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GameStop Final Project Report

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Part 1 Executive Summary

1.1 Company Information

GameStop Corp. is a video game retailer that utilizes a multichannel approach in its operations. It provides such products as video games, accessories, electronics, and much other gaming or virtual entertainment products. There are two major ways the company operates: through brick-and-mortar stores, as well as online stores that sell hard copies of its products. In addition to that company is involved in magazine publishing and recently esports events organization. Many see that company as outdated since most video game stores have turned fully digital such as Steam, and most of the game developers tend to build their own digital platform to sell games.

Gamestop, for many years in the 2000s and 2010s, was a great store that had a very tight community of gamers gathered around the concept of gaming and gaming merchandise. Lately, gaming has swiftly shifted towards online game stores like Steam or Epic Game Store, and Gamestop got left out as a nostalgic memory for many old-school players.

1.2 Current Operating Situation

Recent events of the Gamestop stock spike showed that many people love the Gamestop brand and believe in it despite a constant decline in value for the past 10 years. We believe that such solid nostalgic factors present a fantastic opportunity for the company to penetrate the online game store market in the nearest future. One of the main obstacles for penetration for Gamestop is the strength of large competitors like Steam; however, Gamestop has a very unique asset which is a loyal customer base and nostalgic factor. IPs we propose are aiming at assisting Gamestop in their decision-making process regarding entering the online game store market and present them with a great overall picture of the market with some additional steps towards moving online.

Part 2 Intro to Information Products

2.1 GameStop Market Beacon

GameStop maintains a brick-and-mortar store as its primary sales channel; it has undoubtedly become more and more pressurized in today's video game market, especially when the digital copy game gains its fashion. Paying close attention to the industry trend will allow GameStop to stay alert and become agile in utilizing its resources. Based on the data of games such as release year, sales in different regions, genres, and platforms, we will be able to build our first IP Market Beacon for Game Stop internal use. It tells the industrial level information such as tracking the market status and shows potential opportunities for GameStop to tap into (which games to sell and promote, which platforms are most popular, etc.). The IP can also provide information regarding the sales patterns of different games in each region to help them re-allocate resources and to lower the inventory costs.

2.2 Player's Shopping Guide

Gamers are sometimes confused when deciding whether to purchase a new game. They tend to find resources such as game descriptions, other players' reviews, and video clips to help them make decisions. The discovering process could be time-consuming and even sometimes misleading when the sample wasn’t big enough. The Player’s Shopping Guide provides game comparing services for players who are hesitating about purchasing by utilizing data collected from the player pool. More specifically, the IP will

be able to tell gamers the basic information (genre, publisher, available platforms, etc.) about the game they are looking at, reviews from other players(Avg. Score), and the keywords on the description and reviews. We believe that our Player's Shopping Guide will not only provide gamers the best "shopping experience" but also help GameStop to stay competitive among other video game sellers such as Steam.

We broke up building the IPs into three stages: organizing, analyzing, and visualizing. We performed the first 2 stages by using Python packages such as pandas, seaborn, etc. The final IPs will be delivered to data consumers in the form of interactive dashboards with the features of zoom in and out, filtering, tracing.

Part 3 Dataset Overview

3.1 Data Elements Info.

Below are the brief introductions to the datasets used for developing our IPs. (more details of the datasets shown in the appendix)

Dataset 1: Video game sales in terms of genre, platform, region, year, and publisher as of April 4 2019:

This dataset was generated by a scrape of vgchartz.com. There are 55,792 records in the dataset as of April 4th, 2019. It contains video game sales data regarding genre, platforms, and region, etc. See appendix a for the link to the dataset and detailed data elements.

Dataset 2. IGN's game reviews:

This dataset was collected by an authoritative game evaluation organization called IGN, in a total of 35,068 game reviews. See appendix b for the link to the dataset and detailed data elements.

Dataset 3. Steam's user behavior:

This dataset is generated from public Steam data. It contains users' play time after purchasing a game. See appendix c for the link to the dataset and detailed data elements.

