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Research on the Relationship Between the Ratings of Game App and Its Factors

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Abstract: Mobile games are an indispensable part of human life. This paper investigates the relationship between game ratings scores or popularity on the app store and its game types and game forms aiming to help publishers to monetize their games in such a competitive market. The main findings of this paper is whether a game requires payment, the length of the game description, and the amount of memory occupied by the game play a crucial role in whether the game is popular or not. In addition, this paper also analyzes the number of games released each year and predicts which types of games will be more promising in the future using data from Apple's App Store. This article summarizes what games are more popular with mobile phone users. And give developers a better direction to develop games on the Apple AppStore.

Keywords: first keyword, second keyword, third keyword

1. Introduction

A good game is as pleasing to the eye as an elegant piece of art. In the tense life of people, they bring not only positive emotions, but also unexpected wisdom and dif-ferent creativity to people's life and work [1]. As players who have been playing the strategy game---"Sudoku" since we were really young, strategy games can be consid-ered as one of my most favorite game categories. With the development of social technology, games have become more diverse. In 2014, daily smartphone usage sur-passed TV viewing, with users spending more than 300 minutes on smartphones on average [2], which means mobile app market is expanding. Covering every conceivable sub-genre of game, Apple's App Store contains over one million games in 2022 [3]. Even more, game developers earn more than 20 billion dollars in 2016 [4]. With the diversification of mobile devices and the expansion of the mobile app market, game developers are increasingly competitive [5].

In Apple's App Store, the rating of a game and app review in the app store plays a crucial role in the number of downloads. Several scholars have published articles about whether there is a relationship between customer rating and the rank of app downloads and popularity. The results showed a positive correlation between a game's rating and downloads [6,7]. In related reports, 75% of users said they will check app ratings first when they downloading an app, and if an app get additional one star, it could increase app store conversion by 306% [8]. In some academic papers, we can find the importance of good or bad reviews on the app store to the number of downloads [9]. Whether the app appears at the top or bottom of the rankings of the App Store and even being downloaded at all was affected by ratings and reviews [10]. Thus, as a developer of a game, if they

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want their game to be more popular, when they design or conceive the game, they must consider whether the game can get a good rating and user feedback on the app store. However, in related forums there ex-ists a research gap on how to improve user feedback and rating scores. This paper will analyze which factor of the game will affect the rating scores on the app store and what is the future trend of strategy games on the iPhone. And also analyze the data of game apps in AppStore and find out the relationship between the ratings of the app and its other properties, like the release date, size, genres, etc.

This paper proceeds as follows. The next section provides a background of the data used in this paper. Section 3 describes the research approach, method used and the results. Section 4 discusses the results and conclusion.

2. Data Description

To analyze the relation between rating and features of strategy games, there is no doubt that the data from the official website of the AppleStore is the most rigor-ous. Scraping those information from Apple's iTunePreview, we could aggregate those into a database (CSV form). The data has 17k rows and 18 columns which contain the URL of each app, game ID, game name, subtitles, average user rating, user rating count, price, and so on. Most of the columns are strings, two of them are data values, and five of them have numeric values.

3. Method and Result

3.1. Number of Apps Released Per Month

This part is going to analyze the number of apps released/updated per month. To achieve that, using the groupby function, along with count and sum methods of pandas to aggregate the raw data.

As seen in the figure 1, the number of apps released per month kept increas-ing from Jan 2008 to around Mar 2016. After that, the number of new apps released started to drop slowly, and an abrupt drop is observed near Sep 2019. For the number of upgraded apps released each month, the difference between the two lines from 2008 to 2016 shows the number of apps initially released at that time and was upgraded later. It shows that quite a lot of game apps have been upgraded at least once after the initial release, and also there is a peak for the yellow line around Jun 2019. That indi-cates a great number of apps were upgraded at that time.

