

Evolution of the Console Game Industry Over Time

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Everyone worked on everything together pretty much.

Abstract

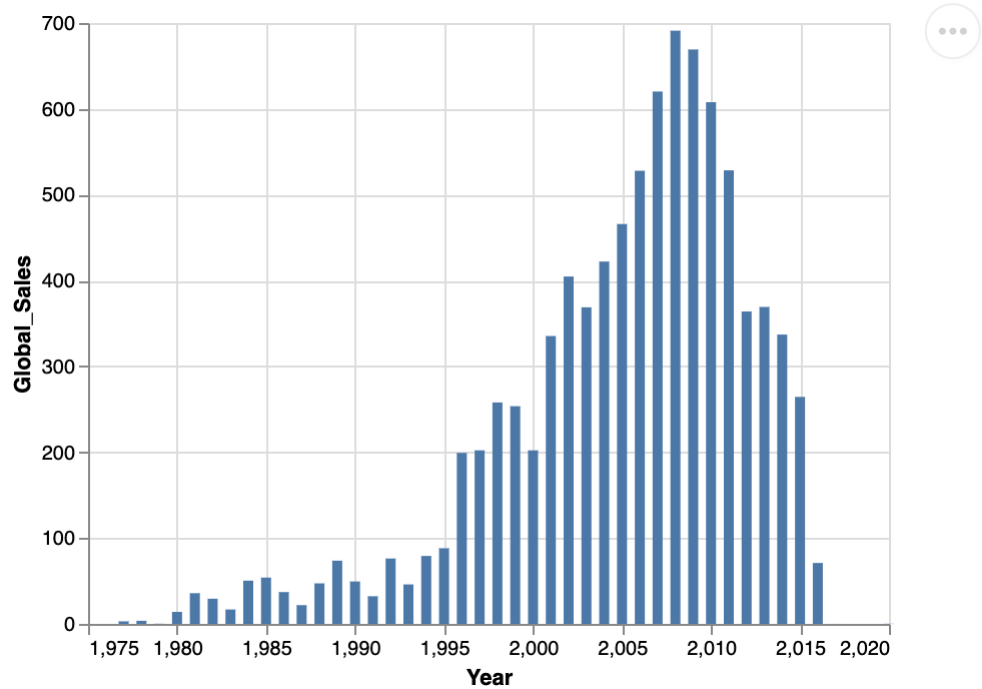
Videogames have been an increasingly popular form of entertainment that pushed computational hardware, content creation, competitive play, and opening many commercial opportunities along the way. We were genuinely interested in the console game market as we have played games ourselves when we used to be younger. This project will focus on looking at how new console releases influenced game sales and the popularity of certain genres over time. We found that there was a change in sales before and after 2010, in which we explored later in the analysis section. Looking at specific variables like genre/platform/region of the console games, we found which genres consumers preferred the most globally/regionally.

Background: Sales of videogames

Back in 1983, there was an absurd over saturation of video game consoles in the market. Naturally, the enourmous variety of consoles confused customers and led to consumers turning away from the video game market, causing a drop in revenue by a whopping 97 percent. This would be later known as the Video game crash of 1983. Ever since, the video game market has been on a constant rise. The market of videogames have been an increasingly popular form of entertainment pushing computational hardware, content creation, competitive play, and opening many commercial opportunities along the way. Titles or the games themselves have existed through various means such as consoles or specifically curated hardware from companies such as Sony with their Playstation series of console, Microsoft with Xbox consoles, and Nintendo with their most recent Switch console. Recently, another popular option in terms of hardware comes through custom built computers. (image: PS console and Nintendo switch)



Figure 1: Shows the total number of video game sold globally from 1980 - 2016.



The project takes a look at console video game titles since the video game crash to identify how the industry has changed over time. It will mainly explore the business side of the industry, looking at the sales of titles which can be used to discover overall change in tastes over time, the longevity of a franchise or series of games, and possible differences in success of a title by different parts of the world (North America, Europe, Japan, etc). Additionally, it will also attempt to figure out why the console video game industry began to fall around 2010 despite the constant rise for 30 years.

1. Data Description

The data are recorded number of sales in games from year 1980 through 2020 that had sold more than 100,000 copies.

