Classification of Game Genres Based on Interaction Patterns and Popularity in the Virtual World of Roblox

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ABSTRACT

The rapid growth of user-generated virtual environments has elevated the importance of understanding player behavior and content dynamics in metaverse platforms. This study investigates the relationship between game genres and user engagement in Roblox, one of the largest and most interactive virtual worlds. Utilizing a dataset of over 300 game entries, we analyzed engagement metrics including visits (ranging from thousands to over 2.8 billion), likes (up to 1,000,000), favorites (up to 3.4 million), and active user counts (as high as 22,155). Descriptive statistics and correlation analysis revealed that action-oriented genres(particularly Action, Shopping, and Obby and Platformer) consistently outperform others in attracting and retaining users. The strong positive correlation between likes and favorites (r = 0.95) indicates that user satisfaction strongly predicts long-term interest, while negative feedback (dislikes) shows minimal correlation with other variables. In contrast, genres such as Education and Entertainment demonstrated significantly lower averages, with visits below 1 million, and active user counts typically under 1,000. These findings provide practical insights for developers and platform administrators seeking to optimize content strategies and offer a foundation for future research involving clustering analysis, sentiment mining, and temporal behavior modeling to enhance recommendation systems and genre personalization within metaverse ecosystems.

Keywords Roblox, Game Genre Classification, User Engagement, Metaverse Analytics, Virtual Worlds

INTRODUCTION

The evolution of digital environments has culminated in the rise of the metaverse—a networked, immersive virtual space where users can interact, create, and transact in real-time [1]. Unlike traditional video games, the metaverse blurs the line between consumption and creation, positioning users as both players and content developers [2]. Among the platforms that have embraced this paradigm, Roblox is a leading example of a participatory virtual world. As of 2024, Roblox reports over 70 million daily active users, with over 40 million user-generated games across various genres, making it a rich ecosystem for studying user behavior, content dynamics, and engagement patterns [3]. Roblox enables users to design and publish games using its proprietary engine and scripting tools, resulting in a wide spectrum of genres such as Action, Simulation, and Adventure, to Education and Entertainment [4]. Each genre not only represents different gameplay mechanics but also embodies distinct interaction styles, reward systems, and social experiences. Understanding how these genres influence user engagement is central to improving content relevance, player retention, and platform growth in the

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broader context of the metaverse [5]. In prior literature, various factors affecting user engagement in gaming environments have been studied, such as game difficulty, social features, feedback loops, and aesthetic appeal [6]. However, most studies adopt a game-centric or user-centric view (analyzing single titles or aggregated player behavior) without explicitly accounting for how game genres mediate these interactions. Furthermore, while research in recommender systems and gamification has advanced significantly, few works have utilized large-scale platform data to evaluate genre-specific patterns, especially within user-generated metaverse ecosystems such as Roblox.

This study fills that gap by classifying and comparing games across genres using platform-level engagement data. By analyzing a curated dataset of over 300 Roblox games, enriched with metrics such as visits, likes, dislikes, favorites, active users, server size, and genre labels, we aim to identify distinctive interaction patterns and popularity trends that emerge at the genre level. Our objective is not only to describe which genres are more popular, but to explain how and why such differences occur using empirical evidence. Understanding these patterns offers practical value to developers, marketers, and platform administrators. Developers can tailor game mechanics and content to align with user expectations within specific genres; marketers can segment users based on behavioral preferences; and platforms like Roblox can improve discovery algorithms by factoring in genre-based engagement likelihoods. On a theoretical level, this research contributes to metaverse analytics by operationalizing game genre as a critical dimension in modeling interaction dynamics.

Despite the growing academic interest in the metaverse, current research lacks a genre-oriented framework for understanding engagement behavior. Most studies either generalize user interaction patterns across all game types or rely on subjective data such as player surveys. Additionally, genre classification is often treated as a static label rather than a driver of design, behavior, and popularity. There is a clear lack of empirical, genre-specific, data-driven analysis that systematically compares user engagement across content types within immersive, user-generated virtual worlds. This study addresses that void by offering a multi-dimensional analysis of genre behavior using Roblox as a representative metaverse platform.

