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Relationship between Ice and Snow Sports Culture and Ice and Snow Sports Based on Mobile Big Data

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Abstract: Snow sports have gained popularity among the general public as a result of China's economy's recent steady growth and the Chinese people's continuously rising level of life. The issue of cultural development as it relates to the growth of snow sports is receiving more and more attention from society. The development of the individual cultural qualities of the athletes and the growth of sports culture can only be better encouraged by making sure that the cultural quality of the sports team can be improved in all areas. Only then would the snow sports be able to flourish. It is of great and far-reaching significance to maintain the leading position of China's snow sports in the world and to develop the healthy and sustainable development of China's sports. It is also of great significance to promote social stability and the construction of spiritual civilization as well as enhance the construction of a socialist harmonious society. This paper proposed to use the association rules in mobile big data to mine the relationship between sports culture and snow sports. This method is not only simple in operation but also more efficient. The experimental results of this paper have shown that the operating efficiency of the classic Apriori algorithm is about 50%, while the operating efficiency of the improved Apriori algorithm is about 90%. Therefore, in the comparison of operating efficiency, the improved Apriori algorithm is more advantageous by only 7%, indicating that the improved Apriori algorithm saves a lot of memory. After analyzing the relationship between sports culture and snow sports through Apriori algorithm, it is found that the relationship between the two is complementary and proportional.

1. Introduction

Due to the in-depth implementation of sports culture in China, the people's understanding of ice and snow art is deeper, creativity is also infinitely improved, and their enthusiasm for ice and snow art is improved. In the design stage of sports culture, attention should be paid to the characteristics

of art works, the vitality it possesses, and the epochal nature of the works. It should also pay attention to the distinctive design theme, fully attract the attention of the appreciator, and break the traditional design mode. Every ice and snow artist must create according to the above principles, reflecting the integration and cultural heritage of sports culture. Therefore, for the sports culture industry, it not only embodies art and sports activities, but also embodies a cultural phenomenon. It can not only inherit the cultural spirit but also inherit and realize the cultural essence. It reflects people's spirit of continuous innovation and leaps to a new level in the stage of conquering nature.

After the successful hosting of the Beijing Olympic Games, the development of China's snow sports has become a new historical starting point, which has further strengthened the cultural learning of ice and snow athletes, promoted the cultural construction of snow sports activities and gradually improved China's international status. snow sports athletes can become popularizers and creators of highly socialist culture in the gradual development, and become supporters and pioneers of the spirit of the times. Competitive sports have advanced and succeeded greatly with the ongoing development of China's political economy. National authorities place a high value on promoting ice and snow culture and are growing increasingly concerned with the growth of sports culture. The unique aspect of this research is the approach of association rules that is suggested to investigate the connection between sports culture and snow sports. This method is based on the background of mobile big data. To boost the method's performance, the Apriori algorithm is also enhanced.

2. Related Work

The popularity of mass ice and snow activities is on the rise in the twenty-first century. Snow sports have received a lot of attention recently for its benefits to both physical and mental health. This focus has been influenced by the harmonious growth of man and nature, the influence of ecological sports creativity, and the rejuvenation of people's health idea. According to Zhang L, the sports sector plays a significant role in both the national economic and social life. The development and advancement of the sports sector can be fueled by the arrival of the big data era by fostering scientific decision-making and creation of the sports and cultural relics industries. He combined data mining algorithms and data warehousing techniques such as fusion decision trees and Bayesian into the sports industry [1]. Escrivaboulley G chose clustered randomization controls to study the effects of a teacher professional development program based on self-decision theory to improve students' physical activity in physical education teaching, so as to improve motivational styles supported by primary teacher needs. The results showed that teachers in the therapeutic state increased support for students' psychological needs during most of the grade [2]. Hallmann K believed that e-sports is growing globally, with more and more people participating as players or spectators. He evaluated the five characteristics of sports and examined whether electronic snow sports can be regarded as sports according to the evaluation of sports [3]. Wang Y has established a big data analysis architecture for medical institutions. He identified 5 big data analysis functions from 26 big data cases [4]. Wang X found that the topic of how to effectively offload cellular traffic to device sharing is gaining traction. Users share content locally using wireless short-range communications. This not only has an excellent sharing experience, but also interesting and popular content is published with high precision and has strong social influence among friends [5]. Scholars believed that the connection between sports and other things can be mined through big data, and they thought that cultural factors in sports are very important. However, they have no specific investigative report to prove their point.

