Research on E-Sports User Preferences and User Characteristics of Student Groups in Anhui Province

Ling Yuan and Shanhui Sun(✉)

College of Mathematics and Statistics, Suzhou University, Suzhou 234000, Anhui, China
1178599658@qq.com

Abstract. Electronic Sports (E-sports) is a competition of intelligence and physical strength between people using electronic equipment as sports equipment. At present, e-sports competitions have become an official sports event, and are no longer synonymous with unprofessional work. E-sports will be a business card for young people around the world to know China in the new era. Based on the current hot development of e-sports, this research takes the participation of college students in Anhui Province in e-sports activities and their consumption in e-sports as the investigation and research content. Through the investigation and statistics of the characteristics of college students' e-sports game group in Anhui Province, the development status and influencing factors of college students' e-sports game market are analyzed. This study uses the SVM algorithm to analyze the emotional tendencies of college students' e-sports game groups, and comprehensively explores the deep factors of college students' participation and consumption of e-sports games. It has certain reference significance for the relevant enterprises to optimize the product portfolio development new mechanism and develop the college student market in Anhui Province.

Keywords: User modeling · customer preference · market research · statistical modeling

1 Introduction

At the beginning of the 21st century, the Internet and computers were popularized in the homes of the general public, and game competitions were prosperous and developed, which also laid the foundation for the following e-sports events. The annual event is a platform for professional e-sports players to show their strength, and win the championship. It's their dream. In the platform of mobile e-sports, the size of the audience will increase with the participation of college students. In mobile e-sports, there are also national competitions and competitive competitions with the theme of intra-city leagues. Here, netizens from various provinces are gathered here to learn from each other.

As a new thing, e-sports has appeared in the public eye. At present, there are 626 million users, 214.44 billion game market sales revenue, and 83.44 billion e-sports game market revenue. Riatti (2021) found that e-sports has strong vitality by studying the

J. Yen et al. (Eds.): ICBIS 2023, AHCS 14, pp. 184–190, 2023.
https://doi.org/10.2991/978-94-6463-198-2_21

Korean e-sports market, but these do not make us ignore its problems. At present, South Korea, as a pioneer and leader in the e-sports industry, already has its own complete industrial chain. With the increase of public awareness of e-sports and the promotion of mainstream media, the e-sports market in various countries has gradually opened and developed.

With the change of ideas, e-sports has become a common form of entertainment for contemporary college students. Wang Yi (2016) pointed out that college students are an important group to participate in e-sports. Consumption is inevitable to participate in e-sports, and most participants will consume more or less. The quality of the product itself cannot directly affect the consumption willingness. The consumption willingness of college students should be affected through game experience, and the willingness of consumers needs to be grasped by e-sports operators. Li Lele (2010) study, consumption experience is the most important factor in promoting electronic sports consumption, and negative public opinion will restrain students' e-sports willingness to spend, the quality of the product itself does not actually how much impact on college students' group, the key is the product experience, only good products experience, students will be more willing to increase consumption, to experience buying it. Consumption is also obviously affected by consumption ability, most college students will spend within their economic capacity. Therefore, Chen Mei (2021) believes that e-sports developers should pay attention to the experience requirements of college students, pay attention to the average consumption level and ability of college students, and ensure the health of products, so as to promote the benign consumption of college students and the better development of e-sports.

This research adopts the method of questionnaire survey to conduct a sample survey of college students in Anhui Province, investigates a series of data related to the inclination and preference of college students in Anhui Province towards e-sports games, and conducts statistical modeling to develop the e-sports market. Optimize the welfare mechanism, and promote the development of the e-sports market for college students to provide corresponding basis and reference. At the same time, it also provides constructive and innovative opinions and suggestions for transforming the e-sports game mode, enhancing the sense of game immersion and promoting the prosperity and development of the e-sports market.