Literature Review

The rapid development of user-generated platforms and immersive virtual environments has led to a growing body of research exploring how game mechanics, genre, and interaction patterns shape user engagement. Genre classification has long served as a foundational concept in game studies. Apperley proposed that genre is not only a taxonomy of thematic categories but also reflects the cognitive and behavioral expectations of players [7]. Building on this, Yee argued that each genre evokes distinct motivational drivers, such as achievement, immersion, or social interaction, which in turn shape user retention and in-game behavior [8]. In the context of sandbox and social platforms like Roblox, where players participate in both game creation and consumption, genre serves a dual role: as a design convention and as a behavioral attractor. Several studies have investigated how genre influences player dynamics. Li et al. found that genres such as role-playing and simulation tend to foster collaboration and persistent interaction, while competitive genres

like action and battle royale trigger shorter but more intense engagement sessions [9]. Similarly, Elson et al. demonstrated that the cognitive load and feedback systems in fast-paced genres directly affect player satisfaction and emotional arousal, thus impacting return intentions [10]. From a design standpoint, games in certain genres are more likely to include embedded reward systems, which, according to Sweetser and Wyeth, enhance flow and player immersion which is two factors strongly associated with long-term engagement [11].

While genre sets the structural context, platform-level metrics provide observable indicators of user response. Hamari et al. and Seering et al. emphasized that metrics such as likes, shares, and favorites can be interpreted as proxies for user satisfaction and content quality [12], [13]. These metrics are particularly salient in user-generated environments like Roblox and Steam Workshop, where social signaling often replaces traditional game reviews. Fan et al. analyzed how these metrics relate to game discoverability and concluded that cumulative engagement data can be used to predict user retention across different content types [14]. However, these analyses typically consider the platform as a whole, overlooking the role that genre may play in modulating how such metrics behave. In terms of predictive modeling, several studies have implemented machine learning to classify games or users based on interaction patterns. Eskandari et al. applied unsupervised learning to classify behavior clusters in blockchain-based gaming, demonstrating how player profiles can be algorithmically derived from engagement vectors [15]. Similarly, Sifa et al. proposed that clustering users based on behavioral telemetry provides deeper insights into content alignment and gameplay preference [16]. De Grove et al. extended this by showing that behavioral segments (especially when mapped to content categories like genre) are more effective in predicting player loyalty than demographic variables alone [17]. Despite these advancements, relatively few studies have treated genre as an analytical unit within large-scale user-generated environments. For example, Yang et al. developed a model to forecast game popularity based on metadata and title sentiment but did not disaggregate findings by genre [18]. Conti et al. discussed security and system-level risks in decentralized environments but omitted genre as a variable of interest [19]. Similarly, research by Hunicke et al. on the MDA (Mechanics-Dynamics-Aesthetics) framework highlighted how gameplay elements influence experience design, yet this framework has rarely been applied to genre-based comparative analysis at the platform level [20]. This study aims to address that research gap by providing a genre-focused, data-driven analysis of user engagement in Roblox. Rather than viewing genre as a fixed label, we explore how it functions as a behavioral determinant, shaping the structure of user interaction, platform visibility, and popularity dynamics. By analyzing over 300 games across diverse genres with millions of recorded engagements, our research offers a unique contribution to the metaverse literature, game analytics, and digital content design.

Method

This research employed a quantitative, data-driven methodology to analyze and classify game genres within the Roblox metaverse using various user engagement metrics. The methodology consisted of four main stages (see figure 1): data collection, preprocessing, exploratory analysis, and genre-based

classification.