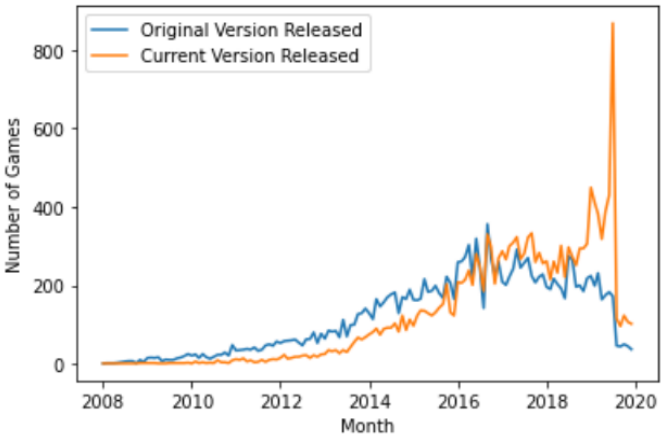

Figure 1: Number of apps released per month.

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3.2. Average Rating Scores of Apps Released Each Month

To analyze the average rating of apps released each month, since there are missing values in the rating column, they need to be dropped before continuing.

Figure 2 shows that the average rating of apps released each month is generally increasing from Jan 2008 to Dec 2019. It's clear that recently-released apps are more likely to have high ratings, and old apps can get low ratings more easily since they're not updated frequently, and cannot meet the needs of the users.

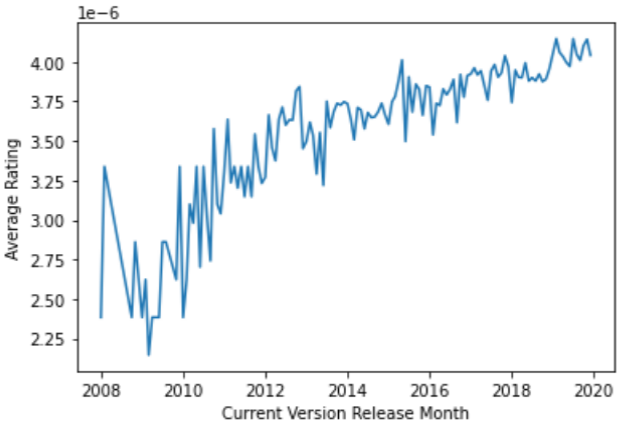

Figure 2: Rating released each month.

3.3. Average Rating Scores of Apps Released Each Month

Number of Different Game Genres. In addition, to release time, part 3 also analyzes the properties of games as a function of their genre. Since every game has a genre of "Games", the data should exclude them for better visualization.

Figure 3 shows the number of games in each genre. Only the top 15 genres were selected for clarity. It shows that the majority of games are in the strategy genre. About 25% of all games are in the puzzle genre. The genre "Entertainment" is not really helpful in determining the content of the games, so it has been ignored in the analysis.

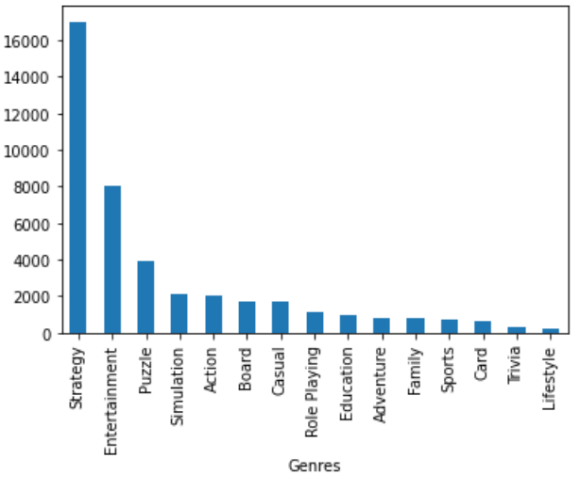

Figure 3: Rating released each month.

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Rating Scores of Different Genres. Figure 4 also calculated the average rating of the genres mentioned above. It seems that different genres have similar average ratings, from around 3.8 to 4.2. Among them, casual games seem to have the highest average rating, and board games seem to have the lowest average rating. But those average rating scores don't seem to be significantly different. Thus, to make analysis more accurate, it also needs to analyze the number of reviews of games in each genre.