Dataset 4: Steam games complete data

This dataset contains more than 40k games from steam shops regarding game reviews, genre, and publisher, etc. See appendix d for the link to the dataset and detailed data elements.

3.2 Data Quality Concerns

We discovered a critical data quality issue during the data wrangling process. We originally planned to extract the "Critic_Score" column from a dataset and appended it to our master file. However, most of the information (88%) was missing; thus there is no other way to do the imputation. Fortunately, we have found another dataset that contains the critic score with zero missing values. Image 2 in the appendix shows a N/A map for dataset 4. Even though columns *desc_snippet, achievements, mature_content, requirements* are almost empty, those variables are not necessary for our analysis purpose, and we can simply drop them. For game reviews, we chose to use *all_reviews* instead of recent_reviews because of missing value issues as well. The *all_reviews* column is formatted as shown in image 3 in the appendix. To change the format for future analysis, we extracted keywords that before "," and turned the *all_reviews* column into a categorical variable.

3.3 Data Wrangling process

As we planned to inner join Dataset 2 with Dataset 1, another issue was that the column "Platform" has inconsistent expression between the two datasets. To solve this problem, we did a research of each platform and its abbreviation and finally assigned each of them with a unique name.

Datasets 3 and 4 are data from Steam, and they share the same column: game name. Dataset 3 contains two user behaviors: purchased and played, while dataset 4 contains detailed game information as well as customer reviews. We only kept users who actually played the game and have playtime. Then we merged dataset 3 with cleaned dataset 4 by game name to analyze customer post-purchase behavior.

After the datasets have been merged together and all other data wrangling steps have been done, we unpivot the dataset to make it in a Tableau-ready format (long format). Now the dataset contains a healthy amount of data that is fully decontaminated and organized, including critical variables which make the dataset diverse. In brief, our ready-to-go dataset has in total seven layers of information: Global geographic, time series, publishers, game console platforms, genre, scores, and sales. We are confident about the dataset as well as the future IP deliverables.

3.4 IP Features At a Glance

Below are the features in our final IPs that are generated by the combination of different data elements

IP feature 1. Publisher Popularity

By analyzing the popularity of different genres in each region, we can achieve a better understanding of customer needs in each region and reallocate inventory accordingly. Data elements used: *Sales, Regions,* and *Publisher.*

IP feature 2. Sales Trend by Publisher

By knowing the sales trend by publishers throughout the years, we can have a better idea of how each publisher performed over time. It is also making predictive analysis in the upcoming years easier. Data elements used: *Total Sales, Year,* and *Publisher.*

IP feature 3. Sales Trend by Platform

Game console platforms have their own life cycles since release. By knowing the sales trend over a period of time, we can have a clear image of where we can understand where the game platform is currently in its life cycle and further determine the optimal inventory level. Data elements include *Total Sales, Year,* and *Publisher.*

IP feature 4: Platform Score Distribution

One game can be released on multiple game console platforms such as PC, PS, NS, and Xbox, and people can have very different experiences on different platforms. This IP feature will provide the score distribution of the 4 game console platforms. Data elements include *Master Platform* and *Score*.

IP feature 5: Publishers With Their Best Genre

Even the top publishers like Nintendo and EA have their strengths and weaknesses in producing certain game genres. This IP feature can benefit both GameStop and gamers by informing them how well each publisher performed on the sales of different genre games. When a publisher releases a game next time, we can have an idea of how popular it will be. Data elements include *Genre*, *Publisher*, and *Sales*.

IP feature 6: Genre Sales in Market Region

Gamers' preferences in different regions may vary; it makes no sense to carry many sports games in the region where gamers prefer action games. This IP feature allows GameStop to know what are the best selling genres in different regions so that they can boost the efficiency of inventory control. Data elements include *Genre, Market Region,* and *Sales*.

