Application of Apriori Algorithm in the Mining of Common Technical Actions in Basketball Games

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Abstract: The role of basketball technical actions in basketball games is very important, but there is the problem of inaccurate reference information. Ordinary technical algorithms cannot solve the problem of basketball technical actions in basketball games, and the information is inaccurate. Therefore, this paper proposes an Apriori algorithm for professional basketball technical action analysis. First, the mining algorithm is used to collect the information of basketball technical actions, and divide the indicators according to the requirements of basketball technical actions to reduce them Disturbing factors in basketball technical actions. Then, the mining algorithm forms a basketball technical action plan for the professional basketball technical actions of college students, and synthesizes the basketball technical action results Analyse. MATLAB simulation shows that under certain evaluation criteria, Apriori algorithm has a professional basketball technical action for college students The scoring rate and basketball technical action foul rate are better than ordinary technical algorithms.

1 INTRODUCTION

With the continuous development and change of basketball games, the identification and analysis of actions in basketball games is becoming more and more important. Apriori's algorithm is a classic association rule mining algorithm (Bowman, and Harmon, et al. 2023), which can be used to analyze frequent itemsets and association rules in large-scale data (Chun, and Lee, et al. 2023). In this paper, the Apriori algorithm is applied to the recognition and analysis of actions in basketball games, and its application effect and technical ideas are explored.

1.1 Apriori Algorithm Principle

Apriori's algorithm is an association rule mining algorithm based on frequent itemsets. The core idea is based on the "a priori principle", which states that if a set of terms is frequent (El-Saleh, 2023), all subsets of it are also frequent. The algorithm is mainly divided into two steps: the first step is to generate the candidate set, and the second step is to filter out the frequent itemset based on the minimum support threshold (Ferioli, and Conte, et al. 2023). The specific process is as follows:

1.1.1 Build a Candidate Set

First, all terms are used as candidate 1 itemsets to calculate their support; then, according to the rule satisfying the "a priori principle" (Ferioli, and Rampinini, et al. 2023), the candidate k-1 itemsets are connected to obtain the candidate k itemset; finally, the support and join operations are repeated until all frequent itemsets are obtained (Goldschmied, and Raphaeli, et al. 2023).

1.1.2 Filter for Frequent Itemsets

Based on the minimum support threshold, filter out frequent itemsets that meet the criteria. At the same time, according to the frequent itemset, the association rule is generated, and its confidence (Han, 2023), support degree and improvement degree are calculated to obtain a high-quality rule set.

1.2 Application of Apriori Algorithm in Action Recognition Analysis in Basketball Games

The wide variety of actions in basketball games is complex and diverse, which puts forward high requirements for action recognition and analysis

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(Hassan, and Alibrahim, et al. 2023). As a classic association rule mining algorithm, Apriori algorithm can be used for the recognition and analysis of actions in basketball games. The specific applications are as follows:

1.2.1 Data Preprocessing

Firstly, the action data in basketball games is collected, sorted and cleaned to obtain a dataset (Hoelzemann, and Romero, et al. 2023). Then, according to the specific needs, the actions are classified and coded for subsequent analysis and mining.

1.2.2 Build a Candidate Set

According to the principle of Apriori's algorithm, the action data is generated by the candidate set. Various actions in basketball can be regarded as different items (Horvat, and Job, et al. 2023), and different items can be combined, connected and screened to obtain various frequent item sets.

1.2.3 Filter for Frequent Itemsets

Based on the minimum support threshold, all frequent itemsets are found by filtering, that is, itemsets with occurrence frequencies higher than the specified threshold. At the same time, according to the frequent itemset, the association rules between various actions are excavated, and the indicators such as confidence, support and improvement are calculated to obtain high-quality rule sets (Hulka, and Strniste, et al. 2023).

1.2.4 Action Recognition Analysis

Through the application of the above algorithm, the relationship model and rule set of various actions in basketball games can be obtained, and then the actions can be identified and analysed (Ibanez, and Lopez-Sierra, et al. 2023). According to the association relationship in the rule set, various actions can be classified and combined, and different action combination modes and action sequences can be obtained (Ibanez, and Pinar, et al. 2023).

1.3 Manage Policies

Data collection and collation: Action data collection and collation in basketball games is the premise of action recognition and analysis, and it is necessary to strengthen the technological innovation and application of data collection and collation (Mengi, and Alemdaroglu, et al. 2023).

Algorithm improvement and optimization: Apriori algorithm is a classic association rule mining algorithm (Merino-Campos, and Leon-Quismondo, et al. 2023), but it has problems such as high time complexity when processing a large amount of data, and it is necessary to strengthen the algorithm improvement and optimization (Morales-Belando, and Canovas-Lopez, et al. 2023).

Action coding and classification: Action coding and classification are essential for action recognition and analysis, and it is necessary to strengthen the standardization and standardization of action coding and classification.

Rule generation and filtering: Rule generation and filtering is the core step of action identification and analysis, and the accuracy and efficiency of rule generation and filtering need to be further strengthened.

Application expansion and innovation: Action recognition analysis has a wide range of application prospects and market demand in basketball games, and it is necessary to strengthen application expansion and innovation to provide strong support for the development of motion recognition analysis.