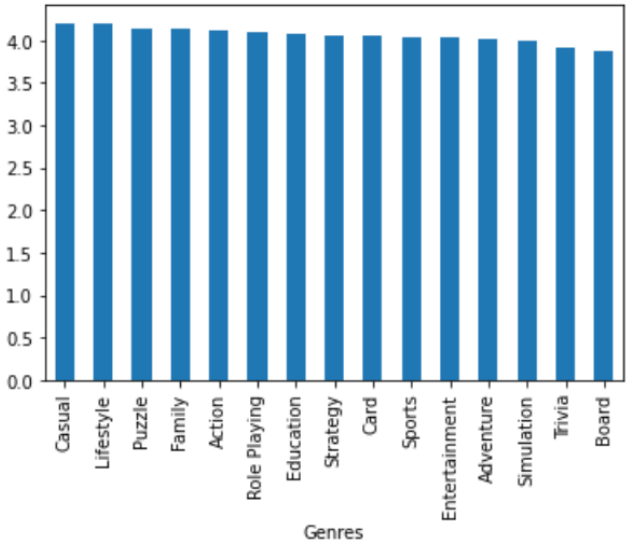

Figure 4: Different genres average rate.

Review Amounts of Different Genres. Surprisingly in figure 5, games under the genre of "Health & Fitness" have the most reviews on average. That could be caused by the fact that the number of apps in this genre is small, or a specific very popular app is in this genre. Therefore, this result is not really helpful in finding the trend of app reviews. To get a more meaningful result, this section only analyzes the top 15 genres with most number of games.

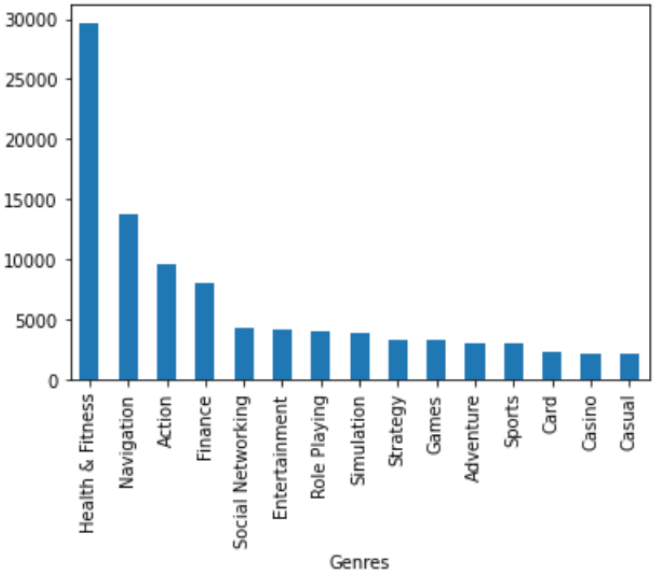

Figure 5: Review amount of game in each genre.

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In figure 6 it turns out that the genre "Action" has the highest number of reviews, followed by "Entertainment" and "Role Playing". Thus, “action games” are the most popular games on the AppStore. We can further group the data by their price (free or not free) and find the price's dependence on the number of reviews.

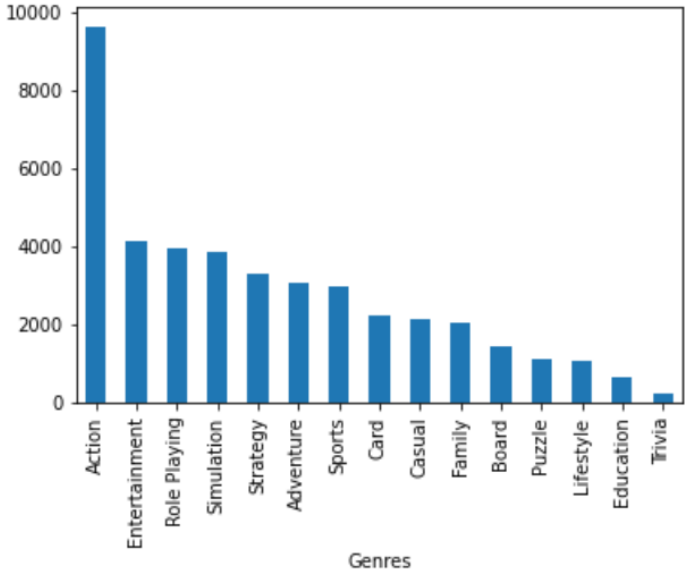

Figure 6: Review amount of top 15 genre.