Basic Information About Collection of Data

The data was found online at <https://www.kaggle.com/arslanali4343/sales-of-video-games>. The intention for the collection of the data was for general purposes. Regarding the source of data, it is noted that the data values were web scraped off the website <https://www.vgchartz.com/> using the python library BeautifulSoup, which is known to pull data from HTML or XML documents. For reference, the website vgchartz is a online site that keeps track of all

console games/hardware sold over the world. They rank the games/consoles by the number of copies sold and let users known which games/console are popular at the moment. The dataset we obtained from vgchartz is composed of popular games introduced to the game market since 1980 and the sampling mechanism was specifically framed around games that totalled up to more than 100,000 copies sold. Additionally, the scope of inference can be extended towards console games that are currently out for sale in the game market.

Data Structure

For this study, the observational units are popular games published between 1977 and 2020, with the variables consisting of the rank, Name, Platform, Year, Genre, Publisher, NA_Sales, EU_Sales, JP_Sales, Other_Sales, and the Global_Sales. Additional details regarding the variables can be found below.

Table 1: The variable description, data type, and the units of measurement for each variable are provided in the table below.

Name	Variable description	Type	Units of measurement
Rank	Ranking of Overall Sales	Ordinal	Rank Numbers
Name	Name of The Game	Nominal	Game Names
Platform	Platform of Game Release	Nominal	Game Platforms
Year	Year of Game Release	Ordinal	Calendar Year
Genre	Genre of The Game	Nominal	Game Genres
Publisher	Publisher of The Game	Nominal	Game Companies
NA_Sales	Total Sales in North America	Numeric	in Millions
EU_Sales	Total Sales in Europe	Numeric	in Millions
JP_Sales	Total Sales in Japan	Numeric	in Millions
Other_Sales	Total Sales in Rest of the World	Numeric	in Millions
Global_Sales	Total Sales Worldwide	Numeric	in Millions

Variable Summaries

The dataset consists of 16596 observations with 11 variables. The variable Year has a minimum value of 1977 and a maximum value of 2020, indicating that the first year the data was recorded was in 1977 and the last recorded data was in 2020. The mean values of quantative values are NA_Sales-0.2638, EU_Sales-0.1460, JP_Sales-0.0778, Other_Sales-0.0481 and Global_Sales-0.5375 respectively. The maximum values for the sales by region is NA_Sales-41.49, EU_Sales-29.02, JP_Sales-10.22, Other_Sales-10.57 and Global_Sales-82.74. For the qualitative values of Platform, Genre, Publisher, Platform has 31 unique values, Genre has 12 unique values and Publisher has 12 unique values.

Preprocessing of Data

After doing some data exploration, it was seen that a substantial number of observations had missing values in them. The exact number of missing numbers for each variable had can be found below.

Table 2: Table shows the number of missing values in the observations by variable in the table below.

Name	No of Missing Values
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	2

Upon exploration of the data, it was decided that it would be too dangerous/risky to plainly remove the observations with missing values as they might later be crucial for the subsequent analysis portion. Thus every observation had their missing values replaced with their actual values after searching online. The subsequent analysis was done with the dataset without any missing values.

2. Methods

Our exploratory analysis aimed at highlighting the trends in sales and preferences for video games over time. This stage of the analysis identified the rise and decline of video game sales before and after 2010. Subsequently, the sales of video games was plotted against time by their console type. Changes suggest that the preferences of the consumers were constantly evolving within the video game market. Lastly, a combination of genres and regional sales plotted against time was done to give insight on how regional location played into genre preferences.