Association rules are also utilized to mine the relationship between cooperative data as mobile big data grows. The synergistic and complimentary features of big data and 5G wireless networks were first described by Zhang N. Big data makes use of diverse resources in 5G wireless networks,

including communication, caching, and computation, to support big data applications and services and meet big data requirements including capacity, speed, and diversity [6]. Chen Y discovered that low-level modeling is essential to machine learning and signal processing. Applications span from dimensionality reduction and adaptive filtering to collaborative filtering, video surveillance, medical images, and video surveillance, and their effective use can significantly decrease sensing, computation, and storage costs [7]. Al-Ali A R found that increasing energy costs and demands have led many organizations to look for smart ways to monitor, control and conserve energy. Smart energy management systems help reduce costs while meeting energy demands [8]. Duan M found that as datasets became more complex, extreme learning machines (ELMs) running in traditional serial environments would not be able to achieve fast and efficient functions. Three parallel sub-algorithms for big data categorization were included in his efficient ELM based on the Spark framework (SELM) [9]. Researchers have discovered that big data can resolve a wide range of challenging problems, increasing data processing efficiency and lowering computational costs. It is ideal if it is used to explore the connection between sports culture and athletics. However, the academics did not specify how to use it.

3. Association Rule Algorithm Based on Mobile Big Data

3.1. Problems Existing in Popular sports culture

Sports culture has strong regional characteristics and unique cultural attributes. The elements of sports culture are composed of cold climate and water resources. Because of the existence of ice and snow, people are constantly fighting with nature. The development of Xinjiang is diverse and multi-ethnic. In terms of spiritual nature, Xinjiang's culture is simple and vigorous. Throughout the history of development, the sports culture with northern characteristics has replaced the original traditionality by modernity, forming a unique natural landscape of ice and snow [10]. The expansion of the sports culture industry must be based on a new angle to shoot ice and snow art, so that the ice and snow art can be displayed in a new way to tap the infinite potential of human beings and to improve the creativity of human beings. Therefore, sports culture can represent a kind of human power. The items of snow sports are shown in Figure 1.

Figure 1. Items of snow sports

The emergence of an sports culture has also been hampered, as seen in Figure 1. The following

are the issues with current ice and snow sport culture:

(1) Governmental Efforts at Propaganda is Low

The culture of snow sports is its intangible asset, and it dominates and is relevant to the most well-known snow sports. It is impossible to deny the effect that sports culture has played in fostering the growth of these sports. The promotion of a vast number of snow sports-related industries likewise depends heavily on sports culture. However, China's existing snow sports cultural environment is far from adequate, and the cultural atmosphere of snow sports is not strong enough. Due to the lack of government propaganda of snow sports and the ineffective creation of snow sports cultural atmosphere, it is more difficult to attract people's attention. This is very detrimental to the development of public snow sports in China.

(2) Development of snow sports Lacks A Humanistic Foundation

The popularization of snow sports is the humanistic basis for the in-depth development of snow sports. At present, the number of people participating in snow sports in China is relatively small. On the one hand, because the professional snow sports teams have been shrinking in recent years, the number of athletes engaged in professional or amateur ice and snow training has also gradually decreased. On the other hand, there are fewer amateurs, and the popularity of snow sports is greatly reduced.

(3) Low Enthusiasm for Public Participation

None of the existing major ice and snow festivals is set up specifically to promote snow sports, or to focus on promoting snow sports. Local governments are slightly biased in the positioning and publicity of the ice and snow festival, focusing on attracting outside attention.

3.2. Association Rule Algorithm

Among the many mining methods of data mining, the mining method based on association rules is an important part and occupies a very important position in the field of data mining [11]. Association rule is a simple rule with high practical application value. The main task of association rule mining is to dig out implicit and useful connections from a large amount of messy data, such as supermarket shopping. Shopping malls can use the method of association rule mining to find out the preferences of customers for various commodities, thereby creating greater profits. Therefore, association rule mining plays an important role in the commercial field. The schematic diagram of the association rule is shown in Figure 2.

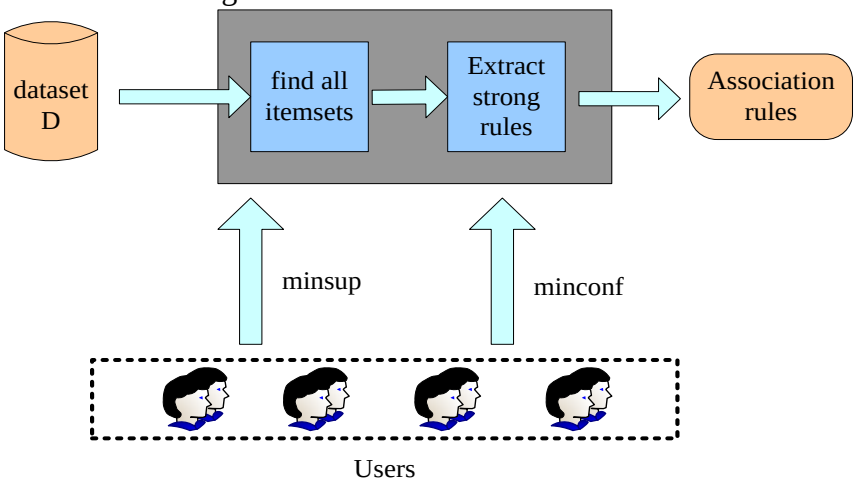


Figure 2. Schematic diagram of association rules

As shown in Figure 2: The association rule has two basic parameters: support and confidence. In