Figure 7 finds that free apps generally have more reviews than paid apps, except for the "Family" genre. In addition, in some genres, like "Sports" and "Adventure", the ratio of reviews in free apps and that of paid apps are extremely high. That suggests paid games in those genres are far less popular than free games.

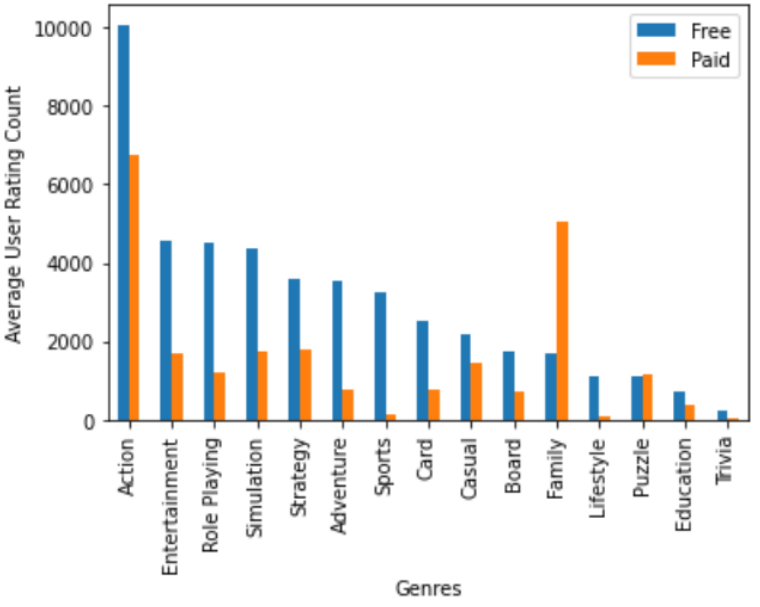

Figure 7: Review amount of price(free or not free).

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3.4. Criterion of Popularity

The popularity of an app can be determined by both its average rating and its number of reviews. As the number of views may differ greatly between apps, it should be proposed another value for judging the popularity of an app.

$$\text{Popularity} = \text{rating} \times \log10\ (\text{number of reviews}) \tag{1}$$

This method can decrease the impact of the number of views on the popularity of an app to a proper level. The distribution of popularity is shown in figure 8. Figure 8 also claims that the number of apps at a specific popularity level decreases exponentially with increasing popularity. This value will be used for further studies.

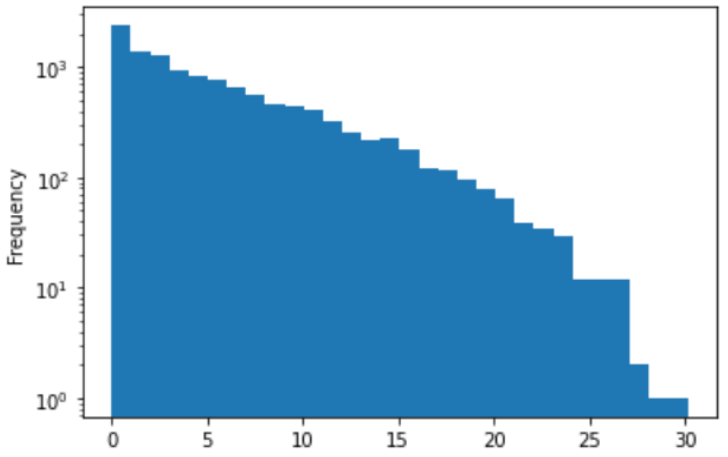

Figure 8: Distribution of popularity.