IP feature 7: Most Played Game by Genre and Developer

Genre and developer are two main elements that gamers will consider when purchasing a game. Such features will allow gamers to sort and compare games that they are interested in among others and make the choice that will lead them to the next step of comparing game reviews.

IP feature 8: Most Played Game by reviews

Just as in the clothes buying process, customers first choose the brand and style they are familiar and comfortable with, and only after that they proceed to the final decision-making step - comparing available options within a category. This feature allows customers to take that step quickly and interactively, comparing games of interest within a category they chose, making the final decision more satisfactory and sure.

IP feature 9: Price distribution for Most-Played Games

Games were released at different prices; knowing players' feedback on games in each price bin, such as detailed reviews, average playing time, can provide GameStop further information about the game's popularity by price range.

Part 4 Final Information Products & Visualizations

This section contains the user interface overview of our final information products as well as more breakdown details of findings and analysis.

4.1 GameStop Decision Cockpit - Market Overview

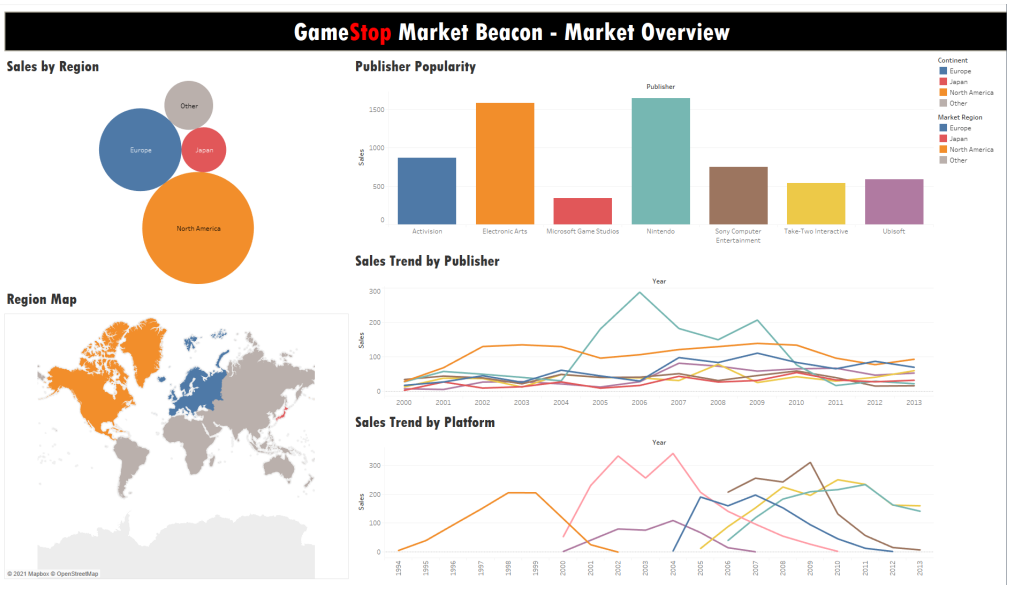


Image 1: GameStop Market Beacon - Market Overview

The GameStop Market Beacon - Market Overview was designed to show the overall market environment, such as the market share of each publisher in the different regions.

Starting with the design of the first IP, we custom-built a region map that contains the 4 regions in our dataset: North America, Europe, Japan, and Other. The region map works as the main navigation panel that allows GameStop to click on and filter the related information in each market. For example, by clicking on the region module on the map, the dashboard will instantly zoom in the information about the overall market size, the composition of publishers, as well as the time-series information regarding the sales trend of publishers and game console platforms.

Here we chose to show only the top 7 publishers in our dashboard. The 2 reasons for that are first, based on our analysis, in the total of 576 publishers, the top 7 publishers owned nearly 50% of the market share.

Putting GameStop's brick and mortar store business model into consideration, we suggest focusing on those viral publishers to speed up the inventory turnover and have more chances to capture the most popular games. Second, according to the article *In the Brain, Seven Is A Magic Number*, human brains can effectively recall no more than 7 items at a short time (Lauren, 2009). Last but not least, we avoid using color-blind combinations such as red and green to increase usability.