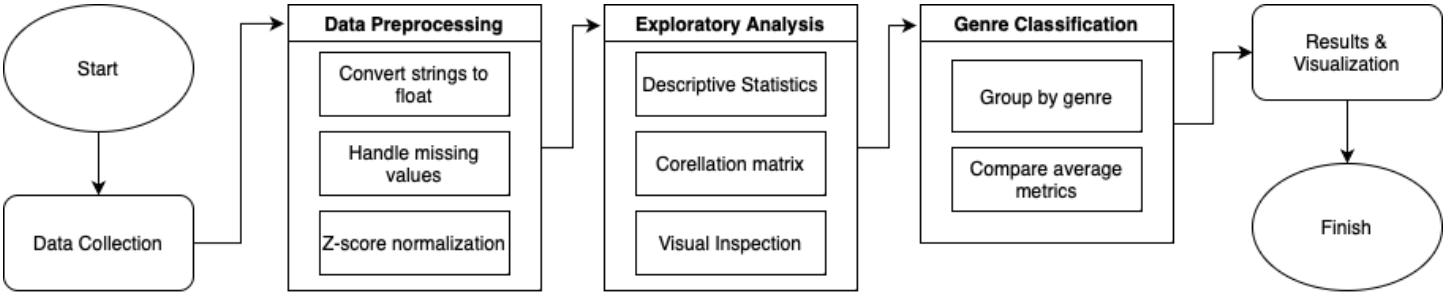

Figure 1 Research Step

The dataset was compiled from publicly accessible Roblox game listings during the fourth quarter of 2024. It included over 300 game records, each comprising metadata such as title, genre, creator, and age recommendation, as well as behavioral metrics: total visits, likes, dislikes, favorites, active user count, and server capacity. Features related to interactivity, such as voice chat and camera support, were also included. After data cleaning and duplicate removal, a final dataset of approximately 250 valid entries was used for analysis. During preprocessing, raw numerical fields such as Visits, Likes, Favorites, and Dislikes were originally stored in abbreviated formats (e.g., “2.8 B+”, “745 K+”). These were converted to actual float values using a parsing function. Boolean attributes (e.g., Voice Chat) were converted into binary format. For standardization purposes, each numeric metric was normalized using z-score normalization, defined by the equation:

$$z = \frac{X - \mu}{\sigma} \tag{1}$$

X is the original value, μ is the mean of the feature, and σ is the standard deviation. This ensures comparability across features with different scales and prevents domination by metrics with large magnitudes, such as visit counts [23], [24], [25].

Following preprocessing, descriptive statistics were computed for each genre. These included the mean ($\bar{x}$) of key metrics, defined respectively as:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i \quad ; \quad \sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2} \tag{2}$$

A correlation matrix was also constructed using the Pearson correlation coefficient, which measures the strength and direction of linear relationships between pairs of variables. The formula used is [26], [27], [28]:

$$r_{xy} = \frac{\sum(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum(X_i - \bar{X})^2(\sum Y_i - \bar{Y})^2}} \tag{3}$$

This helped assess whether variables such as likes and favorites, or active users and visits, moved in tandem, indicating interconnected engagement

behavior.

To visualize the data, bar plots, heatmaps, and comparative tables were generated. These were used to compare average performance across genres, identify high- and low-engagement categories, and interpret statistical results more intuitively. Finally, genre-based classification was conducted by grouping entries according to their labeled genre and calculating their normalized averages across the selected metrics. While unsupervised clustering methods such as K-Means or Principal Component Analysis (PCA) were considered, this study prioritized transparency and interpretability over algorithmic abstraction. As such, genres were evaluated using summary statistics rather than complex modeling, although future work may adopt clustering models for latent genre segmentation. In summary, this methodology combined statistical rigor with data preprocessing and visualization to provide a robust basis for analyzing how game genres in the Roblox metaverse influence user interaction and content popularity.

