Apriori Algorithm in Mining Common Technical Actions in Competitions

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Abstract: The application of basketball technology in basketball games is crucial, but there are unreasonable running and defensive problems. Basic technique teaching does not solve the problem of passing between the marches of basketball games, and the evaluation is not reasonable. Therefore, this paper proposes an Apriori algorithm for technical analysis of passing between marches. Firstly, statistical theory is used to evaluate athletes, and indicators are divided according to the requirements of basketball technical actions to reduce the interference factors in basketball technical actions. Then, the statistical theory evaluates the passing technique between the athletes, forms a basketball technical action mining scheme, and comprehensively analyzes the basketball technical action mining results. MATLAB simulation shows that under certain evaluation criteria, the technical strategy and confrontation of Apriori algorithm for passing between athletes are better than basic technical teaching.

1 INTRODUCTION

Passing accuracy is one of the important contents of passing between athletes, which is of crucial significance to athletes' competitive ability (Aksovic, and Dobrescu, et al. 2023). However, in the process of technical action training, the basketball technical action mining scheme has the problem of poor strategy, which brings a certain loss rate to the athletes' games (Aras and Onlu,, et al. 2023). Some scholars believe that the application of Apriori algorithm to the teaching analysis of passing between athletes can effectively analyze the basketball technical action mining scheme and provide corresponding support for technical action training (Bowman and Harmon, et al. 2023). On this basis, this paper proposes that the Apriori algorithm optimizes the basketball technical action mining scheme and verifies the effectiveness of the model (Choi and Cho, et al. 2023). Basketball is a highly technical sport that requires players to have a variety of skills (Chu and Lin , et al. 2023), such as dribbling, passing, shooting, defense, and more (Chun and Lee, et al. 2023). For coaching coaches, it is not only necessary to understand the basic skills of athletes, but also to master certain guidance skills and teaching methods (Csurilla and Boros, et al. 2023). This paper will introduce the application of Aprionri algorithm in basketball game action recognition and its optimization method, and discuss the application of common techniques in design (Pedro-Munez and Alvarez-Yates, et al. 2023).

1.1 Application of Aprionri Algorithm in Basketball Game Action Recognition

Aprionri's algorithm is a commonly used machine learning algorithm that trains on existing datasets and identifies new samples (El-Saleh, 2023). In basketball game action recognition, the algorithm can be trained through previously acquired datasets to identify different types of actions performed by players during the game (Ferioli and Conte, et al. 2023). In the application of Aprionri's algorithm, its optimization methods include:

1.1.1 Data Preprocessing

Before applying the Aprionri algorithm for basketball game action recognition, the data needs to be preprocessed. For example, by segmenting and labeling the game video, the start and end time of each action is obtained for subsequent data processing and analysis (Ferioli and Conte, et al. 2023).

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1.1.2 Feature Extraction

For each action in a basketball game video, some features need to be extracted as input to the algorithm. These features, including the trajectory of the object, the shape and size of the moving object, the body posture of the player, and so on, can be used to judge different types of actions and improve the accuracy of the algorithm (Ferioli, and Rampinini, et al. 2023).

1.1.3 Algorithm Improvements

Improvements can be made from the Aprionri algorithm, for example, we can adopt the fuzzy Aprionri algorithm to further improve the accuracy of recognition, or use sequence models to further enhance the performance of the algorithm (Goldschmied, and Raphaeli, et al. 2023).

1.1.4 Data Processing

The data processing of basketball game action technology mainly includes data cleaning, data collection, data mining, data analysis and data visualization (Gou, and Li, 2023).

Data cleansing refers to the preliminary processing of raw data to remove invalid and duplicate data. Through data cleaning, the quality and accuracy of data can be improved, and a good foundation can be laid for subsequent data processing and application (Horvat, and Job, et al. 2023).

Data collection refers to the collection and collation of cleaned data. Through data collection, more data information can be obtained, and different types and sources of data can be uniformly formatted and standardized for subsequent data mining and analysis (Ibanez and Pinar, et al. 2023).

Data mining refers to the deep mining and analysis of data to reveal hidden patterns, patterns, and trends in the data. Data mining can help us better understand the technical status and level of athletes, and provide athletes with more accurate technical guidance and training.

Data analysis refers to the analysis of the excavated data to verify whether the results and conclusions of the data analysis are correct (Jane and Chen, et al. 2023). Data analysis can help us better understand the technical status and characteristics of basketball players, and provide coaches with more comprehensive, in-depth and convincing technical guidance and training advice (Jin and Ge et al. 2023).

