

## Explanation design of the visualizations

<https://project-4200-dashboard.onrender.com>

**Overall structure (cover page + project introduction page + data introduction page + summary page and future page)**

Our website adopts a storytelling scrolling structure, presenting the project in stages from “Research Motivation → Data Sources → Analysis Findings → Summary and Outlook”, helping users to grasp the logic of VR game market analysis as a whole. Each section uses a uniform card style (white background, rounded corners, shadows), showing a clear sense of hierarchy on a gradient background. Scrolling animations (e.g., fading, sliding up) implemented by IntersectionObserver create a smooth and continuous reading rhythm while enhancing user immersion.

In addition, the CSS is used to create a smooth and continuous reading rhythm through the .cover. In addition, CSS styles such as .cover-page and .content-card are used to maintain page aesthetics and enhance the user's browsing experience.

### **Visualization page**

This page serves as a “visual guide” to transition to the core of the data visualization. In this card, we explicitly tell the user that different angles of the graph will be shown next, and use visual elements in the visual-card (such as the gradient-bar) to draw the eye and direct attention to the graph. This design helps the user make sense of the structure and gives the page a more modern, technological feel that fits the theme of analyzing VR games.

### **Data Visualization Chart Area (Bar + Top Game Search + Sankey + Line + Scatter + Histogram)**

This section is the centerpiece of the site and provides an in-depth analysis of the factors influencing the popularity of VR games in multiple dimensions through six different types of charts. All chart areas are styled with a uniform .plot-card style, combining headers, explanatory

text, and interactive controls (sliders, drop-down menus, etc.) to create a professional yet user-friendly visual analysis environment. Underneath each chart is an explanation area, which explains in detail the content and meaning of the variables in the chart, so that users can easily understand the meaning behind the data.

In terms of chart selection, we have matched the most suitable graph types for different analytical purposes:

- Bar Plot: Shows how often different main genres appear in the Top N games, and is used to determine how dominant each genre is in the market.
- Top Game Search: Show details of the most popular games in each genre.
- Sankey Diagram: connects game genres and ratings to show the flow relationship between content preferences and user ratings.
- Line Chart: Shows the number of reviews aggregated by month over time, identifying temporal and seasonal trends in review activity.
- Scatter Plot: Explore the relationship between pricing and popularity by displaying the price, number of reviews, and ratings of a game simultaneously by coordinate position and color.
- Histogram + KDE (Histogram and Kernel Density Estimation): shows the potential connection between game price distribution and user engagement, identifying common pricing strategies and popular price segments.

In addition, all charts support interactive exploration, such as adjusting Top N ranges, filtering game types, and displaying details on mouse hover. These designs enhance both data insights and user engagement, making the entire analysis process more exploratory and useful!

### **Bar plot**

To investigate how each of the main game genres is distributed across the different popularity levels, I have used a vertical bar chart, showing the frequency of each genre in the

Top N list of the most reviewed games. The x-axis of the chart represents the main genre of the game, while the y-axis indicates the number of those games in that genre. Each bar stands for a genre, the bars are depicting the frequency of these genres in the selected range for Top N. The N value (e.g., Top 10, Top 1000) is placed at the top of the interface in a slider bar, which will make the chart dynamic and interactive.

The bar chart is particularly good for showing this kind of frequency data among categories because it enables a straightforward comparison of genres and trends as the size of the sample grows. For example, in the Top 10 games, Action and Adventure genres are the most common, while in the Top 1260 these same genres are supplemented by Casual, Simulation, and Indie genres. The widening of the range drafts shows which genres remain generally popular and which genres make their names only after a much wider range.

This particular chart type is best for exploratory and explanatory analyses as it provides an ideal basis for both kinds of approach. In such a way, it caters to the exploration process by enlightening users on the pattern discovered and it is also useful in explanation as the indicated dominance or absence of certain genres is clearly seen. To a greater extent, the bar chart is preferred over more complex visualizations due to its clarity, simplicity, and direct interpretability, which are essential for understanding the variety of genres in top-reviewed games.

### **Top Game Search visualization**

**Top Rated Game by Genre** This view is designed to help users and game developers quickly identify the best VR games in a given genre. Finding the best games in a dataset containing hundreds or even thousands of games can be overwhelming. This tool solves this problem by highlighting the highest rated games in each genre based on review summaries and number of reviews. First, it prioritizes both quality and popularity. By sorting first by review sentiment (e.g., “overwhelmingly favorable”) and then by number of reviews, the tool ensures that the results are not only widely loved, but also widely played and rated. Second, it saves users time. Instead of having to manually browse or sift through dozens of games, users can

simply select a game genre and instantly see the top recommendations, which is ideal for decision-making or game discovery. And, it supports focused exploration. For gamers who favor specific game genres (e.g., horror, simulation, adventure), this allows them to gain targeted insights without getting lost in unrelated games. Thus, this approach is a good choice.