3. Results

Overall General Sales Over Time

Figure 2: The overall general sales from 1977 to 2020

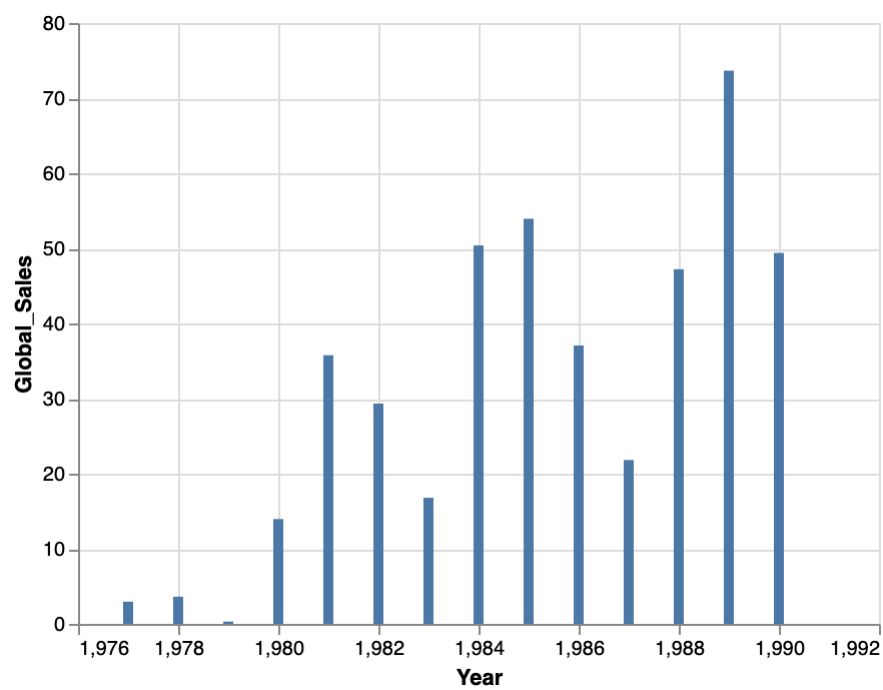
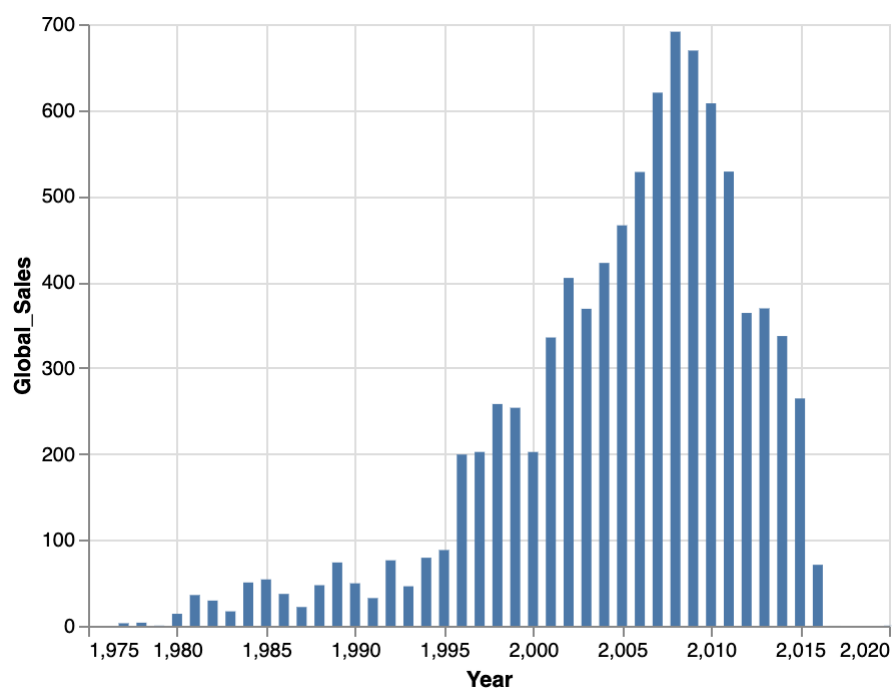