2 Sampling and Data Processing

The second part is the sampling design. The survey is generally determined to be all college students in Anhui Province. Anhui Province is divided into southern Anhui, middle Anhui, and northern Anhui according to regions. This research will conduct simple random sampling, stratified sampling and Multi-stage sampling survey in colleges and universities in southern Anhui, middle Anhui, and northern Anhui.

The confidence level is $1-\alpha$, the absolute error limit is d, and S^2 is the population variance. The formula for determining the estimated total sample size is:

$$n_0 = \frac{z_{\alpha/2}^2 S^2}{d^2} \tag{1}$$

According to the "2021 Anhui Statistical Yearbook", the number of college students in Anhui Province in 2020 will be 710,031, the confidence level is $1-\alpha = 95\%$, and

Table 1. Design effect coefficient calculation table

sampling layer	variance per layer	total variance	Simple random sampling variance	Design effect factor
Central Anhui	0.003	0.0265	0.0273	0.9707
Southern Anhui	0.001			
Northern Anhui	0.0012			

the absolute error limit is controlled at 5%. At this time, take 0.05, and the population variance $S^2 = 0.25$ The required sample size $n_0 = 384$ is obtained by calculation.

The design effect coefficient is a statistic that reflects the design effect of samples in the sampling scheme. The design effect coefficient can be calculated by the following formula (Table 1):

$$deff = \frac{v(p_{prop})}{v(p_{srs})} \tag{2}$$

Through calculation, it can be obtained that the design effect coefficient of this study is 0.9707, and because it is consistent with the sampling design effect coefficient ($deff < 1$ of stratified random sampling) queried by Jin Yongjin's "Sampling Technology" (fifth edition), Therefore, our sampling design has better results in comparison.

3 Statistical Modeling Analysis

3.1 Cluster Analysis

During the survey, we found that college students' answers to the three indicators of "monthly disposable income", "average daily game frequency" and "average daily game time" were different, but after careful observation, there was a close correlation between the reasons for college students' choice. So we thought that we should be able to use the cluster analysis method to aggregate the three influencing factors to analyze the reasons.

Firstly, the data obtained from the survey were standardized and the optimal number of clusters was determined based on the Factoextra package of R language. The line chart of cluster number of college student esports players was drawn as shown in Fig. 1.

It can be found that the overall clustering into three categories is appropriate. Through cluster analysis, we divided college student esports users into three categories by three indicators: "monthly disposable income", "average daily game frequency" and "average daily game time". The clustering situation of college student esports users is shown in Fig. 2:

The final clustering results show that college students esports game groups cluster into three categories. In this study, the first category of college students esports game group is called "low consumption potential group", which has less disposable income per month, lower average daily game frequency and shorter average daily game time. The second category of college students E-Sports game group is called "medium consumption

