the more lucrative platform to release a game on as it account for more video game sales.
- The Shooter Genre makes the most sales globally and is within the top 3 for all 4 different regions

- Video Games Sales as a whole are expected to rise in the coming years

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11. Appendices:

Code: It is available on github on the following link: https://github.com/Saacid-Ali/Video-Game-Sales

Importing Libraries Used

```
: #Importing Libraries Used
import pandas as pd
import numpy as np
import matplotlib as mpl
import matplotlib.pyplot as plt
import plotly.express as px
import plotly as py
import plotly.graph_objects as go
from plotly.offline import init_notebook_mode,iplot
init_notebook_mode(connected=True)
```

Creating the Data Frame

```
#Creating Dataframe
data = pd.read_csv('VGSales.csv', encoding='latin1')
VGS = pd.DataFrame(data)
```

Cleaning the Data Frame

```
: VGS.drop_duplicates() #Removing Duplicates
VGS_miss_values = VGS.isnull().sum() #Checking Attributes that have Null Values
VGS.Publisher = VGS.Publisher.mask(VGS.Publisher == 'Sony Computer Entertainment','Sony Interactive Entertainment') #Replacing va
VGS.Publisher = VGS.Publisher.mask(VGS.Publisher == 'Warner Bros. Interactive','Warner Bros. Interactive Entertainment')
VGS.Publisher = VGS.Publisher.mask(VGS.Publisher == '2K Games','Take-Two Interactive')
VGS.Publisher = VGS.Publisher.mask(VGS.Publisher == '2K Sports','Take-Two Interactive')
VGS.Publisher = VGS.Publisher.mask(VGS.Publisher == 'Rockstar Games','Take-Two Interactive')
VGS.Publisher = VGS.Publisher.mask(VGS.Publisher == 'EA Sports','Electronic Arts')
```

Total Video Game Sales by Genre Bar Chart

```
#Displaying Total Video Game Sales by Genre
VGS.groupby('Genre')['Global_Sales'].sum().plot(kind = 'bar')
plt.ylabel('Sales (Mill)')
plt.xlabel('Genre')
plt.legend()
plt.title('Video Game Sales by Genre')
plt.savefig('/Users/Saacid/Desktop/Genre_Sales.png', bbox_inches= 'tight')
```

Total Video Game Sales by Genre in different regions Bar Chart

```
#Displaying Total Video Game Sales by Genre in different regions as a barchart
VGS.groupby('Genre')['NA_Sales', 'EU_Sales', 'JP_Sales', 'Other_Sales'].sum().plot(kind = 'bar')
plt.ylabel('Sales (Mill)')
plt.xlabel('Genre')
plt.legend()
plt.title('Video Game Sales by Genre with Region Breakdown')
plt.savefig('/Users/Saacid/Desktop/Genre_SalesRB.png', bbox_inches= 'tight', dpi =1366)
```

Total 15 Video Game by Sales Scatter Plot

```
#Showing Top 15 Selling Video Games
tp=VGS.head(15)
TP1=go.Scatter(
                    x = tp.Name,
                    y = tp.Global_Sales,
                    mode = "markers",
                    name = "Global_Sales",
                    text= tp.Name)

datas = [TP1]

layout = dict(title = 'Top 15 Video Games',
              xaxis= dict(title= 'Title',ticklen= 5,zeroline= False,zerolinewidth=1,gridcolor="white"),
              yaxis= dict(title= 'Global_Sales(In Millions)',ticklen= 5,zeroline= False,zerolinewidth=1,gridcolor="white",),
               )
fig = dict(data = datas, layout = layout)
iplot(fig)
```

Video Game Sales by Platform Pie Chart

```
#Video Game Sales Breakdown by Platform
labels = VGS.Platform
values = VGS.Global_Sales

fig = go.Figure(data=[go.Pie(labels=labels, values=values, textinfo='label+percent',
                             insidetextorientation='radial'
                            )])
fig.show()
```