The North American market generates the most sales overall, followed by the European market. In terms of the population density in each market, the spend on games in the North American market is $4.4 per capita, followed by the Japanese market at $3.2 per capita, then the European market at $1.9 per capita.

Among the top 7 publishers in the world, Nintendo and Electronic Arts are in the leading position. However, they dominated in very different markets. In the total of $409 million in sales in Japan, 40% was generated by Nintendo alone. Even in the North American and European markets, Nintendo was still the second-largest publisher. EA (Electronic Arts), on the other hand, was in the leading position in North America, Europe, and Other markets, but it did not generate many sales from the Japanese market.

We also explored an exciting pattern of the platform trend. Most of the game console platforms experienced an "M" shape on game sales during their life cycle. According to a study, the average life cycle of a game console lies between 6 to 7 years (Henry, 2020). Our observation held consistently with the research that their sales dropped below the starting point around the 6th year and completely shading out of the market around the 10th year.

4.2 GameStop Market Beacon - Platform & Publisher Breakdown

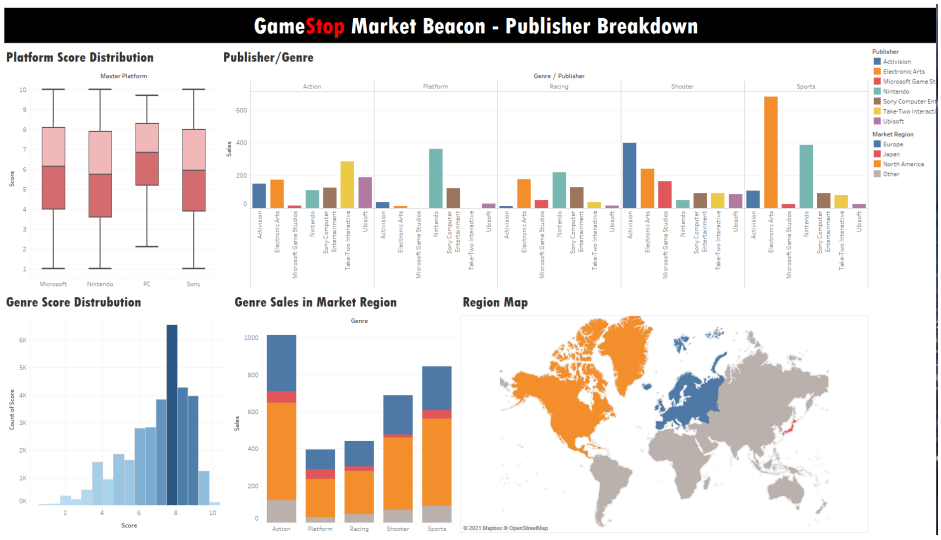


Image 2: GameStop Market Beacon - Publisher Breakdown

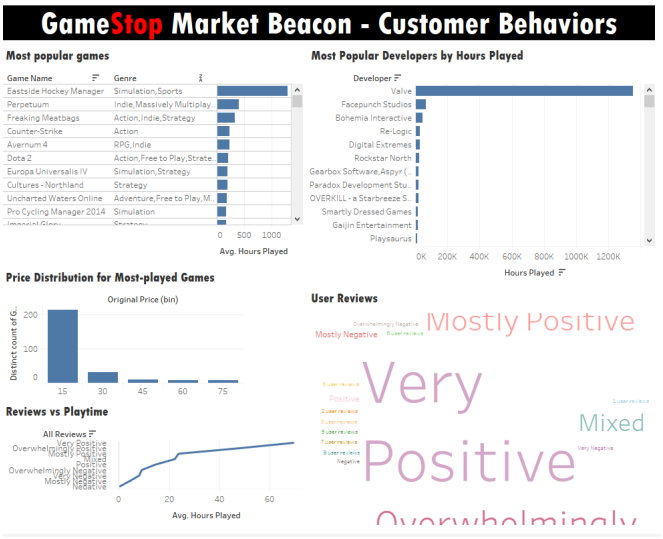
The second dashboard in the Market Beacon IP is the breakdown of the detail level information, which emphasizes publishers' strengths and weaknesses, and also game console experience based on review scores. There are three main navigation panels in this dashboard: Region module, Genre Score Distribution module, and Platform With Their Best Genre module.