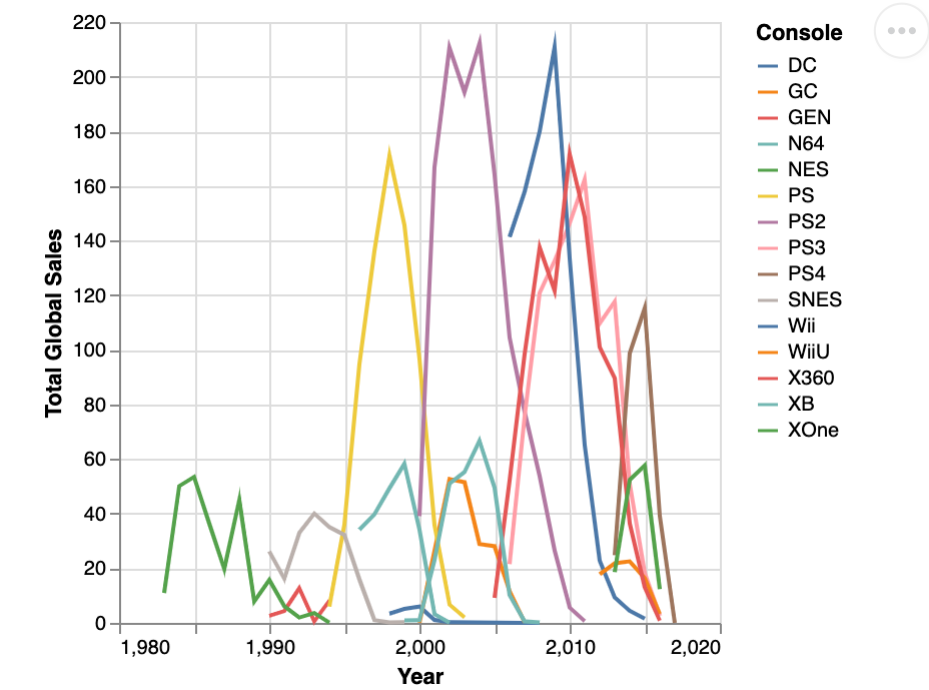
Figure 3: The overall general sales from 1977 to 2020



The plot shows the overall sales of videogames over the years with some notable details around 1983 and 2010. The videogame crash can be attributed to an overcrowded console market from prominent companies themselves such as Atari and other companies (other consoles including Odyssey, the Intellivision, the ColecoVision, the Atari 5200), the rise of third-party developers (developers separate from the actual console manufacturers which in this case would be Atari) particularly for the Atari 2600, and competing hardware through the release of home computers. The dropoff after 2010 can be attributed the expansion of the PC gaming market with online game libraries such as Steam and the proliferation of free to play games from Riot, Nexon, etc. Influential titles such as Minecraft could have had a hand in introducing a younger generation at the time to PC gaming possibly leading to their own involvement with the hardware itself by building their own PCs and thus moving away from consoles. A further drift may also be seen because unlike consoles, users maintain as well as upgrade hardware whenever they want and generally higher performance can be achieved with less or the same amount of money that would have originally went towards a console.

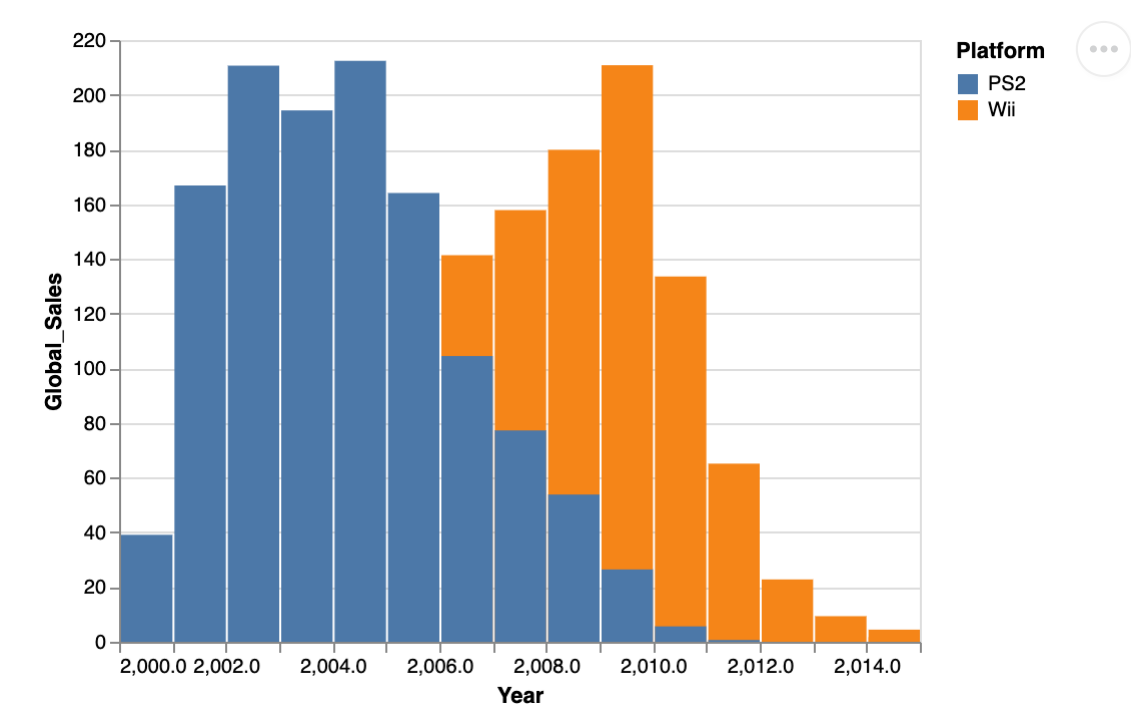
Sales of Games by Console Over Time (Top 15)

Figure 4: Plots show the changes in overall sales for the top 15 consoles between 1980 and 2017.