the transaction database M, there are $A \Rightarrow B$ establishments, in which both A and B are itemsets in M, also known as the transaction containing A at the same time and the frequency of B [12]. It is abbreviated as Formula 1:

$$s(A \Rightarrow B) = s(A \cup B) = P(A \cup B) \tag{1}$$

The confidence of an association rule refers to the existence of itemsets A and B, and the frequency of B appearing in the transaction containing A. It is abbreviated as Formula 2:

$$c(A \cup B) = P(A|B) \tag{2}$$

The item is the smallest unit in the database. It can not be divided and this paper usually use i to represent. The set composed of items and items is called itemset in this paper [13], as shown in Formula 3:

$$I = \{i_1, i_2, ..., i_k\} \tag{3}$$

Among them, I is an item set, how many items an item set contains, this article calls it several itemsets.

The data types of Boolean association rules are all discrete and typed, as shown in Formula 4:

$$T = \{t_1, t_2, ..., t_N\} \tag{4}$$

Support count is one of the important properties of itemsets, which can be expressed as Formula 5 by mathematical formula:

$$\sigma(A) = |\{t_i | A \subseteq t_i, \ t_i \in T\}| \tag{5}$$

Support is an important measure for association rules, because rules with low support are often viewed as incidental with little value and are generally not of interest. The higher the trust level of the rule, the higher the probability of showing B in the transaction containing A, and the higher the trust level of the association rule.

3.3. Apriori Algorithm Based on Association Rules

The Apriori algorithm uses an iterative process of layer-by-layer search to explore (k+1) itemsets with k itemsets [14]. First, each item is counted by scanning the database, and the item that satisfies the minimum support is found, which belongs to the L_1 frequent itemset. Therefore, L_1 can be used to locate the set of frequent itemsets L_2 [15]. Once there are no frequent k itemsets remaining, L_3 can be found using L_2, and a database scan must be performed to find L_k. The Apriori algorithm is shown in Figure 3:

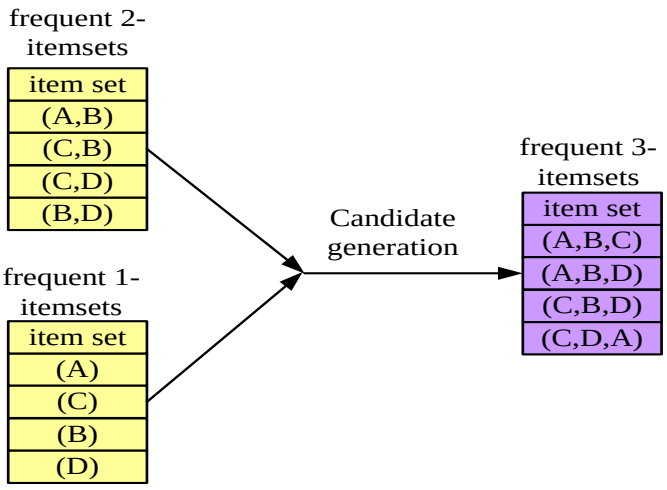


Figure 3. Apriori algorithm

As shown in Figure 3: When in the process using L_{k-1} to find the L_k, it includes a connection step and a pruning step. At the same time, prior properties are used to compress the search space to improve the efficiency of generating frequent itemsets [16].

According to the prior properties, if the itemset I does not meet the minimum support threshold, then Formula 6 can be obtained:

$$P(I)\,\pi\ \min\_\sup \tag{6}$$

If item A is added to itemset I, the result is also unlikely to be frequent. That is shown in Formula 7:

$$P(A \cup I)\,\pi\ \min\_\sup \tag{7}$$

When looking for L_k, L_{k-1} can be connected to itself and get a set of candidate k itemsets, denoted as c_k, as shown in Formula 8:

$$c_k = L_{k-1} \infty L_k \tag{8}$$

The generation of candidate itemsets can be achieved in many ways and the main method is brute force method, as shown in Formula 9:

$$a_i = b_i (i = 1,2,3,\ldots,k-2) \tag{9}$$

3.4. Improvement of Apriori Algorithm in Association Rules

The traditional Apriori algorithm has certain advantages, but the space complexity is very large. Using the two theorems of the connection step and the verification step, if a particular item set is not a frequent items set, the set can be deleted directly [17-18]. The algorithm is also very effective for data mining of association rules with short patterns. The idea of the algorithm is simple, the operation is also very easy, and there is no need for complex formula derivation. However, when dealing with large-scale databases, the mining efficiency of the algorithm is significantly reduced.

The classical Apriori algorithm is improved by using the above properties of association rules. In the whole process of verifying the candidate itemsets, only one L_{k-1} scan is performed, which

greatly improves the operation efficiency of the algorithm [19].