By clicking on the Genre Score Distribution panel, we found that most of the high score games belong to Take-Two interactive and Nintendo's action games, such as the GTA series and the Super Mario series game; the most common score was around 7.5 and made by both Nintendo and EA's sports games such as Mario Party and FIFA; the low score games around 6 were mostly made by Activision's comic games such as Deadpool and LEGO.

Even though GameStop now knows the strengths and weaknesses of each publisher in making different genre games, the review of the same game on different game consoles may vary. There are 4 main game consoles and platforms in the current market: PC, Xbox from Microsoft, NS from Nintendo, and PS from Sony. By clicking at some of the best selling genre and publisher combinations, we noticed that EA's best selling genre: sports games gained pretty low scores on the PC but higher score on the other 3 platforms; Activison's shooter game performed well on the PC but gained lower scores on the other platforms; Microsoft's shooter games were designed more for their own Xbox console thus they didn't make many optimizations for PC.

We believe the Market Overview and the Publisher Breakdown dashboard would make a strong combination of the Market Beacon information product.

4.3 GameStop Market Beacon - Customer behaviors

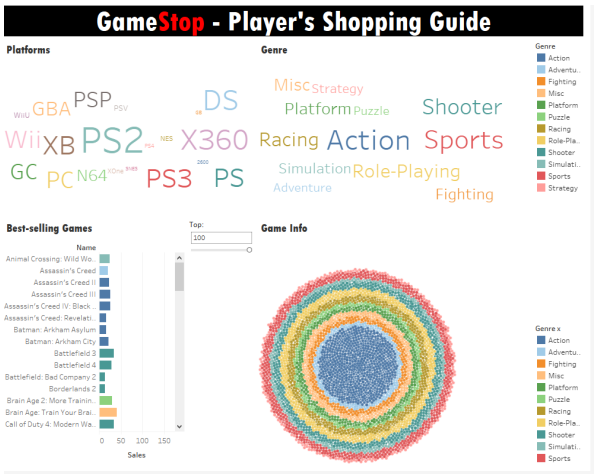


Above is the third dashboard for Market Beacon IP that helps Gamestop understand customers' post-purchase behaviors and reveiws. We utilized various graphs to visualize the relation between users' play-time and detailed game information, including genre, publisher, price range, and reviews. The audience of this dashboard is Gamestop's marketing team who specialized in analyzing consumer behaviors. The marketing team can analyze the relationship between the price for the most-played games and reviews to come up with a competitive pricing strategy.

The navigation panel for this dashboard is the Price Distribution for Most-played Games module. By clicking on the price bins, the dashboard will filter on the related information. For example, the most popular game in the $15 price bin is a sports game called Eastside Hockey Manager, with an average playing time above 1,000 hours. In the same price bin, the top 3 most popular publishers are Digital Extremes, Rockstar North, and Gearbox Software. We also noticed that the average hours played has a positive relationship with the review rating: the average playing time for the games that have primarily negative reviews is around 3.03 hours, while the average playing time for those popular games is 39 hours.

This dashboard will be handy for GameStop when deciding which games to carry in different price ranges. Also, by watching these 3 dashboards in the Market Beacon, GameStop can clearly know all the market and publishers' information at both overall and detail levels to guide the decision making.