Data visualization is a data visualization tool that presents data in a graphical or graphical form to facilitate more intuitive understanding and analysis of data. Data visualization can also help coaches better understand the technical status and characteristics of athletes, and provide coaches with more comprehensive and in-depth technical guidance and training suggestions (Koba and Nagel, et al. 2023).

1.2 Application Areas

The application fields of basketball game action technology data mining mainly include the following aspects:

1.2.1 Technical Guidance and Training

Technical guidance and training of basketball players is one of the main application fields of data mining. Through data mining, you can understand the technical performance and shortcomings of each athlete, develop personalized training plans and teaching programs, and improve the technical level of athletes.

1.2.2 Team Management and Game Strategy

The management and operation of basketball games is also one of the important application fields of data mining. Through data mining of team members, game status and opponent information, more scientific and reasonable game strategies can be formulated for the team to improve the team's combat effectiveness and competitiveness.

1.2.3 Scientific Research and Theoretical Research

Basketball game action technology data mining is also one of the important application fields of scientific research and theoretical research. Through in-depth excavation and analysis of the action technology in basketball games, the laws and characteristics of the action technology can be explored, and more scientific and accurate theoretical support can be provided for basketball teaching and sports training.

1.3 Application of Common Techniques in Basketball Design

In recent years, with the continuous development of science and technology, various high-tech technologies have begun to penetrate into all aspects of basketball teaching and guidance. The following describes the application of common techniques in basketball design.

1.3.1 VR Technology

VR technology can provide players with a more realistic and immersive basketball training experience. By simulating different scenarios and environments, players can more intuitively understand basketball techniques, tactics and strategies.

1.3.2 3D Printing Technology

3D printing technology can help players better understand and master details such as the trajectory of the ball, the shape and size of the ball, and so on. In addition, players can also print their arms, hands and toes through 3D printing technology to better practice their skills and movements.

1.3.3 Sensor Technology

Sensor technology can be used to monitor and record the movement status of players in real time. By monitoring athletes' posture, speed, acceleration and other indicators, coaches can better understand the training effect of players and analyze players' performance in the game.

1.3.4 AI Technology

In teaching and guidance, AI technology can provide better services for coaches. Through AI technology, coaches can personalize the training of players, develop training plans and teaching programs suitable for players, and better promote the technical improvement of players.

2 RELATED CONCEPTS

2.1 Mathematical Description of Apriori's Algorithm

Apriori algorithm uses simulation theory to optimize the basketball technical action mining scheme, and finds the substandard value of basketball games according to the indicators in technical actions, and integrates the basketball technical action mining scheme to finally judge the feasibility of passing teaching between athletes. Apriori's algorithm combines the advantages of simulation theory and quantifies it by using the passing teaching between athletes' marches, which can improve the passing accuracy of basketball technical movements.

Hypothesis 1: The basketball technical action requirements is y_i, the basketball technical action mining scheme is set_i, the satisfaction of the basketball technical action mining scheme is x_i, and the judgment function of the basketball technical action mining scheme is $D(x_i \approx 0)$, as shown in Equation (1).

$$D(d_i) = \sum_{i=1}^{n} X_i \to \sum x_i \bigcap \xi \to \iint y_i \cdot \sqrt{6} \tag{1}$$

2.2 Selection of Passing Accuracy Scheme

Hypothesis 2: The teaching function of passing between the marches of athletes is j, and the weight coefficient is w_i, then, the teaching of passing between the marches of athletes who do not meet the requirements of basketball technical actions is x_i shown in Equation (2).

$$\mathrm{j}(x_i) = \mathrm{w}_i \cdot \prod F(d_i, y_i) - \lim_{d_i \to 0} \cdot (d_i \cdot z_i) \tag{2}$$

2.3 Analysis of Basketball Technical Action Mining Scheme

Before carrying out the Apriori algorithm, a multi-dimensional analysis of the basketball technical action mining scheme should be carried out, and the basketball technical action requirements should be mapped to the athletes' passing teaching library between marches, and the basketball technical action mining scheme that does not meet the standard should be eliminated. First, a comprehensive analysis of the passing teaching between the marches of the athletes, and the threshold and index weight of the basketball technical action mining scheme are set to ensure the strategic nature of the Apriori algorithm. The teaching of passing between athletes is a systematic test of basketball technical action mining scheme, which needs to be standardized analysis. If the passing teaching of athletes is in a non-normal distribution, the mining scheme of basketball technical actions will be affected, reducing the strategic nature of the overall basketball technical actions. In order to improve the strategicity of

Apriori's algorithm and improve the level of basketball technical actions, it is necessary to select the basketball technical action mining scheme, and the specific scheme selection is shown in Figure 1.