Result

To classify game genres based on interaction patterns and popularity within the Roblox metaverse, we extracted and analyzed key metrics, including the number of visits, likes, dislikes, favorites, active users, and server size. These variables were cleaned and numerically transformed to ensure consistency across the dataset. The dataset includes Roblox games spanning various genres, such as Simulation, Survival, Action, Shopping, and Sports and racing. Popularity indicators such as visits and likes showed significant variance, with some games reaching over 2.8 billion visits and more than one million likes. Metrics such as active users and server size were also observed to differ greatly between genres, suggesting variability in player engagement and session design. A correlation heatmap was constructed to examine the relationships among the selected metrics. The analysis revealed a strong positive correlation between likes and favorites ($r = 0.95$), indicating that users who engage positively with a game are highly likely to mark it as a favorite. A moderate correlation was also found between visits and active users ($r = 0.61$), suggesting that highly visited games tend to maintain a more substantial active user base. Conversely, dislikes exhibited low correlation with other features, implying that negative feedback has limited impact on overall popularity metrics. An initial examination of genre-based data reveals that games under the Shopping and Action categories attract the highest levels of user activity, often coupled with larger server sizes. In contrast, Simulation and Sports and Racing genres show more balanced user behavior, with moderate levels of engagement and popularity indicators. These findings suggest that genre design, particularly in terms of session interactivity and social features, may influence engagement outcomes.

Table 1 summarizes selected game titles across different genres, highlighting the interplay between interaction features and popularity metrics.

Table 1 Game Genre Interaction Summary

Genre	Visits	Likes	Dislikes	Favorites	Active Users	Server Size
Shopping	2.80B	1,000,000	124,000	3,438,844	19,469	24
Survival	988.30M	982,000	107,000	2,911,356	2,709	45

Simulation	765.90M	746,000	101,000	635,262	22,155	20
Sports and Racing	355.70M	241,000	52,000	358,703	3,445	10
Action	2.40B	1,000,000	245,000	2,363,252	9,035	16

To provide a broader perspective on genre-based interaction patterns, table 2 includes additional examples beyond the top entries. This expanded summary confirms that high engagement is not exclusive to a few genres, but rather distributed variably across several categories depending on gameplay mechanics, social features, and user preferences.

Table 2 Expanded Game Genre Interaction Table

Genre	Visits	Likes	Dislikes	Favorites	Active Users	Server Size
Shopping	2,800,000,000	1,000,000	124,000	3,438,844	19,469	24
Survival	988,300,000	982,000	107,000	2,911,356	2,709	45
Simulation	765,900,000	746,000	101,000	635,262	22,155	20
Sports and Racing	355,700,000	241,000	52,000	358,703	3,445	10
Action	2,400,000,000	1,000,000	245,000	2,363,252	9,035	16

We computed the average values of key popularity and interaction metrics to further generalize interaction dynamics across different genres. Table 3 presents these averages, revealing genre-specific behavioral trends. For instance, Actiongames lead in average visits, likes, and active users, reflecting their high-engagement nature. Meanwhile, Educationgames show the lowest interaction levels across all metrics, suggesting limited reach or niche appeal within the platform.

Table 3 Average Metrics by Genre

Genre	Avg Visits	Avg Likes	Avg Dislikes	Avg Favorites	Avg Active Users	Avg Server Size
Action	657,502,700	401,973	74,564	1,137,665	5,069	25.05
Adventure	317,014,700	175,393	29,118	683,048	1,809	31.33
Education	492,757	232	132	663	55	15.00
Entertainment	55,996,440	58,191	7,883	178,683	507	40.74
Obby and Platformer	580,163,700	132,806	46,704	1,978,513	1,627	20.54

The tabulated summaries (tables 1–3) provide concrete evidence of the disparities in interaction and popularity metrics across game genres within the Roblox metaverse. These disparities are further clarified and reinforced through visual representation. As illustrated in figure 2, genres such as Action and Obby and Platformer consistently outperform others in both average likes and active user count, validating the numerical trends observed in the tables. The chart also reveals the significant gap between these high-engagement genres and those with more limited appeal, such as Education and Entertainment, which remain well below the average across key engagement indicators. This visual reinforcement helps highlight not only the raw popularity of certain genres but also their ability to sustain active participation, making them distinct within the ecosystem of Roblox-based virtual experiences.