### **Sankey**

To explore how different types of VR games are received by users, I used a Sankey diagram to illustrate the relationship between each primary game genre and its corresponding Steam user rating (Review Summary). On the left are the primary genres, and on the right are the review summaries (e.g., “Very Positive”, “Mixed”, etc.). Each flow represents how many games from a specific genre fall into a particular rating category, with the thickness of the line indicating the total count, and the color intensity on the right indicating the relative rating level—from light (Mixed) to dark (Overwhelmingly Positive).

To further enhance interpretability, the tooltip now displays not only the raw count of games flowing from a genre to a rating, but also the percentage share within that genre. This allows users to compare not just how many, but how likely games of a certain genre are to receive specific ratings.

From this visualization, we can observe both quantity and quality patterns. For instance, while Action games have a large number of titles and are mostly rated “Mostly Positive”, genres like Casual or Adventure may show a higher proportion flowing into “Very Positive” or even “Overwhelmingly Positive”. Conversely, smaller genres such as Gore or Nudity may show a higher concentration in “Mixed” or lower ratings.

By combining flow distribution, percentage comparison, and color gradients to indicate rating levels, this Sankey chart provides a multi-layered, visually intuitive analysis of how game genres relate to user satisfaction—making it far more informative than simple tables or bar charts, and therefore ideal for interpreting this data.

### **Lineplot**

In order to analyze trends in monthly review activity for VR games, I created a line graph across years showing the total number of reviews received for each month in a selected year. the x-axis represents the month from January to December, and the y-axis represents the number of reviews. Users can interactively select one or more years to compare, thus tracking and comparing seasonal or cyclical changes in the VR game market. Enhanced tooltips now show not only the number of reviews for a given month and year, but also the most reviewed games for that month, providing more context for each peak. This allows users to relate trends to actual games, which can help explain the reasons for spikes in reviews. For example, in the 2024 view, we can observe a strong spike in reviews in June, likely related to the release of a high-profile title, followed by another rise in December. This line graph is perfect for highlighting seasonal spikes, such as mid-year or holiday spikes as well as comparisons across years to identify recurring patterns or anomalies Overall, this visualization effectively captures temporal review dynamics while enabling users to gain a deeper understanding of the reasoning behind the trend through year selection and interactive insights.

### **Scatter plot**

The scatter plot is employed to illustrate the correlation between virtual reality game prices and user reviews of the games' popularity. Each data point on the chart is representative of a distinct VR game. The vertical axis of the chart represents the total number of user ratings, while the horizontal axis denotes the financial cost of each game in USD, with a maximum value of \$200. The colors of the dots represent whether the comments are "Mixed," "Mostly Positive," "Very Positive," or "Overwhelmingly Positive," which additionally shows how well-liked and well-received each game is by users.

This interactive graph shows the data in detail. Users can focus on particular areas, like games in a particular price range or those with a given number of reviews. Users can also analyze the distribution of games that fit into certain genre categories, such as "action," "adventure," or "simulation," by selecting genres. Furthermore, the application of a "Top N" filter

to the list ensures that only the most highly ranked games are displayed, which makes the visualization focus on the most popular ones.

This scatter plot allows users to explore the relationships between cost, popularity, and game genres in the VR industry. With the use of this tool, developers and gamers can gain a better understanding of the factors that influence player engagement with games at various price points and the market performance of these titles. Users can view information such as a game's title, price, genre, number of reviews, and a summary of player comments by hovering over particular points on the chart. With all the information, this chart not only shows the relationship between price and reviews for the VR games but also tells the developers under which price the games are more popular.

### **Histogram**

This histogram is used to examine the distribution of VR game prices among those with the most reviews. It demonstrates prevalent pricing trends and the correlation between game prices and gameplay frequency.

The x-axis shows the price range of VR games in USD, divided into intervals such as \$0–\$5, \$5–\$10, \$10–\$15, and so on. The y-axis shows the number of games in each price range. Each bar on the chart shows the number of top-reviewed VR games that are priced within that range.

The chart shows that most popular games are concentrated in the \$10–\$20 and \$5–\$10 price ranges. Games that cost less than \$30 tend to get more attention, while games that cost more than \$40 become less common, which might mean that people are less interested in them. To make it easier to understand, a red curve (kernel density estimate) is shown over the bars, and a green diamond shows the price range with the highest number of games. The bars are shaded differently too, dark blue shows low prices and light blue shows high prices. Users can change how many of the most-reviewed games are included by adjusting the "Top N Games" slider. As users change the value, the bars and red curves automatically update.

This histogram helps users find the best price for a game and see how price affects its popularity, which makes it easy to understand and helpful for developers and analysts looking into pricing strategy and market trends in the VR space. This histogram also assists users in identifying the optimal price for a game and understanding the impact of price on its popularity.