First, the transaction data in the transaction database D is stored as a matrix structure, as follows: among them, the transaction is represented by T, and the itemset is represented by I, as shown in Formula 10:

$$D=\begin{bmatrix} T_1 & T_1 & ... & T_n \\ d_{11} & d_{11} & ... & d_{1n} \\ d_{21} & d_{22} & ... & d_{1n} \\ d_{m1} & d_{m2} & ... & d_{mn} \end{bmatrix} \tag{10}$$

Among them:

$$d_{ij}=\begin{cases} 0, I_i \neq T_j \\ 1, I_i = T_j \end{cases} \tag{11}$$

The columns in the above matrix D correspond to the transactions in the transaction database D. For example, the corresponding matrix D of T_1 and T_2 can be expressed as Formula 12:

$$D=\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \tag{12}$$

After the transactions in the transaction database are converted into a matrix storage form, the total number of values in each row is the support count of itemset I, so it can be quickly found from the frequent single item matrix set in transaction set D [20]. The row vector D_i of the above matrix is Formula (13):

$$D_i=(d_{i1}, d_{i2},..., d_{in}) \tag{13}$$

Then the above matrix D can be expressed in the following form:

$$D=\begin{bmatrix} D_1 \\ D_2 \\ ... \\ D_m \end{bmatrix} \tag{14}$$

According to the mathematical definition, the inner product of vectors D_i and D_j can also be called the product of vector operations, but the result is not a vector but a specific value. The formula is represented by Formula 15:

$$\lfloor D_i, D_j \rfloor = d_{i1} \times d_{j1} + d_{i2} \times d_{j2} + ... + d_{in} \times d_{jn} \tag{15}$$

It can be seen that instead of scanning all transactions in the transaction database, it is only necessary to scan the rows corresponding to each candidate itemset in order to use the transaction vector matrix to calculate the support of the candidate itemsets. The operation is relatively easy to implement and takes very little time. This strategy greatly reduces the number of candidate item sets that must be considered, because as the algorithm runs further, there are fewer of them and the process is simpler. The overhead required to compute the support of the statistical candidate

itemsets effectively reduces the running time of the algorithm and increases the speed.

3.5. Relationship between Sports Culture and Snow Sports

(1) Sports culture is the Premise of snow sports

It represents the process of human exploration, showing the great spirit of human adventure and reflecting the interaction between humans and nature. Therefore, when designing ice and snow art works with the theme of sports culture and elements, the sports culture should be payed attention to. Combining with the local landscape, unique works can be created. The constructed public space reflects openness and public participation, which fully conforms to the purpose of environmental design. It reflects the cultural content of the ice and snow landscape and conforms to the national culture of the region.

(2) Snow sports are the Continuation of sports culture

In the future, the development direction of sports culture is to expand the sports culture industry in depth. In order to truly protect the brand of ice and snow art in the expansion of the sports culture industry, it is only necessary to extensively learn from experience, gather the strengths of everyone, formulate regulations and standardize management, can the spiritual wealth of the city be increased, and local cultural concepts can be expressed on a positive basis. Therefore, expanding the sports culture industry is a necessary environment for both art and culture. In other words, a city can only truly think if it has superior public art. At present, China has a shortage of resources and serious environmental pollution. Therefore, the concept of ecological civilization must be changed, that is, to achieve sustainable development in harmony with nature. Only in this way can the ice and snow industry drive the development of Xinjiang, and the people can do their best to build a beautiful sports culture.

4. Development Based on the Snow Sports and the Experiment of Apriori Algorithm

4.1. Development and Status Quo of Sports Culture and Snow Sports

Since the 1950s, the development of skiing events has begun to rise around the world. Among them, European and American countries have begun to build ski resorts on a large scale, and design tourism products for skiing projects accordingly. Therefore, European and American countries have an early history of development, and the scale has begun to take shape, thus forming a relatively sound ice and snow tourism industry chain. Since the 21st century, China's ice and snow tourism industry has gradually developed. So far, China can obtain tens of billions of dollars in economic benefits every year by relying on the ice and snow industry chain. China's economic development has also changed the consumption patterns of residents. Therefore, snow sports no longer serve the upper class, but have been widely promoted among ordinary residents, and have a good market development prospect in China. The development of snow sports in recent years is shown in Figure 4:

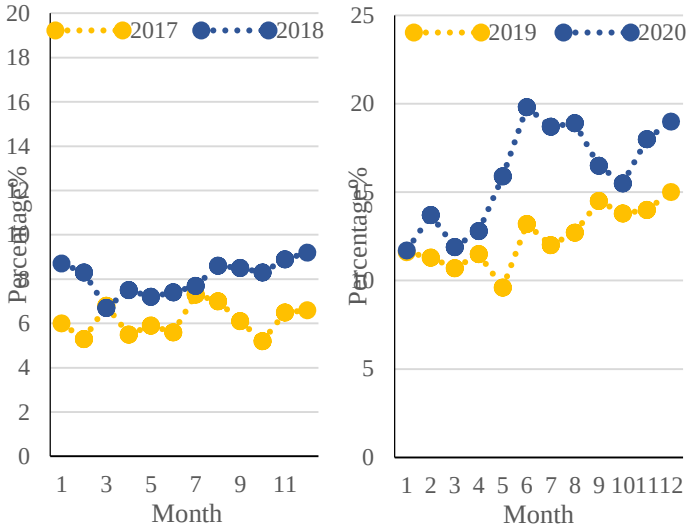


Figure 4. Development of snow sports from 2017 to 2020

As shown in Figure 4: From 2017 to 2020, snow sports have been on an upward trend. Only by improving the cultural creativity of human beings can a cultural power be created. Therefore, the ecological development of the entire industry can only be realized by dedicating to promoting the ice and snow art culture and paying attention to the ecological concept in the development of the sports culture and art industry. In addition, on the basis of the current ice and snow art model, under the guidance of ecological culture, efforts should be made to find the balance of the ecosystem. It aims to achieve zero pollution and zero emissions in the process of economic production with the least capital, as well as take into account the ecological efficiency, economic efficiency and social efficiency of productivity to maintain the stable development of human society.

Under the situation of China's "national system", most parents or coaches sent the snow sports athletes to the corresponding sports schools, so that they only focus on training and lack of cultural learning at a very young age. However, for elite athletes of different ages and belonging to special groups, there are many deficiencies and deficiencies in the implementation of cultural education. From a pedagogical point of view, the learning of youth culture courses should pay attention to the stages and imbalances of its education. Education should be carried out in stages according to the characteristics of different age groups, and grasp the physical and mental development of athletes in different age groups during the critical period, and the education of cultural and professional skills should be carried out in a targeted manner.

This paper selected 60 snow sports athletes as the survey objects, and their basic information is shown in Table 1:

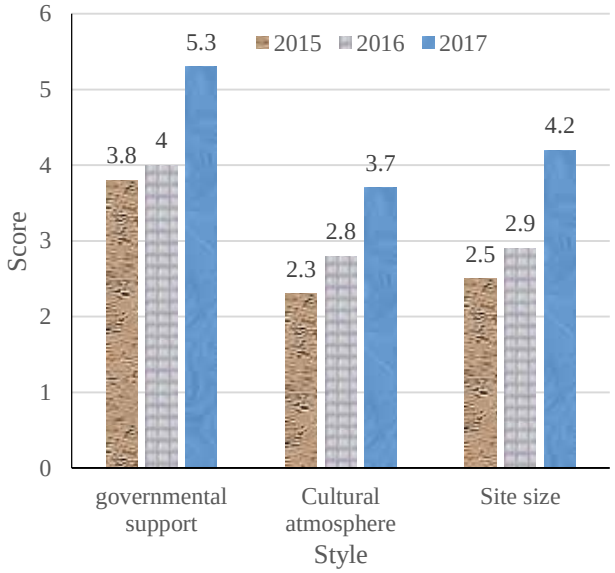
Table 1. Age distribution of athletes on sports teams

Index	Index	Number of people	Percentage
Gender	Male	35	58%
	Female	25	42%
Age	10-15	13	21%
	16-21	22	36%
	22-27	25	43%

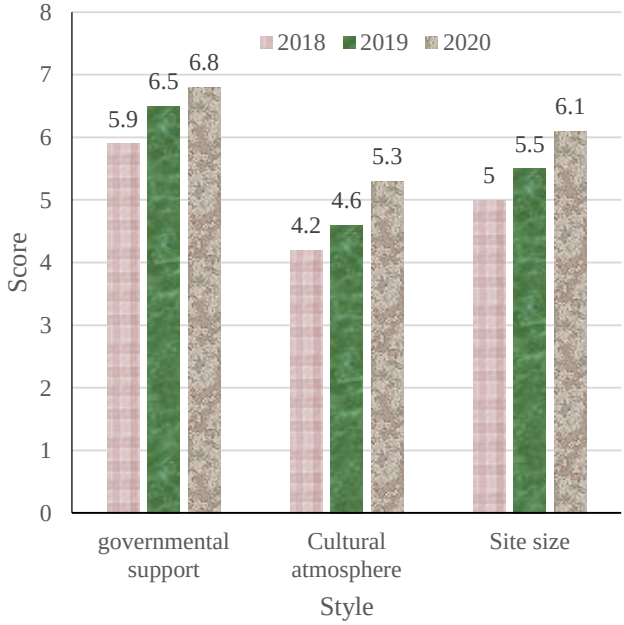
As shown in Table 1: the age of athletes is mainly concentrated between 16 and 26 years old, and this period is the time period from high school to college graduation in terms of ordinary students.

However, for athletes, during this period, they not only have to undertake the mission of winning glory for the country on the sports field, but also carry out cultural learning to increase their cultural knowledge and the development of comprehensive quality. Therefore, when the inconsistency between the athletes' sports training and education problems is very obvious, it can lead to the increase of the athlete's own pressure, which would affect the training and fail to achieve the desired effect.