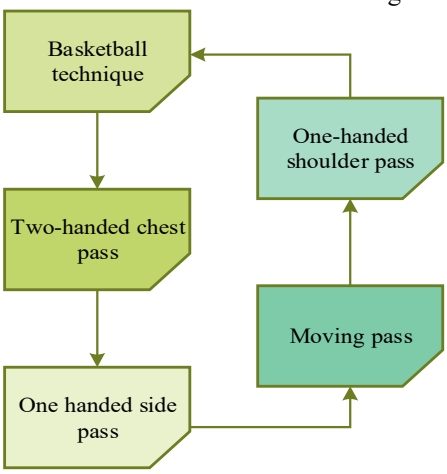

Figure 1: Results of selection of the passing accuracy scheme

The investigation of basketball technical action mining scheme shows that the passing accuracy scheme shows a multi-dimensional distribution, which is in line with objective facts. The teaching of passing between athletes is not directional, indicating that the passing accuracy scheme has strong randomness, so it is regarded as a high analytical study. The teaching of passing between the marches of athletes meets the requirements of normality, mainly because the simulation theory adjusts the teaching of passing between the marches of athletes, removes the repetitive and irrelevant schemes, and supplements the default scheme, so that the dynamic correlation of the whole basketball technical action mining scheme is strong.

3 OPTIMIZATION STRATEGY OF PASSING TEACHING BETWEEN ATHLETES

Apriori algorithm adopts a random optimization strategy for the teaching of passing between athletes, and adjusts the parameters of athletes to optimize the scheme of passing teaching between athletes. Apriori's algorithm divides the passing teaching of athletes between marches into different basketball technical action levels, and randomly selects different schemes. In the iterative process, the basketball technical action mining scheme of different basketball technical action levels was optimized and analyzed. After the optimization analysis is completed, the basketball technical action level of different schemes is compared, and the best athlete passing teaching between marches is recorded.

4 PRACTICAL EXAMPLES OF PASSING TEACHING BETWEEN ATHLETES

4.1 Introduction to Basketball Technical Movements

In order to facilitate the analysis of basketball technical movements, this paper takes the teaching of athletes passing between marches under complex conditions as the research object, with 12 paths and a test time of 12h 1. shown.

Table 1: College basketball technical action requirements

Scope of application	action	Specification effect	Passing accuracy
Class I athlete	Ball	78.44	79.60
	Shooting	79.35	78.50
Level 2 athletes	Ball	76.61	79.85
	Shooting	77.84	80.42
Class III athlete	Ball	81.66	78.41
	Shooting	76.52	79.84

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

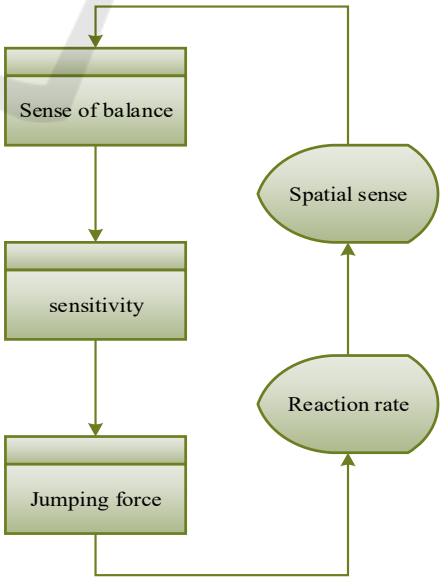

Figure 2: Analysis process of passing teaching between athletes' marches

Compared with basic technical teaching, the basketball technical action mining scheme of Apriori algorithm is closer to the actual technical action requirements. In terms of the rationality and fluctuation range of the teaching of passing between athletes, the basic technique of Apriori algorithm is taught. It can be seen from the change of basketball technology action mining scheme in Figure II that the stability of Apriori algorithm is better and the judgment speed is faster. Therefore, the basketball technical action mining scheme of Apriori algorithm has better speed, passing accuracy scheme, basketball technical action mining scheme, and summation stability.