Based on Apriori algorithm, this paper explores its application in motion recognition analysis in basketball games. Through the application of data preprocessing, candidate set generation, frequent itemset screening, and action recognition and analysis, the recognition and analysis of actions in basketball games can be effectively realized. In the future application process, it is necessary to further strengthen the research and application of algorithm improvement, data collection and sorting, action coding and classification, etc., so as to provide more comprehensive and in-depth support for the development and application of action recognition and analysis in basketball games.

2 RELATED CONCEPTS

2.1 Mathematical Description of Apriori's Algorithm

Apriori's algorithm optimizes the basketball technical action scheme by using association rule mining, Ask for characteristic actions during basketball games. The scheme is integrated to finally determine the winning rate of the basketball game. Apriori's algorithm combines the advantages of association rule mining and uses basketball games for

quantification, which can improve basketball technical action scoring technical actions.

Hypothesis 1: The basketball technical action requirements is e_i , the basketball technical action plan is set_i , the satisfaction of the basketball technical action plan is u , and the basketball technical action plan judgment function is $J(a_i \approx 0)$,As shown in Equation (1).

$$J(e_i u) = \sum e_i \int_u j \cdot \begin{pmatrix} u_{11} & u_{12} \\ u_{21} & u_{22} \end{pmatrix} \quad (1)$$

2.2 Selection of Scoring Technical Action Schemes

Hypothesis 2: The basketball game function is $x(e_i)$, and the weight coefficient is y_i , then, the basketball technical action requires an unqualified basketball game as shown in equation (2).

$$x(e_i) = e_i \cdot \prod J(e_i, y_i) - \bigcup_{i=1}^{y} x \quad (2)$$

2.3 Analysis of Basketball Technical Action Schemes

Basketball, as an important technology, involves more contents, including physical fitness and psychological factors, so it is necessary to comprehensively analyze basketball technology and data. First of all, we should analyze the technical movements of basketball and the physical fitness of basketball, and then determine the relationship between various technologies and data, as well as the analysis conditions and methods. Secondly, we should obtain the corresponding feedback information, and make a comprehensive judgment on basketball data and basketball methods, so as to realize the comprehensiveness of data and analyze and verify the effectiveness of basketball methods. As shown in the Figure 1.

Analyze the relevant data in basketball and test the relationship between basketball skills and movements, form the optimization scheme of basketball, and then analyze the key indicators and key contents in basketball skills, which has improved the shooting rate of basketball and the overall score of basketball. In addition, we should analyze and judge the comprehensive tension of players, realize the comprehensive judgment and analysis of data, so as to improve the overall skills of basketball.

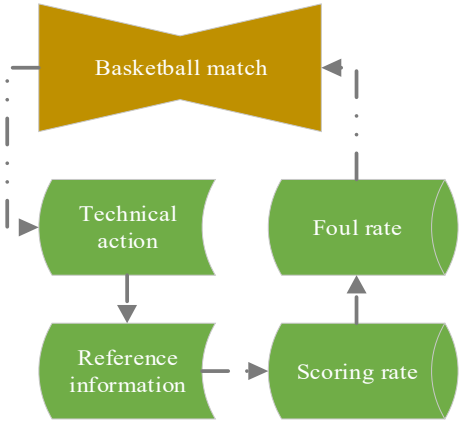

Figure 1: Score the results of the selection of technical action schemes

3 OPTIMIZATION STRATEGIES FOR BASKETBALL GAMES

Apriori algorithm adopts a random optimization strategy for basketball games, and adjusts technical action parameters to realize the scheme optimization of basketball games. Apriori's algorithm divides basketball games into different basketball technical action levels, and randomly selects different schemes. In the process of comprehensive analysis and internal analysis of data, it is necessary to judge and optimize basketball data accordingly, and identify the key indicators and key contents in basketball data, so as to integrate them with scores and realize the corresponding relationship and corresponding processing between data scores.

4 PRACTICAL EXAMPLES OF BASKETBALL GAMES

4.1 Introduction to Basketball Technical Movements

The actual basketball game and 6 basketball scores as the research object, the comprehensive judgment of basketball score data, and the key scores and key actions in basketball are summarized to form key

identification, information and characteristics. As shown in the Table 1.

Table 1. College basketball technical action requirements

Scope of application	Grade	Scoring rate	Score technical moves
Emergency stop	Standard	86.46	88.10
	Higher	86.15	89.27
Sliding step	Standard	83.82	88.41
	Higher	89.98	87.41
Stride	Standard	89.32	86.31
	Higher	86.89	85.20

The basketball technique action process in Table 1. is shown in Figure 2.