The survey results of the problems existing in the development of snow sports are shown in Figure 5:



(a) Factor scores in the development of snow sports from 2015 to 2017



(b) Factor scores in the development of snow sports from 2018 to 2020

Figure 5. Factor scores in the development of snow sports

According to Figure 5: Figure 5(a) shows how the factor scores for the growth of snow sports

from 2015 to 2017 are extremely low, generally below 5 points; Figure 5(b) shows that despite improvements, the factor scores for the growth of snow sports from 2018 to 2020 are still not very high. Therefore, it is clear that there is a lack of social and cultural foundation for snow sports, as well as a lack of policy direction and financial support from the government. Ski resorts and ice skating rinks are small in scale, and the internal and surrounding supporting facilities are not perfect.

This article then asked 60 respondents whether they think the government attaches importance to the development of sports culture in sports, as shown in Table 2:

Table 2. Government attaches great importance to sports culture

Degree of importance	Number of people	Percentage%	Effective percentage%
Very concerned	27	45%	45%
More attention	15	25%	25%
Disregard	12	20%	20%
Very little attention	6	10%	10%

According to Table 2: For the 60 respondents, 27 thought the government gave sports culture little attention, 15 thought it attached relatively, 12 thought it did not attach, and 6 thought it gave sports culture without a lot of attention. It is clear that the majority of the investigators thought the government did not value the culture of snow sports.

The motivation to participate in snow sports concludes strengthening the body, promoting personality, soothing nerves, prolonging life, purifying the mind, cultivating sentiment and repaying the society. It not only promotes the harmonious development of one's own body and mind, but also promotes mutual trust and understanding between people and promotes social harmony in the interactive process of snow sports. The motivation for participating in snow sports is shown in Table 3:

Table 3. Motivation for participating in snow sports

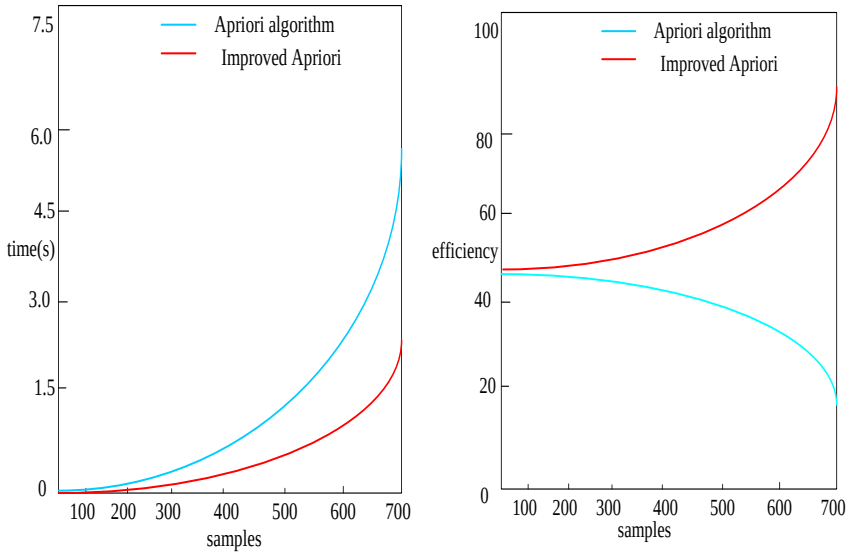
Motivations	Number of people	Percentage%	Effective percentage%
Improve technology	15	25%	25%
Meet new friends	19	31%	31%
Influence the others	11	18%	18%
Experience stimulation	15	26%	26%

As shown in Table 3: The main motivations for ski enthusiasts to participate in snow sports are improving skills, making new friends, influencing people around them and experiencing more new

and exciting snowfields. This reflects that skiing is being recognized by more and more people. People enjoy the physical and mental pleasure during the skiing process and increase social opportunities, showing their personal charm in the process of challenging different venues and enhancing their self-confidence in the process of being skilled. snow sports is not only a sport, but also a medium for the dissemination of sports culture with huge development space.

4.2. Experimental Comparison of Apriori Algorithm before and after Improvement

In order to prove the effectiveness and execution efficiency of the improved Apriori algorithm, this paper used experiments to analyze. This experiment is based on the PC system environment. At the same time, 700 data records of an snow sports cultural center were selected for the experiment. The running time and efficiency obtained through experiments are shown in Figure 6:



(a) Running time of Apriori algorithm before and after improvement

(b) Running efficiency of Apriori algorithm before and after improvement

Figure 6. Comparison of running time and efficiency of Apriori algorithm before and after improvement

As shown in Figure 6: From Figure 6(a), it can be found that the running time of the Apriori algorithm before the improvement is not very different from the running time of the Apriori algorithm after the improvement, but with the increase of the transaction set, the two algorithms gradually widen the gap. From Figure 6(b), it can be found that the efficiency of the improved algorithm has indeed improved, and with the increase of the transaction set,it has become more obvious. Compared with the classic Apriori algorithm, the improved Apriori algorithm has a relatively large progress, and it mines rules faster.