Video Games by Top 20 Publishers Bar Chart

```
#Video Game Sales by Top 20 Publishers
Pub = VGS.groupby('Publisher')['Global_Sales'].sum()
Pubs = Pub.sort_values(ascending = False)
Pubss= Pubs[0:20]
Pubss.plot(kind = 'barh')
plt.ylabel('Publisher')
plt.xlabel('Sales (Mill)')
plt.title('Video Game Sales by Top 20 Publishers')
plt.savefig('/Users/Saacid/Desktop/Pub_Sales1RB.png', bbox_inches= 'tight', dpi =1366)
```

Genre Breakdown of Video Games by Platform Bar Chart

```
#Genre Breakdown of Video Games released by Platform
xPS41=VGS[VGS.Platform=='PS4']
xXOne1=VGS[VGS.Platform=='XOne']
TP11 = go.Histogram(
    x=xPS41.Genre,
    opacity=0.75,
    name = "PS4",
    marker=dict(color='rgb(30,144,255)'))
TP22 = go.Histogram(
    x=xXOne1.Genre,
    opacity=0.75,
    name = "XOne",
    marker=dict(color='rgb(0,128,0)'))


data=[TP11, TP22]

layout = go.Layout(
    title='Genre Breakdown by Platform',
    xaxis=dict(
        title='Genre'
    ),
    yaxis=dict(
        title='Games Released'
    ),
    bargap=0.2,
    bargroupgap=0.1, paper_bgcolor='rgb(243, 243, 243)',
    plot_bgcolor="rgb(243, 243, 243)")
fig = go.Figure(data, layout=layout)
iplot(fig)
```

Video Games by Top 5 Publishers with Genre Breakdown

```
#Video Games Released by Top 5 Publishers with Genre Breakdown
xEA=VGS[VGS.Publisher =='Electronic Arts']
xActi=VGS[VGS.Publisher=='Activision']
xUbi=VGS[VGS.Publisher=='Ubisoft']
xSony=VGS[VGS.Publisher=='Sony Interactive Entertainment']
x2k=VGS[VGS.Publisher=='Take-Two Interactive']
TP1 = go.Histogram(
    x=xEA.Genre,
    name = "Electronic Arts",
    marker=dict(color='rgb(215,48,39)'))
TP2 = go.Histogram(
    x=xActi.Genre,
    opacity=0.75,
    name = "Activision",
    marker=dict(color='rgb(165,0,38)'))
TP3 = go.Histogram(
    x=xUbi.Genre,
    opacity=0.75,
    name = "Ubisoft",
    marker=dict(color='rgb(244,109,67)'))
TP4 = go.Histogram(
    x=xSony.Genre,
    opacity=0.75,
    name = "Sony Interactive Entertainment",
    marker=dict(color='rgb(69,117,180)'))
TP5 = go.Histogram(
    x=x2k.Genre,
    opacity=0.75,
    name = "Take-Two Interactive",
    marker=dict(color='rgb(116,173,209)'))


data=[TP1, TP2, TP3, TP4, TP5]

layout = go.Layout(
    title='Games Released by Publishers with Genre Breakdown',
    xaxis=dict(
        title='Publisher'
    ),
    yaxis=dict(
        title='Games Released'
    ),
    bargap=0.2,
    bargroupgap=0.1, paper_bgcolor='rgb(243, 243, 243)',
    plot_bgcolor="rgb(243, 243, 243)")
fig = go.Figure(data, layout=layout)
iplot(fig)
```

Video Games Released Yearly Scatter plot

```
#Video Games Released Yearly as a Scatter Plot
YR = VGS.groupby('Year_of_Release')['Name'].count().plot(style=".")
plt.ylabel('Games Released')
plt.xlabel('Year of Release')
plt.title('Video Games Released Each Year')
plt.savefig('/Users/Saacid/Desktop/YRS.png', bbox_inches= 'tight')
```

Video Game Sales Yearly Scatter Plot

```
#Video Games Sales Yearly as a Scatter Plot
YR = VGS.groupby('Year_of_Release')['Global_Sales'].sum().plot(style="."
plt.ylabel('Global Sales (Millions)')
plt.xlabel('Year of Release')
plt.title('Video Game Sales Each Year')
plt.savefig('/Users/Saacid/Desktop/SYR.png', bbox_inches= 'tight')
```