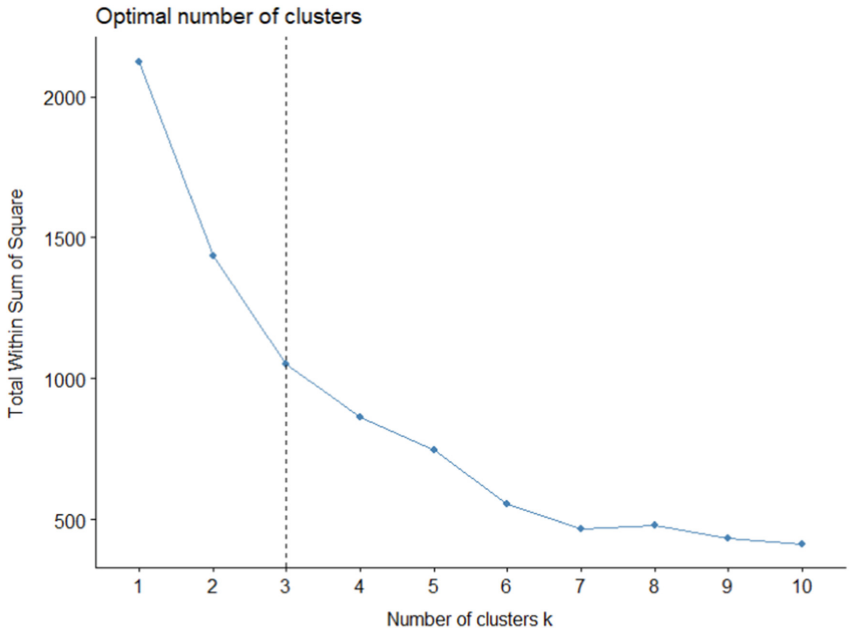

Fig. 1. Line chart of the number of clusters of college students' e-sports game crowd

potential group", which has a reasonable monthly disposable income, average daily game frequency and average daily game time. The third group of college students who play e-sports games is called "high consumption potential group". This group has more disposable income per month, higher average daily game frequency and longer average daily game time.

3.2 Text Sentiment Analysis

Before the analysis, we need to have a basic understanding of the situation of college student e-sports game participation crowd and the situation of college student e-sports game user payment crowd. In order to obtain the subjective emotional attitude of college students towards e-sports games and understand the subjective emotional tendency of college students towards e-sports games, we selected the text sentiment analysis based on SVM algorithm to analyze the evaluation text data set collected in this interview survey, and its optimal classification function formula is as follows:

$$\begin{cases} f(x) = \omega \cdot \varphi(x) + b = \sum_{i=1}^{N} \alpha_i y_i K(x_i, x) + b \\ y = sgn(f(x)) \end{cases} \tag{3}$$

In this study, a classifier composed of linear kernel, polynomial kernel and radial basis kernel of SVM algorithm was used to classify the sentiment of college students' e-sports crowd evaluation text data, and their classification performance was compared by MacP MacR and MacF.

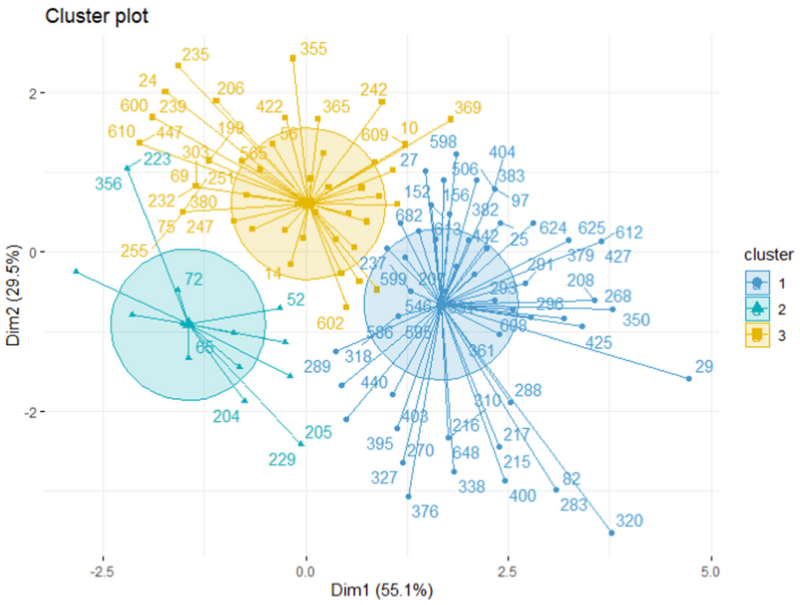

Fig. 2. Clustering diagram of college students' e-sports game crowd

Table 2. SVM classification effect table of kernel function

function	parameter	MacP	MacR	MacF
Linear kernel function	C = 14	82.65%	91.23%	86.72%
Polynomial kernel function	q = 3 C = 7	92.54%	81.32%	86.56%
Radial basis kernel function	σ = 0.3 C = 3	91.24%	90.17%	90.70%

It can be seen from Table 2 that the index data of radial basis kernel function are moderate, and the overall classification effect is the most stable, so the classification effect of SVM based on radial basis kernel is the best.