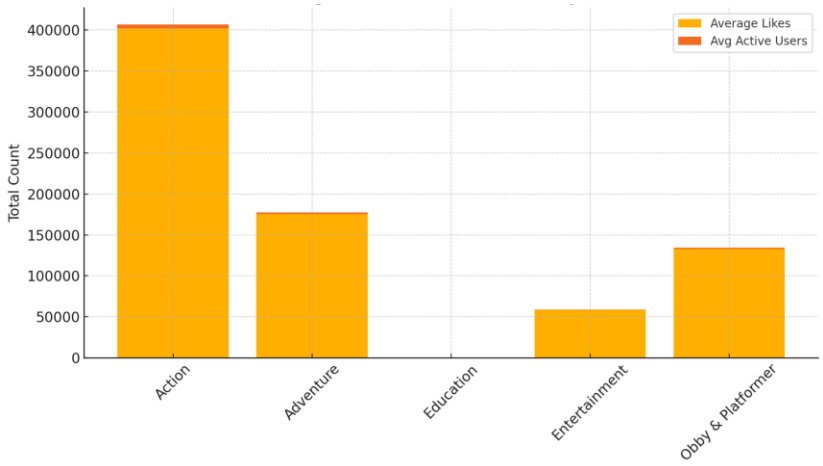

Figure 2 Average Likes and Active Users By Genre

Figure 2 provides a comparative visualization of average likes and active user counts across selected game genres on the Roblox platform. The chart reveals that Action games exhibit the highest user engagement, with a significantly larger average number of likes and concurrent players compared to other genres. This suggests that Action-based gameplay mechanics tend to foster strong player interest and sustained interaction. The genre Obby and Platformer also demonstrates a considerable level of engagement, particularly in terms of average favorites and user activity, which aligns with their high performance as observed in table 3. In contrast, genres like Education and Entertainment show the lowest engagement metrics. These genres register minimal average likes and relatively few active users, indicating a niche or possibly underutilized presence within the broader Roblox ecosystem. Notably, the cumulative bar height visually emphasizes the disparity between high- and low-engagement genres, validating the earlier findings from both the genre-level summary (table 3) and individual game breakdowns (table 1 and table 2). These insights highlight how genre classification is closely tied to user interaction patterns, supporting the core objective of this study: to identify how content type influences popularity and participation in metaverse environments.

Discussion

This study aimed to classify game genres in the Roblox metaverse based on interaction patterns and popularity indicators, utilizing both descriptive analytics and visual interpretation of engagement metrics. The results reveal clear genre-based disparities, confirming that user engagement within Roblox is not uniformly distributed across all types of games but is significantly influenced by content characteristics inherent to each genre. The consistently high performance of Action games across metrics such as visits, likes, favorites, and concurrent users underscores the genre's appeal among Roblox's core demographic. These games typically offer fast-paced gameplay, multiplayer interaction, and reward-driven mechanics (all of which contribute to prolonged user engagement). The high average server size and active user count further support the hypothesis that social features, such as real-time collaboration or competition, act as catalysts for repeated play sessions. Similarly, the Shopping and Obby and Platformer genres exhibit high engagement levels. While Shopping games may rely on customization and avatar expression (which are

highly valued by Roblox users), Obby and Platformer games are often designed with modular challenges that encourage replayability, exploration, and social sharing. These genre characteristics align well with prior research on virtual world engagement, which emphasizes interactivity, personalization, and community participation as critical factors for success in user-generated content platforms.

In contrast, the Education and Entertainment genres consistently fall behind in terms of interaction metrics. Educational games, while pedagogically valuable, often lack the gamification elements or immersive design required to maintain player interest in an entertainment-first platform like Roblox. This finding raises questions about the contextual fit of such content in a metaverse setting, primarily driven by leisure and socialization. The Entertainment genre (despite its name) also shows low engagement. A possible explanation is that many such games are passive or involve scripted sequences with minimal user agency, reducing the depth of interaction. These observations highlight a crucial design challenge: genres that do not prioritize player control, progression systems, or social integration may struggle to sustain interest in dynamic virtual worlds. The strong correlation between likes and favorites ($r = 0.95$) reinforces the idea that positive emotional responses, when captured through user feedback systems, can predict sustained engagement. This suggests that game creators should not only focus on acquiring new players but also on fostering positive in-game experiences that translate into tangible metrics like favorites or repeat visits.