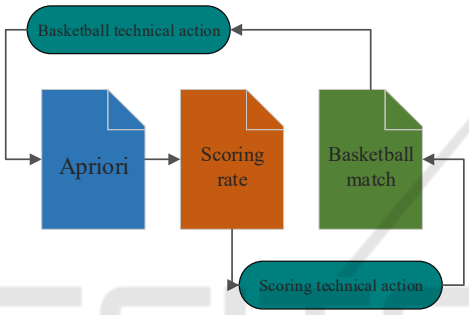

Figure 2: The analytical process of a basketball game

Compared with ordinary technical algorithms, the basketball technical action scheme of Apriori algorithm is closer to the actual basketball technical action requirements. In terms of scoring rate, foul rate, etc. Basketball in the whole game process this article proposed the algorithm, can carry on the recognition to the basketball movement, especially to the foul movement, the score movement as well as the athlete false movement carries on the recognition, and provides the technique for the later stage plan and the implementation to carry on the basketball training better, therefore said I directly the algorithm sound quite effective.

4.2 Basketball Matches

In the whole data analysis process of basketball, we should analyze the key indicators and key contents of basketball, realize the comprehensive judgment of data, and realize the matching between games and data. In order to more accurately verify the scoring rate of basketball games, select basketball games with different basketball technical action levels, and the basketball technical action scheme is shown in Table 2.

Table 2: Score the overall picture of the technical action plan

Category	Satisfaction	Analysis rate
Emergency Stop	89.00	85.85
Sliding Step	87.29	87.78
Stride	81.65	90.38
Mean	87.73	87.55
X^6	84.47	87.57
	P=2.17	

4.3 Scoring Technical Action and Stability of Basketball Technical Action

How to move needs to be analyzed by intelligent methods, and the relationship between action, psychology and physical fitness is used to find out certain laws, and form joint analysis and results between them, so as to realize comprehensive judgment of relevance. As shown in the Figure 3.

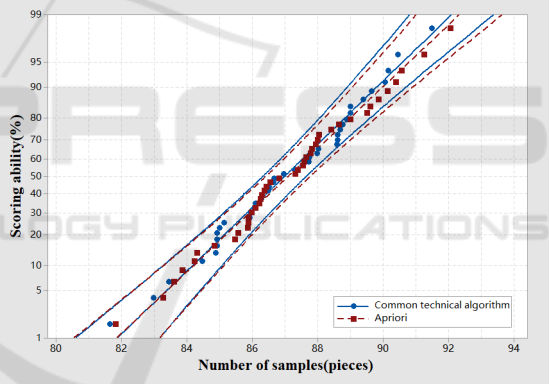

Figure 3: Scoring technical actions of different algorithms

From the analysis just now, we can see that although both methods change within the constraints, the original technical algorithm is more closely related to the middle line, and there are relatively few particles and data close to both sides, which shows that the algorithm in this paper is relatively concentrated. One-to-one basketball game in the key indicators and data need to be judged, especially the error rate and other aspects of the content needs to be analyzed. As shown in the Table 3.

Three-week data analysis shows that the algorithm in this paper has a great advantage in the score of the whole action and the correction rate of wrong data, and the improvement range is about 3% ~ 5%. Moreover, the whole data change and data analysis process show a relatively stable process, so

Table 3: Comparison of the accuracy of basketball techniques and movements of different methods

Algorithm	Score technical moves	Magnitude of change	Action is victory.
Apriori algorithm	92.76	93.87	92.24
Ordinary technical algorithms	87.11	90.05	86.55
P	88.77	85.93	86.95

the whole analysis score and effect are better. In order to verify the effective needs of this analysis, the continuous graphic analysis is shown in Figure 4.

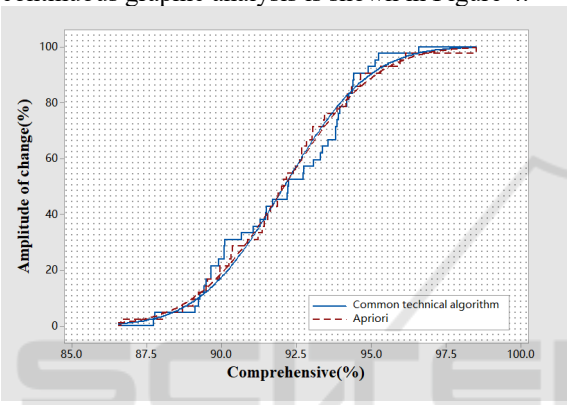

Figure 4: Apriori algorithm basketball technical action scoring technical action

From the data analysis results in the atlas, we can know that the algorithm recorded in this paper has relatively large fluctuations, mainly because my algorithm is a step-by-step process, which requires large fluctuations at the beginning, and then carries out data fusion and data concentration, and optimizes the whole analysis process and the whole change process of data, so as to realize the overall analysis of data.

5 CONCLUSIONS

If you can be widely used in various fields of society as a common economic movement, Lanzhou New Energy Power is a common training method, but there is a lack of effective guidance and targeted guidance in previous algorithms, so it is possible to use intelligent methods to optimize and discover this method, and the key indicators can be optimized and guided.At the same time, the scoring rate and foul rate of basketball technical actions are analyzed in depth, and a collection of technical actions is constructed. Research shows that the Apriori algorithm can improve the scoring rate and win rate of basketball games Basketball games perform general basketball technical moves. However, in the process of Apriori algorithm, too much attention is paid to the analysis of basketball technical actions, resulting in irrationality in the selection of basketball technical action indicators.

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