To study the dependence of different fields on popularity, it should consider the following fields: Price (whether it is free or not); Name length; Description length; Size of app; Number of in-app purchases.

The price of the app and in-app purchases should be considered first. From figure 9, it shows that apps with in-app purchases have a much higher popularity than those without in-app purchases. This is because the in-app purchases often contain enhancements that would attract new users as well as improve the experience for existing users. Whether the app itself is free or not, on the other hand, only has a minor impact on the popularity. What is surprising is that, for apps without any in-app purchases, paid apps have better popularity than free apps. This could be caused by the fact that paid apps tend to provide better user experiences so that people would pay for it, while free apps provide no income to the developer, and the developers tend to spend less time maintaining them.

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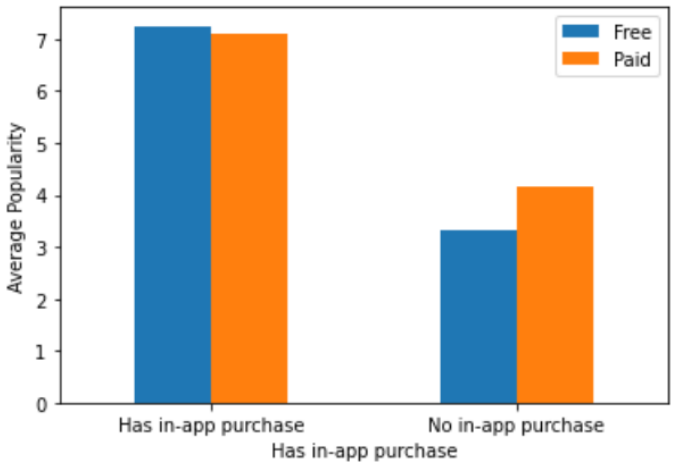

Figure 9: Popularity between free and paid.

The length of the app's name and description is also considerable. They are the information that users will acquire first when they see the app. In figure 10, apps with name length between 15 and 50 characters have the highest value. Names that are either too long or too short tend to have a bad influence on popularity.

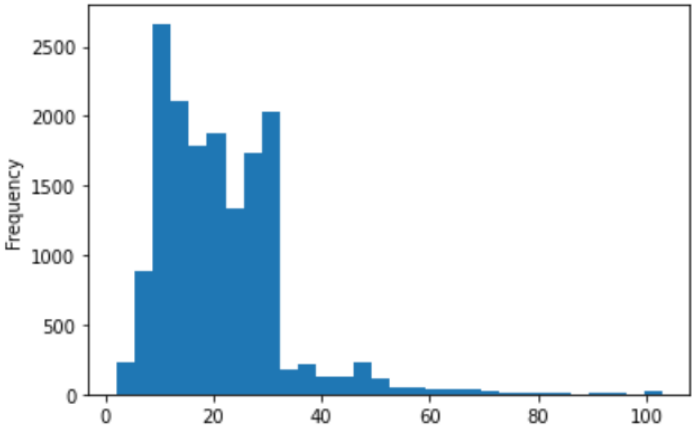

Figure 10: Length of the App's name and the frequency.

Figure 11 finds that the average popularity generally increases with description length. The description length may not be the cause of the popularity, but it may be related with the quality of the app. The final part is about studying the size of the app. The size of the app is the size of the app's binary file. It is related to the quantity of data the app contains.

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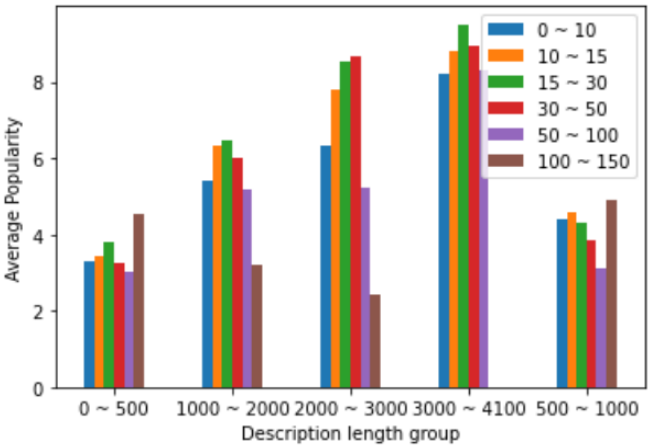

Figure 11: Average popularity of the description length.