Interestingly, dislikes exhibit weak correlation with other metrics. This implies that negative sentiment, at least as recorded via the “dislike” button, is either underutilized by users or less influential in determining long-term popularity. This echoes findings in social media research where negative feedback often lacks the same predictive power as positive engagement in driving content reach or retention. For developers, these results offer a data-driven foundation for genre selection and feature prioritization. Creating games that incorporate multiplayer mechanics, reward systems, and aesthetic personalization appears to be a viable strategy to attract and retain players. Genres that are currently underperforming may benefit from reimagining their content delivery through more interactive and immersive modalities. For the platform itself, such genre-level classification could inform recommendation algorithms, game curation, and developer support programs. By identifying patterns of success linked to genre and engagement behavior, Roblox can enhance content discovery and elevate user satisfaction through more personalized experiences. The findings also contribute to broader discussions on user behavior in metaverse environments, where identity, agency, and interactivity shape the success of digital experiences. They highlight the importance of combining quantitative platform metrics with genre semantics to capture nuanced behavioral patterns. Future research could explore temporal dimensions (e.g., how engagement changes over time), sentiment analysis from user comments, or deeper psychological factors such as motivation and identity formation. Another potential extension would be the use of clustering algorithms (e.g., K-Means, DBSCAN) to identify emergent genre groupings based on behavioral similarity rather than predefined labels.

Conclusion

This research has examined how game genres in the Roblox metaverse can be classified based on patterns of user interaction and popularity. Through a comprehensive analysis of metrics such as visits, likes, favorites, active users, and server capacity, it became evident that genre plays a significant role in shaping user engagement. The findings highlight that genres offering high interactivity, such as Action, Shopping, and Obby and Platformer, consistently outperform others by attracting more users and generating higher levels of positive feedback. These genres are characterized by features that promote replay ability, competition, or social expression (attributes that align closely with the expectations of Roblox's predominantly young, community-driven user base). Conversely, genres such as Education and Entertainment demonstrated lower engagement across most metrics, suggesting that content types lacking interactive or immersive elements may face challenges in retaining user interest within metaverse environments. The strong positive correlation between likes and favorites underscores the importance of designing experiences that generate satisfaction and long-term interest, while the weak role of dislikes indicates that negative feedback is not a strong predictor of game performance on the platform. These findings provide actionable insights for developers and platform administrators seeking to improve user experience and content discoverability through genre-aware design and recommendation systems. Looking ahead, several directions for future research can enhance and expand upon the findings of this study. First, applying unsupervised learning techniques such as clustering algorithms could reveal latent patterns or emergent genre groupings based on user behavior, offering a more data-driven classification system. Second, incorporating a temporal dimension (tracking how engagement metrics change over time in response to content updates or events) could offer valuable insights into the lifecycle dynamics of metaverse games. Third, including sentiment analysis derived from user reviews, chats, or in-game feedback could provide a more nuanced understanding of user satisfaction and emotional engagement. Further studies might explore personalization by analyzing demographic variables such as age, location, or usage frequency to uncover how different user segments interact with specific genres. Finally, extending this analytical framework to other metaverse platforms could determine whether the engagement patterns observed in Roblox are consistent across virtual ecosystems. These future directions would not only strengthen genre classification models but also support the development of more engaging, adaptive, and inclusive virtual experiences across the broader metaverse landscape.

Declarations

Author Contributions

Conceptualization: B.S., U.H., S.H., and R.R.; Methodology: U.H. and S.H.; Software: B.S. and S.H.; Validation: B.S., U.H., and R.R.; Formal Analysis: B.S., U.H., S.H., and R.R.; Investigation: B.S.; Resources: S.H. and U.H.; Data Curation: U.H.; Writing Original Draft Preparation: B.S., U.H., S.H., and R.R.; Writing Review and Editing: U.H., B.S., and R.R.; Visualization: B.S. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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