Several experiments have been carried out in this paper to evaluate the performance of our scheme. Different support values are set in the execution experiments, because with different support values, the number of frequent itemsets is different. The running time and memory consumption are affected by the support degree value. The memory consumption comparison of the Apriori algorithm before and after the improvement is shown in Figure 7:

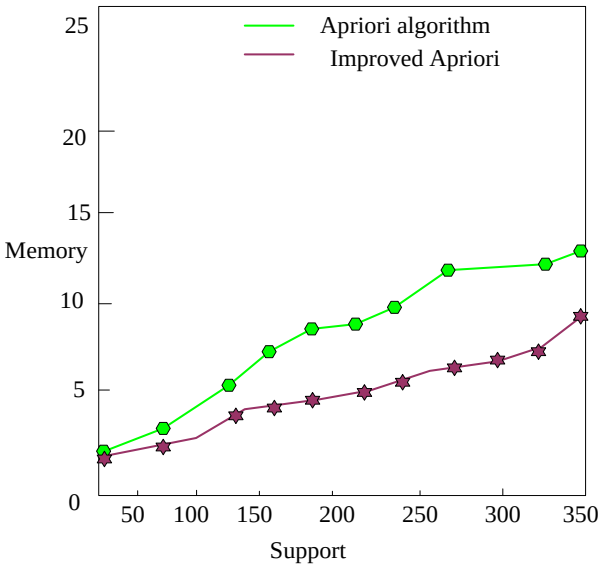


Figure 7. Comparison of memory consumption of Apriori algorithm before and after improvement

As shown in Figure 7: the memory consumption of the Apriori algorithm is the highest among all levels of support because it generates candidate itemsets. The memory consumption of the improved Apriori algorithm is lower, because with the increase of support, it is possible to find the largest item set whose repetitions are greater than the lowest support, so its performance is better. Since the Apriori algorithm only stores and processes non-zero entries, it can take advantage of pruning most of the frequent itemsets in the first few stages.

4.3. Taking a Variety of Measures to Create a Cultural Atmosphere of Snow Sports

(1) Developing Stronger Connections and Partnerships with Other Provinces to Advance Ice and Snow Sports

The government should actively encourage and develop interactions, collaboration, and learning in ice and snow sports among Chinese cities. The ice and snow sports department must develop full interaction with numerous social institutions and strata in order to reap the benefits of ice and snow sports in China in terms of both health and economic growth. Communication and exchanges should be strengthened between cities and provinces, and it may be considered to hold regular municipal, provincial and national snow sports industry conferences to learn from each other's successful experience and enhance understanding. To jointly understand the development context of ice and snow sports and to create new prospects for their development through various levels and varied approaches, and the relevant factors of their development should be examined in depth.

(2) Ice and Snow Festival Should Increase the Participation Rate of the Local People

The current ice and snow festivals in China are primarily meant to promote ice and snow tourism and draw in other countries' investment and tourists. In terms of China, all of the northern provinces have ski areas and ice skating rinks. Which ski resort to visit is variable and unsure if participants only wish to engage in ice and snow activities. The development momentum of ice and snow sports in China cannot be guaranteed to remain strong by relying solely on these activities. Simply highlighting how important sports are won't help the ice and snow business as a whole grow. It is preferable to focus more on growth rather than relying simply on athletics.

5. Conclusion

With its distinctive attitude, the start of the 2022 Beijing Winter Olympics has increased the allure of ice and snow sports. Ice and snow sports have risen to prominence in various sports activities against the backdrop of national fitness initiatives, and many young people want to master these talents. The indoctrination of ice and snow sports culture, however, is lacking in the growth of these sports. People assume that there is little connection between ice and snow sports culture and ice and snow sports because they are unaware of it. This study aimed to demonstrate how ice and snow sports culture can aid in the growth of ice and snow sports. It tried to mine the connection between the two through association rules to draw scientific conclusions and make snow sports get sustainable development. This paper proposed the classic Apriori algorithm and improved it, which improved the mining efficiency of the classic Apriori algorithm and reduced the memory consumption. In order to prove that the improved Apriori algorithm has advantages, this paper conducted a well-founded analysis in the experiment, and finally drew a conclusion. However, only 700 data sets were tested in the experiment, which may make the experimental results unreliable, so it is necessary to expand the data set to obtain more rigorous results in future work.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

References

[1] Zhang L. Design of a sports culture data fusion system based on a data mining algorithm. Personal and Ubiquitous Computing. (2020) 24(1): 75-86. https://doi.org/10.1007/s00779-019-01273-6