At their respective peaks, the consoles that had the biggest popularity were PS2, Wii, PS, X360 and PS3. Three of these consoles were from publisher SONY and the other two were from NINTENDO and MICROSOFT, indicating that they were the top competitors of the market. The consoles from other publishers had a relatively small popularity compared to the bigger publishers.

Figure 5: Plots show the changes in overall sales for PS2 and Wii.



Commercial success of the PS2 and Wii can be attributed to advances in hardware that set them apart to the consumer (DVD playback and motion controls) allowing for a broadening of the demographic that Sony and Nintendo were able to market to. With the emergence of the next gen console of SONY in 2006, the relevance of the PS2 started to decline as can be seen by the drop in sales. The Wii also had a similar phenomenon when WiiU was released around 2012.

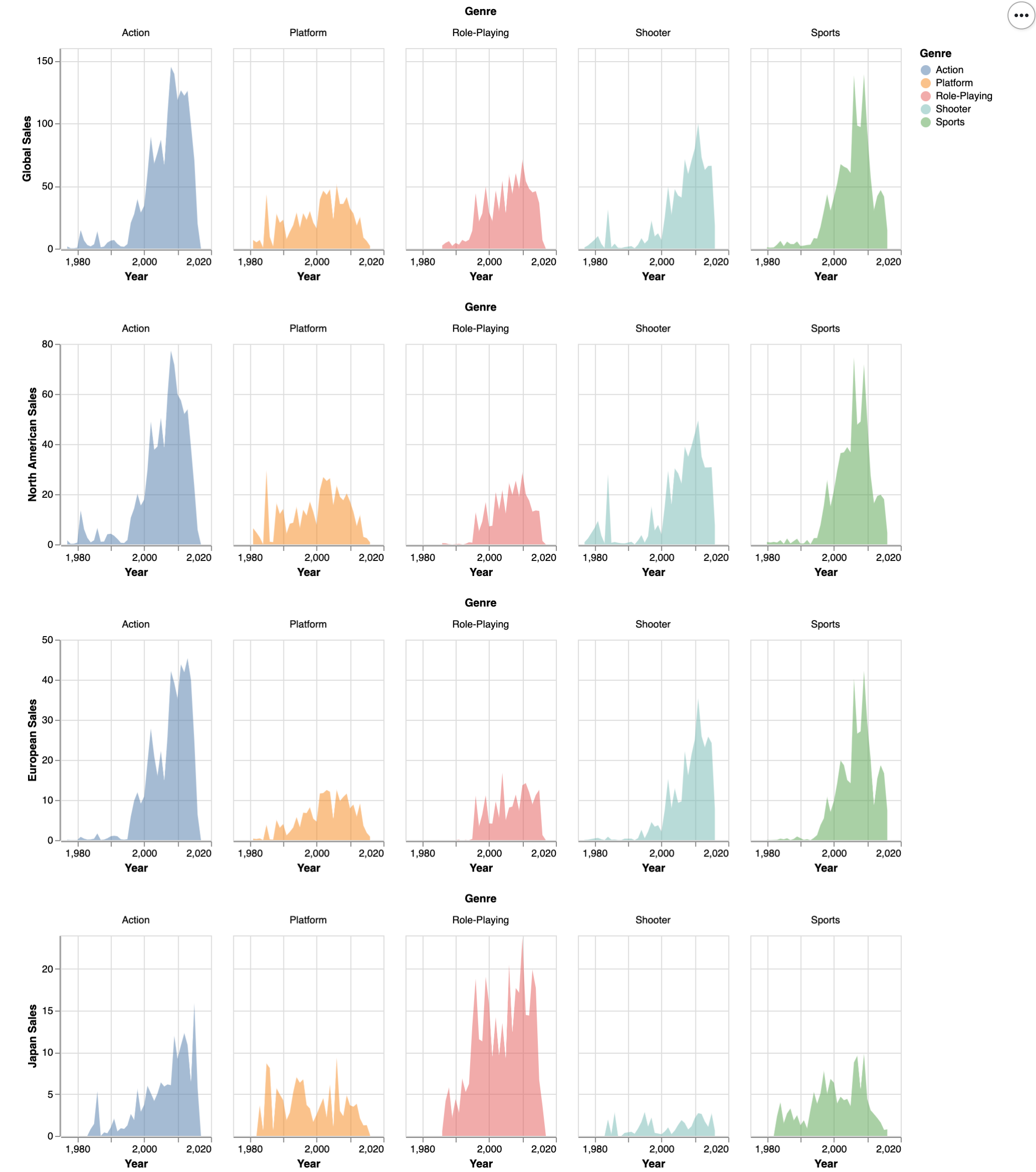
Global and Regional Sales of Video Games over time according to Genre (Top 5)

