

RESEARCH ON GAME OPERATIONAL DATA AND RELEVANT MODELS

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ABSTRACT

Game operational data is a direct expression of game operation performance and a significant evidence to adjust operation strategy and direction of game products. This paper makes an analysis of and research on the important data during game operation to attempt to establish prediction model of operation effect, hoping to add some helpful reflections for game operators in the decision-making process.

INTRODUCTION

With continuous extension of online game market and increasing choices of game players, the games tallying with players' expectation can only keep players ultimately, thus realizing profit. The previous operation only focuses on perceptual operation mode of index of game downloads. It does not have operation but promotion actually. The diversified operational data is converted to useful information so as to improve game quality and operational efficiency, which is realized by deeply excavating operational data.

LITERATURE REVIEW

A. Important operational data and significance

Game operational data is digital presentation of players' behavior. By analyzing operational data, we can roughly understand players' condition of game experience. Simultaneously, it is also one of important evidences to adjust game products. The retention rate of players, ARPU and payment rate are called as "the iron triangle of operation". Games' operation value depends on the actual performance of such three data.

1. Retention rate:

Retention rate is a probability of new registered players re-playing games, focusing on daily state performance after they log in games for the first time. Retention rate is the most direct expression of game quality. The key to improving retention rate is to stack game contents and optimize game experience.

2. Payment rate:

Payment rate = user number of making payment / active

user number

Among the data of the iron triangle, it is the only one can produce an instant effect and influence the other two data through operating means. The improvement of payment rate is fundamental to make use of users' psychology to guide consumption of players, namely, ice-breaking.

3. ARPU:

ARPU = the total revenue / the number of active users

ARPU (Average revenue per user) macroscopically manifests the profitability of games and is decided comprehensively by game operation and products. It always means to overdraft games to improve ARPU rapidly only by operational means.

B. Prediction model of retention rate based on regression analysis

Regression analysis is a sort of statistical analysis technique to determine interdependent quantitative relationships between two or more variables. We attempt to make prediction of retention rate through the relation of x-day retention and x-day.

The curve fitting of retention rate needs to collect fitting samples first, namely, collect retention rate data at multiple time points. The curve fitting of retention rate can be made through excel, SPSS or python. The results derived from several kinds of modes are slightly different. However, they are in the acceptable range. We use excel to make fitting.

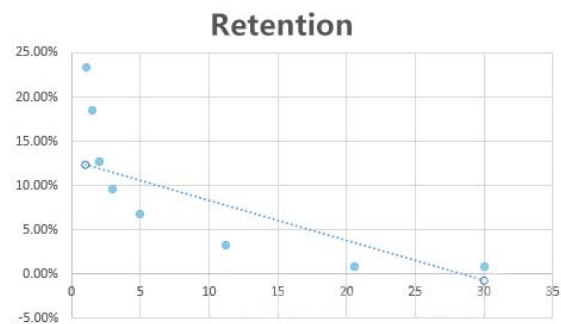


Figure 1 Fitting samples are imported

After completion of adding fitting samples(see Figure1), trend-line format is added and logarithm or power function (logarithm usually predominates) is chosen to demonstrate formula and R squared value(see Figure 2). The more R squared value is close to 1, the better fitting effect is .

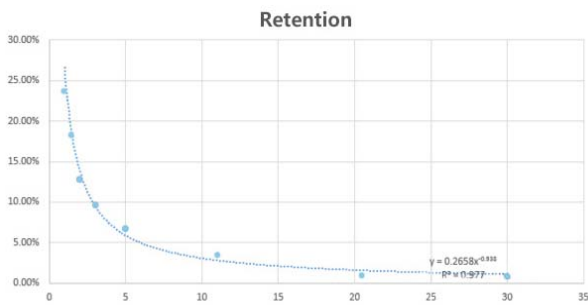


Figure 2 Curve fitting of retention rate

This curve fitting model of retention rate is established under the ideal environment that other factors influencing retention are neglected. A rough prediction can only be made. In the actual operation, actual data of game products probably has a few errors with prediction model due to the influence of various factors such as other competitive products, disturbance of external events and operating activities. Operators are needed to make information feedback on operational data and handle the problems in time.

C. Analysis model of players' viscosity based on retention rate

We attempt to establish analysis model of players' viscosity according to players' retention data. Generally speaking, players' retention rate has positive correlation with DAU that is comprised of DNU and old players(see Figure3).

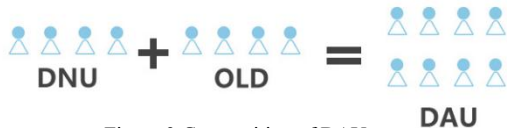


Figure 3 Composition of DAU

Every player's status transits from newly registered player to old player. Therefore, we can divide composition of OLD as per the following way(see Figure4):

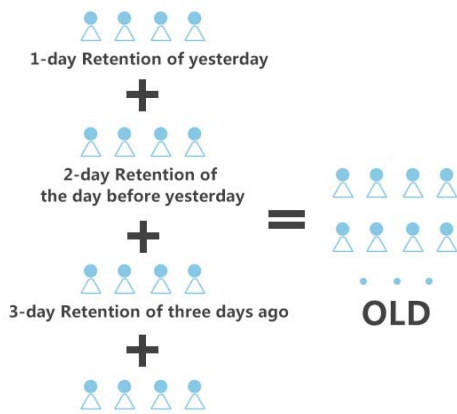


Figure 4 Composition of OLD

Old users are the quantity derived from addition of retention rate product from previously daily DNU to statistical day of DAU. X-day DAU can be deduced:
 $DAU_x = DNU_x + DNU(x-1) * DAY1_Retention_Rate + DNU(x-2) * DAY2_Retention_Rate + DNU(x-n) * DAYn_Retention_$

Rate

The formula splits and specifies DAU. It can be seen that DAU is a comprehensive value derived from weighting of DNU at different time points. This value represents users' variation of viscosity and comprehensive index of retention performance.

In other words, DAU is comprised of return DNU at different time points. Therefore, we can get DAU level occupied by return DNU at different time points. Thus we can deduce:

$$Return_DNU(x-1) = DNU(x-1) * DAY1_Retention_Rate$$

$$DAU_{x_1\%} = Return_DNU(x-1) / DAU_x$$

$$DAU_{x_2\%} = Return_DNU(x-2) / DAU_x$$

...

$$DAU_{x_n\%} = Return_DNU(x-n) / DAU_x$$

So,

$$DAU_{x_1\%} + DAU_{x_2\%} + \dots + DAU_{x_n\%} = 100\%$$

Actually, taking advantage of the theory mentioned above, we can know users' attention to games and viscosity. If more than a half of DAU in a game is contributed by DNU one week ago, it's doubtless that users' viscosity of the game is strong.

CONCLUSION

Operational data can objectively reflect the status of game operation at the present stage. It's of great significance for game operators to discover and solve various problems in the game, determine optimized direction of game, understand users' appeal. However, game operational data is only argument not final result for game products. About the specific project, what operators need to do is to find data model most suitable for the project per se so as to form product data model fit for game operation, thus making optimal decision and improving operation quality and efficiency of game products to maximize game product value.

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