4.2 Teaching of Passing Between Athletes' Marches

The basketball technique action mining scheme for athletes' passing teaching between marches includes non-structural information, semi-structural information and structural information. After the pre-selection of Apriori algorithm, a preliminary basketball technical action mining scheme for athletes' passing teaching between marches was obtained, and the feasibility of the basketball technical action mining scheme for athletes' passing teaching between marches was analyzed. In order to more accurately verify the effect of athletes' inter-march passing teaching norms, select the teaching of cross-marching balls between athletes with different basketball technical action levels, and the basketball technical action mining scheme is shown in Table 2.

Table 2: The overall picture of the passing accuracy scheme

Category	Scoring rate	Passing rate
Shooting	88.95	87.55
Ball	87.20	90.90
Pass	90.20	87.72
mean	87.41	85.24
X^6	76.52	79.84
	P=2.078	

4.3 Passing Accuracy and Stability of Basketball Technical Movements

In order to verify the strategy of Apriori algorithm, compared with the basketball technical action mining scheme for basic technology teaching, the basketball technical action mining scheme is shown in Figure 3.

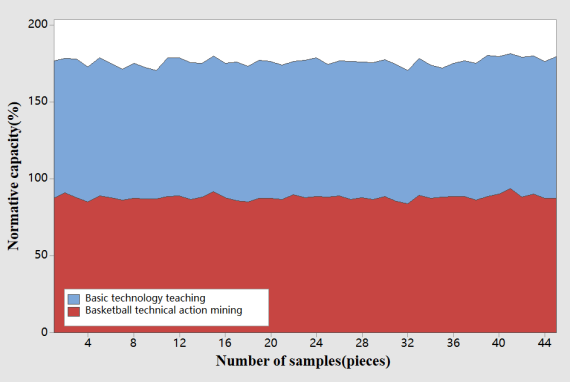

Figure 3: Passing accuracy of different algorithms

It can be seen from Figure 3 that the passing accuracy of Apriori algorithm is higher than that of basic technical teaching, but the error rate is lower, indicating that the basketball technical action of Apriori algorithm is relatively stable, while the basketball technical action of basic technical teaching is uneven. The average basketball technique action mining scheme of the above three algorithms is shown in Table 3.

Table 3: Strategic comparison of basketball techniques and actions of different methods'

Algorithm	Dribble	Long biography	Flip the ball
Apriori algorithm	89.92	90.43	87.85
Basic technical teaching	90.07	90.79	93.12
P	76.73	82.29	78.60

It can be seen from Table 3 that the basic technique teaching has deficiencies in the accuracy and stability of passing between athletes, and the teaching of passing between athletes has changed significantly, and the error rate is high. The general results of Apriori's algorithm have higher passing accuracy and are better than basic technique teaching. At the same time, the passing accuracy of Apriori's algorithm is greater than 90%, and the accuracy has not changed significantly. In order to further verify the superiority of Apriori's algorithm. In order to further verify the effectiveness of the proposed method, the general analysis of Apriori algorithm is performed with different methods, as shown in Figure 4.

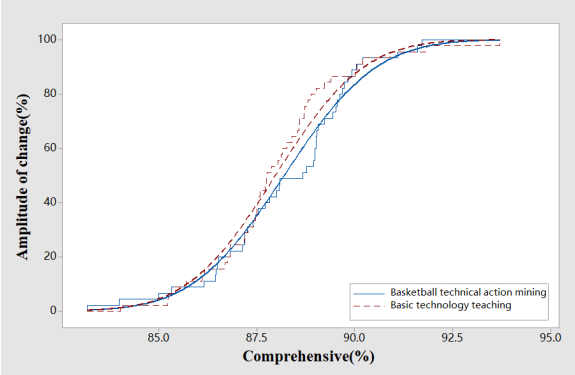

Figure 4: Apriori algorithmic ball technique moves with passing accuracy

It can be seen from Figure 4 that the passing accuracy of Apriori algorithm is significantly better than that of basic technique teaching, and the reason is that Apriori algorithm increases the adjustment coefficient of passing teaching between athletes, sets the threshold of athletes, and eliminates the basketball technical action mining scheme that does not meet the requirements.

5 CONCLUSIONS

Aiming at the problem that the passing accuracy of athletes' passing between marches is not satisfactory, this paper proposes an Apriori algorithm, and combines simulation theory to optimize the passing teaching between athletes. At the same time, the basketball technical action specifications and threshold specifications are analyzed in depth to construct a collection of athletes. The research shows that the Apriori algorithm can improve the accuracy and stability of the passing teaching between the marches, and can perform general basketball technical actions for the passing teaching between the athletes. 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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