Videogames in the game market can be generally categorized into their respective genres. Within the gaming community, just like with almost everything in the world, different consumers have different preferences among these genres. Thus, exploring the development of each genre in the game market gives insight on what type of game consumers have preferred in the past, and what genre of games is flourishing in the market now. Table 3 shows the sum of sales of specific genres over a period of time sorted according to their Global Sales.

Table 3: Top five genres and their total regional and global sales over a period of 43 years, ranked by Global Sales.

	NA_Sales	EU_Sales	JP_Sales	Other_Sales	Global_Sales
Genre					
Action	875.45	521.68	159.95	187.38	1751.18
Sports	680.92	376.41	135.60	134.97	1330.93
Shooter	581.64	312.12	38.26	102.69	1037.34
Role-Playing	326.41	187.18	352.31	59.61	927.37
Platform	445.59	200.37	130.77	51.59	831.37

Figure 6: 4 sets of plots showing the changes in overall and regional sales for the top 5 genres between 1977 and 2020.



We can see from the first set of plots (Global Sales vs. Year by Genre), that there's an overall growth in sales after the 21st century, which is in accordance with how the game market has developed over time. Globally, the Action, Shooter and Sports genres had the biggest growth in the game market over time, as can be seen by the steep incline in their global sales after the year 2000, this could also be due to the fact that out of the 3 big regions, 2 of them had these genres as the biggest growth in their respective markets as well. Regionally, the North American and European markets are pretty similar with again the Action, Shooter and Sports genres dominating the market, as stated earlier. However, looking at the Japanese market, the dominating genre is actually Role-Playing, with Action coming in at second. This could be due to the big difference in culture and preferences in entertainment between the Western and Eastern markets.

4. Discussion

This project analyzed the changes in the console game industry between the time period of 1977-2020. The analysis focused on the trends in sales (Figure 2) and changes in preferences with regards to genre (Figure 6) , region (Figure 6) and platform (Figure 4) over this time period.

The analysis suggests that the console game market was on constant rise until around the year 2010, peaking at about 700 million copies sold in a single year. Ever since, it was followed by a steady decline. A possible explanation is that games releases were being made widely available on PCs instead of just on consoles. Given the functionality of a PC in comparison to that of a console, the average consumer is much more likely to have a PC and thus, much more likely to invest in PC versions of games. Overall, as shown in figure 4, Sony, Microsoft and Nintendo dominated the console market. For example, PS2 from Sony and Wii from Nintendo were the top selling consoles at their respective peaks. The success can be attributed to advances in the hardware aspect, making it more appealing to the consumers. Additionally, analysis has shown that the top five genres globally are action, shooter, platform, role-playing and sports. Regionally, action was the most popular in two out of the three regions --NA and EU, while role-playing was the most popular genre in JP. An assumption can be made that this could be attributed to the big difference in cultural preferences between the Western and Eastern markets.

There are limitations in interpreting the results solely for consoles because there wasn't a sufficient amount of data from platforms such as Steam, Battle.net, Epic Games, Origin, and Ubisoft to merit any further relevant findings. Some other possible topics that could have been explored are how long a series of games have lasted or continue to have success and whether or not that has any relevance to genre, publisher, console or platform, etc. Moreover, exploring whether titles released for multiple consoles could have seen the same success.