[2] Escrivaboulley G, Tessier D, Ntoumanis N. Need-supportive professional development in elementary school physical education: Effects of a cluster-randomized control trial on teachers' motivating style and student physical activity. Sport, Exercise, and Performance Psychology. (2018) 7(2): 218-234. https://doi.org/10.1037/spy0000119

[3] Hallmann K, Giel T. eSports Competitive sports or recreational activity. Sport Management Review. (2018) 21(1): 14-20. https://doi.org/10.1016/j.smr.2017.07.011

[4] Wang Y, Kung L A, Byrd T A. Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations. Technological Forecasting & Social Change. (2018) 126(JAN.): 3-13. https://doi.org/10.1016/j.techfore.2015.12.019

[5] Wang X, Zhang Y, Leung V, Guizan Ni, Jiang T. D2D Big Data: Content Deliveries over Wireless Device-to-Device Sharing in Large Scale Mobile Networks. IEEE Wireless Communications. (2018) 25(1): 32-38. https://doi.org/10.1109/MWC.2018.1700215

[6] Zhang N, Yang P, Ren J. Synergy of Big Data and 5G Wireless Networks: Opportunities, Approaches, and Challenges. IEEE Wireless Communications. (2018) 25(1): 12-18. https://doi.org/10.1109/MWC.2018.1700193

[7] Chen Y, Chi Y. Harnessing Structures in Big Data via Guaranteed Low-Rank Matrix Estimation. IEEE Signal Processing Magazine. (2018) 35(4): 14-31. https://doi.org/10.1109/MSP.2018.2821706

[8] Al-Ali A R, Zualkernan I A, Rashid M, R Gupta, M Alikarar. A smart home energy management system using IoT and big data analytics approach. IEEE Transactions on Consumer Electronics. (2018) 63(4): 426-434. https://doi.org/10.1109/TCE.2017.015014

[9] Duan M, Li K, Liao X. A Parallel Multiclassification Algorithm for Big Data Using an Extreme Learning Machine. IEEE Transactions on Neural Networks & Learning Systems. (2018) 29(6): 2337-2351. https://doi.org/10.1109/TNNLS.2017.2654357

[10] Neggers J, Allix O, Hild F. Big Data in Experimental Mechanics and Model Order Reduction: Today's Challenges and Tomorrow's Opportunities. Archives of Computational Methods in Engineering. (2018) 25(1): 143-164. https://doi.org/10.1007/s11831-017-9234-3

[11] Hourcade J P, Zeising A, Antle A N. Child-computer interaction, ubiquitous technologies, and big data. Interactions. (2018) 25(6): 78-81. https://doi.org/10.1145/3274572

[12] Al-Salim A M, El-Gorashi T, Lawey A Q, Elmirghani JMH. Greening Big Data Networks: The Impact of Veracity. Iet Optoelectronics. (2018) 12(3): 126-135. https://doi.org/10.1049/iet-opt.2016.0165

[13] Maldonado-Mahauad J, Perez-Sanagustin M, Kizilcec R F, Morales Nicolas, Gama M. Mining theory-based patterns from Big data: Identifying self-regulated learning strategies in Massive Open Online Courses. Computers in Human Behavior. (2018) 80(MAR.): 179-196. https://doi.org/10.1016/j.chb.2017.11.011

[14] Cen Chen, Kenli Li, Aijia Ouyang, et al. FlinkCL: An OpenCL-Based In-Memory Computing Architecture on Heterogeneous CPU-GPU Clusters for Big Data. IEEE Transactions on Computers. (2018) 67(12): 1765-1779. https://doi.org/10.1109/TC.2018.2839719

[15] Khan S, Shakil K A, Alam M. Cloud based Big Data Analytics: A Survey of Current Research and Future Directions. Computer Science. (2018) 03(5): 107-117.

[16] Jeble S, Dubey R, Childe S J, et al. Impact of Big Data & Predictive Analytics Capability on Supply Chain Sustainability. The International Journal of Logistics Management. (2018) 29(2): 00-00. https://doi.org/10.1108/IJLM-05-2017-0134

[17] Zhang Y, Mi Z. Environmental benefits of bike sharing: A big data-based analysis. Applied Energy. (2018) 220(JUN.15): 296-301. https://doi.org/10.1016/j.apenergy.2018.03.101

[18] Begenau J, Farboodi M, Veldkamp L. Big Data in Finance and the Growth of Large Firms. Journal of Monetary Economics. (2018) 97(AUG.): 71-87. https://doi.org/10.1016/j.jmoneco.2018.05.013

[19] Xu W, Zhou H, Cheng N. Internet of Vehicles in Big Data Era. IEEE/CAA Journal of Automatica Sinica. (2018) 5(1): 19-35. https://doi.org/10.1109/JAS.2017.7510736

[20] Ming Z. Research on the Transmission Mode of National Traditional Sports Culture from the Perspective of Intangible Cultural Heritage Protection. International Core Journal of Engineering. (2020) 6(5): 84-87.