4.4 GameStop - Player's Shopping Guide



Different from the first IP, this dashboard's audiences are in-store customers. We use word clouds and a circle chart to make the dashboard more visually appealing and easy to read. It is an interactive dashboard where customers can choose games by platforms, genre, or best-selling games. It replicates the convenient online shopping experience in brick-and-mortar stores. When a customer selects the platform and game genre, the bottom chart will display the best-selling games given the customer's preference. After the customer clicks on the game name, the circle chart will display detailed game information, including game publish year, game name, and average game score.

To implement this IP, we recommend Gamestop to install digital kiosks equipped with touch screens to display our dashboard. It offers customers self-service options and a similar experience to convenient online shopping. Customers can choose games with different features and get access to game reviews as well. It helps customers find their perfect game in stores with no hassle and significantly improves the in-store shopping experience, bringing more in-store traffic in the long run.

Part 5 Information Product Management

5.1 Quality of Information

One of the most important aspects of maintaining and potentially improving data quality that is used in suggested IPs is to keep data centralized and also centralize access to dashboards and data sources for their usage. Centralized updates and access will allow Gamestop to maintain high-quality data since it will be impossible to dilute it with unsupervised actions and to distribute that information across company members for further usage in corporate or in-store decisions. Consistency in data updates and formatting resulting from centralization will ensure future data quality and its usability.

The fuel of our IPs is the constantly updating data, and specific resources should be allocated towards market analysis and research that will be used for constant IP updates to make them relevant. Such a process is very time-consuming by hand; therefore, it would be best to make it automated through auto-compiled files with necessary data that would be uploaded into the system, such as data pipeline and web scraper. Such an approach will ensure that data is of high quality and up-to-date for efficient decisions.

5.2 Porter's Five Forces of IPs & Strategic Value

IPs that we have developed are aiming at increasing GameStop's efficiency in terms of in-store inventory management, strategic positioning, and distribution decisions. In addition to that, our IPs will increase customer satisfaction as they will be receiving better shopping experiences and more personalized products, which will help Gamestop maintain a long-term relationship with its current customers and attract new customers, which will reduce the threat of substitution. Meanwhile, personalized shopping guides and better in-store shopping experiences are value-added services that differentiate Gamestop from its competitors. When customers cannot get similar experiences and services from other game retailers, customers' bargaining power will significantly decrease.

To assess the effectiveness of such IP, constant monitoring of different parameters through analytical tools such as Google Analytics that monitors online traffic and customer engagement might be valuable. Inventory turnover rate is a critical metric that will show how our IP performs, and it is supposed to lower with the time of IP usage. In addition to that, customer surveys and overall demand must grow since GameStop will be able to provide customers with better-fitted products. This could also decrease the bargaining power of game publishers due to the large column of sales. Finally, the most up-to-date market data will allow the company to make more data-supported decisions and drive GameStop to a more competitive position on the market along with its rivals, which means that there is a potential for market share growth. Monitoring such important metrics will show how well an IP performs and if it is beneficial for the company.

Part 6 Implementation strategy

In order to implement such IPs into company operations, we will be required to convince the board of its benefits and return on investment in such products.

First of all, existing visualization and dashboards present a great example of how valuable such market research and data can be collected in one place and what a great market overview it gives. We will show that such a dashboard visualizes market trends and patterns, so it is easier for GameStop to see a possible opportunity on the market or withdraw from potentially harmful activity.

Secondly, we will cover the fact that the benefits from such IP outweighs potential expenses on implementation and in the long run, allow GameStop to drive down inventory expenses and turnovers by limiting in-store products to the ones that are actually in the most demand for the market area it operates in.

Lastly, we will cover the fact that the combination of both IPs will potentially increase customer satisfaction level, increase in-store traffic, and will allow companies to make more beneficial strategic decisions to compete with major game stores such as Steam or Epic Games Store.

Appendix

a.