From the distribution of app size (Figure 12) find out that the size of apps varies greatly, from smaller than 300 KB to larger than 30 GB. The next part will find out how the app size affects the popularity.

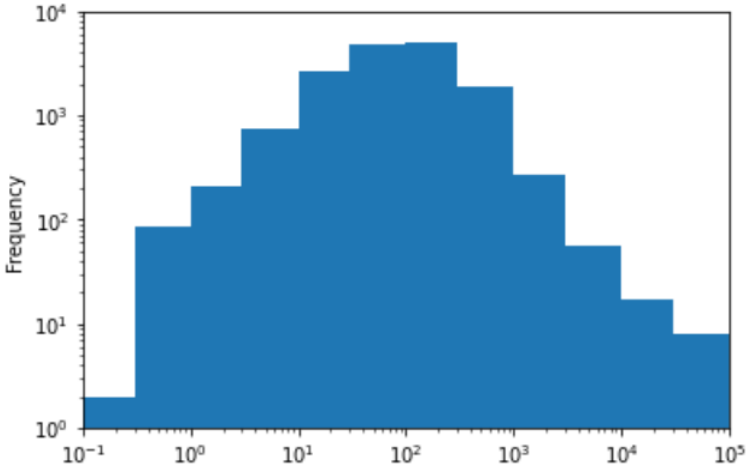

Figure 12: Distribution of App size and its frequency.

Figure 13 indicates that apps with sizes between 1 GB and 10 GB have the highest popularity. Sizes that are either too small or too large tend to have a bad influence on popularity. Apps that are too small tend to provide too few features, while apps that are too large take up a lot of space, which may affect the user's experience.

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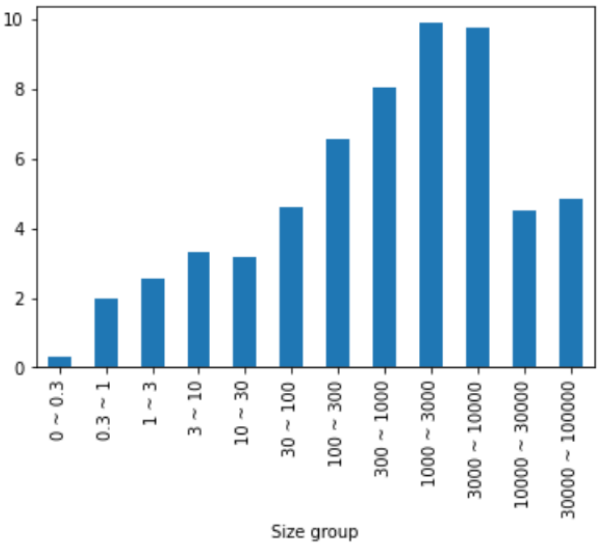

Figure 13: Popularity and game size.

4. Conclusion

This paper analysis what kind of game will have a higher rating score and more popular on the Apple AppStore. The main conclusion is that the year of 2016 seems to be the year with the most game releases, and also games released later generally have larger sizes and higher ratings. As for the game genres, the majority of games are in the strategy genre. Games in the casual genre and the board genre seem to have the highest and the lowest average ratings.

By analyzing the data of strategy games currently in the AppStore, this paper implicates that the developer needs to make apps that have in-app purchases, and a name with proper length so as to make a popular game. In addition, the description of the app should be as long as possible, and the size should better be between 1 GB and 10 GB. This result of this paper can help the game developers have an overview about the game market. Designing popular games by carefully evaluating the preferences of potential users and designing the game accordingly is significant for future mobile game application developers.

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