Based on the above classification results, it can be seen that the positive emotion of college students for e-sports games is mostly fanatical words, while the negative emotion of college students for e-sports games is mostly subjective words. Therefore, college students tend to have a variety of attitudes toward e-sports games.

4 Conclusion and Suggestion

In paid e-sports games, there are three user groups with high, medium and low consumption potential, and there are a wide range of consumer users. With the continuous increase of users' online time, the group of e-sports game participants is constantly expanding. In order to improve their gaming experience, college students' e-sports game users will

acquire game props through consumption. With the continuous optimization and quality improvement of e-sports games, the consumption potential of users is constantly improving, especially paid e-sports games can obtain a better gaming experience and have a broad mass base.

In the process of pricing, game operators conduct differentiated pricing according to the psychological expectations of different e-sports game players. For "whale players", that is, players who invest a lot of money in the game, because they have high payment expectations and ability to pay, the game pricing strategy should be targeted to design high psychological value (decorative and functional) Game items or game paid services and sell them at the price closest to their psychological expected threshold. For ordinary college students who are in the "long tail", they will not buy such high-priced items to show off their financial resources. What they are most concerned about is the cost-effectiveness of the items sold in the game. Therefore, on the premise of meeting the new needs of college students' e-sports, a new model of consumption has been guided by the development of a large number of new equipment, new skins, new badges, and more game currency.

Acknowledgements. This work was supported by the following projects: Suzhou College National Innovation and Entrepreneurship Training Program(202210379033); Suzhou College Provincial Innovation and Entrepreneurship Training Program(S202110379129); Suzhou College School-level innovation and entrepreneurship training program(ZCXM22–064); Anhui Province Social Science Innovation Development Research Project (2020CX104); Anhui Province Provincial Quality Engineering Project Key Teaching Research Project (2020jyxm2213); Suzhou University School-level Teaching Research Project (szxy2019jyxm02); Suzhou University Academic Technology Leader Reserve Candidate Project (2020XJHB06).

References

Ma Guangkun, Hu Shuai. Research on the influence of e-sports on the development of my country's sports economy [J]. Contemporary Sports Science and Technology, 2021,11(31): 223-226. DOI: https://doi.org/10.16655/j.cnki.2095-2813.2104-1579 -7019.

Riatti, Paolo, Thiel, Ansgar. The societal impact of electronic sport: a scoping review[J]. German Journal of Exercise and Sport Research, 2021(prepublish).

Lei Yuping, Pei Dechao. Research on the current situation and countermeasures of college students participating in e-sports [J]. Youth Sports, 2020(07):132-133.

Zhang Zheng. The influence of e-sports industry on "post-00s" college students' career choices [J]. Teaching and Educating People (Higher Education Forum), 2021(36):9-11.

D.E. Rae, C. Kemp, P.R. Pienaar. Brace yourselves: esports is coming[J]. South African Journal of Sports Medicine, 2020, 32(1):

Lian Zhongxing. Research on the Influencing Factors of College Students' E-sports Consumption Willingness [J]. Sichuan Sports Science, 2022, 41(01): 126-130. DOI: https://doi.org/10.13932/j.cnki.sctykx.2022.01.28.

Wang Yi. New regulations on mobile games raise the industry threshold [J]. Investment Beijing, 2016(8):43-45.

Li Lele. Research on Influencing Factors of Mobile Game Consumption Willingness [D]. Dongbei University of Finance and Economics, 2010.

Chen Mei, Wang Pan, Zhang Chenyang. An Empirical Study on Influencing Factors of E-sports Users' Consumption Behavior——Based on the Perspective of SOR Theory [J]. Journal of Sports Adult Education, 2021,37(05):23-31. DOI: https://doi.org/10.16419/j.cnki.42-1684/g8.2021.05.004.