Link to the dataset:
https://www.kaggle.com/ashaheedq/video-games-sales-2019?select=vgsales-12-4-2019-shortcsv.
Fields include:

Rank - Ranking of overall sales	User Score - Users score the game from 10
Name - The name of the game	Total Shipped - Total shipped copies of the game
Platform - Platform of the game (i.e. PC, PS4, XOne, etc.)	Global_Sales - Total worldwide sales (in millions)
Genre - Genre of the game	NA_Sales - Sales in North America (in millions)
ESRB Rating - ESRB Rating of the game	PAL_Sales - Sales in Europe (in millions)
Publisher - Publisher of the game	JP_Sales - Sales in Japan (in millions)
Developer - Developer of the game	Other_Sales - Sales in the rest of the world (in millions)
Critic Score - Critic score of the game from 10	Year - Year of release of the game

b.

Link to the dataset: https://www.kaggle.com/adakibet/igns-game-reviews?select=gamedata.xlsx
Fields include:

Game (name of the games)	Platform (operating platform)
Score (review scores given by IGN)	Genre (game genre)

c.

Link to the dataset: https://www.kaggle.com/tamber/steam-video-games
Fields include:

User ID - Users' unique ID	Name of the steam game - Game title
purchase - behavior name (purchase/play)	Hours - number of hours that person played

d.

Link to the dataset: https://www.kaggle.com/trolukovich/steam-games-complete-dataset
Useful Fields include:

Game name	all_reviews
Release date	developer / publisher
Popular_tags	genre
Price	Game details

e.

f. Missing value heatmap

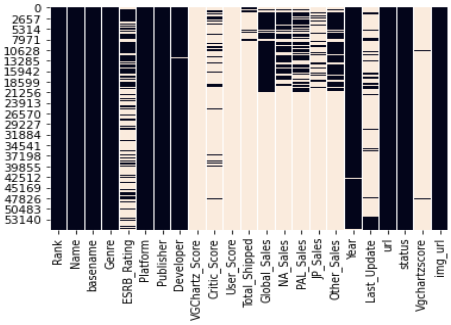


Image 1: Critic_Score File N/A Map

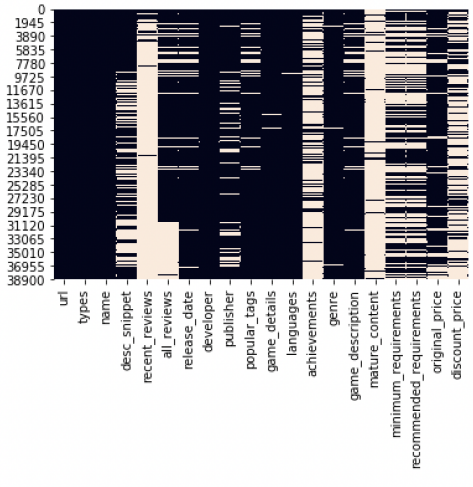


Image 2: Dataset 4 N/A Map

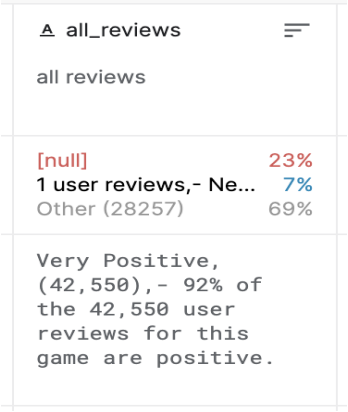


Image 3: All_reviews column

Reference

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Grundy, T. (2006). Rethinking and reinventing Michael Porter's five forces model. *Strategic Change*, *15*(5), 213–229. https://doi.org/10.1002/jsc.764

Team Member Contributions

Zhi Ji: Finding datasets, data exploration, data wrangling, data visualization, IP dashboard 1 & 2, Final report part 2, 3, 4, PPT slides design

Zhen Wei: Finding datasets, data exploration, data wrangling, data visualization, IP dashboard 3 & 4, Final report part 2, 3, 4, PPt slides design

Zinaida Dvoskina: Finding dataset, Animated presentation design, final report part 1

Kirill Ilin: Finding datasets, final report part 1, 5, 6