# NBA Game Analysis based on Big Data

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**Abstract.** As an important sport, basketball has a history of more than 100 years. With the rapid development of basketball, data analysis technology has also been widely used. In basketball games, the data that people see is a set of systematic data formed by professional workers through division of labor and close cooperation, classification and statistical analysis. In addition, based on information on the field, spectators get a general idea of how athletes are performing during the game and predict where the data will go. Based on the above background, this paper discusses the significance and application of NBA game data analysis methods, and shows that in NBA games, data analysis can effectively promote the development of basketball.

**Keywords:** NBA; Data Analysis; Big Data.

## 1. Introduction

Basketball as a strong confrontation of the sport, with exciting, entertaining, interesting characteristics, loved by people. The American Men's Basketball Professional League (NBA) is more popular among basketball fans. In recent years, a growing number of researchers have been analyzing NBA game data. However, most of the analysis of basketball data is based on a certain Angle of the data to analyze, such as shooting percentage, shot opportunities, few comprehensive analyses of data from all angles of work. At the same time, most of the data analysis results are the use of line charts, bar charts and other common display graphs to represent the data analysis results, relatively simple.

With the continuous development of visualization, there are many forms that can represent data [1], as well as integrate multiple views for data presentation. By mapping the original data directly or indirectly into a visual expression, the law and change trend of the data can be displayed more directly, data anomalies can be found quickly from the results, and users can be assisted to analyze the causes of problems through interactive methods such as multi-view linkage [2].

Therefore, in order to solve the problems of lack of data analysis and single visualization structure, single legend in view and lack of linkage between graphs, this paper hopes to design an NBA game data analysis system, so as to obtain the game data of the entire NBA season [3], analyze the game data from multiple angles and carry out multivariate visualization.

## 2. The Constitution Factor and Analysis Method

The data statistics system of NBA games is composed of modern sophisticated equipment, on-site professional statisticians, law enforcement referees and data analysis staff. The final statistical results of the competition are obtained through the highly specialized collaboration of personnel and equipment.

### 2.1 Modern Precision Equipment

With the development of modern basketball to this day, the technical ability of players has been continuously improved, which has made the basketball game more and more intense. In order to accurately record the game data and match the intensity of the game, many precision instruments came into being. For example, the recorded data can be accurate to a 24s timer after the decimal point, the indicator light set on the backboard and the synchronization end time of the game, the decibel meter to measure the sound of the audience, the referee whistle with special sound output, the thermal

imaging system, etc. All of these instruments and equipment help to accurately record the situation and data of the game scene.

### 2.2 On-site Professional Statisticians

On-site statisticians mainly have the following types: recorders, announcers, 24s timekeepers, large screen operators, technical statisticians, etc. These professional statisticians need to cooperate with the law enforcement referees tacitly and understand the gestures made by the referees; at the same time, they also need to record a series of actions such as shooting, assists, blocks, rebounds, steals, fouls and free throws of the players on the court, and enter them into the computer. Inside; grasp the team's foul situation and report to the referee in a timely manner, and also operate and manage various equipment and system software on site.

### 2.3 Law Enforcement Referees

In NBA games, players should conduct activities under the premise of complying with the rules. If there is any violation, the referee has the right to make corresponding rulings [4]. Law enforcement referees are very important to a basketball game. They not only have supreme power, but also shoulder great responsibilities. In the game statistics system, the referee is also very critical to the player's ruling [5]. Players must abide by the rules on the field and move under the supervision of the referee, and their final game data is largely affected by the referee's judgment.

### 2.4 Data Analysis Staff

The main job of the analyst is to use mathematical methods to analyze and process the statistics of the game data to form intuitive and concise results, so that the coach can more easily understand and grasp the game situation of a certain player, and it can also help the team manager to be more scientific [6]. Reasonable selection of talents. For a data analyst, a basketball game is like a math problem with complex variables and parameters. For example, in the field of shooting percentage, the analyst will calculate the shooting percentage of a player or team in a game through the statistics of the number of shots and the number of hits, and then calculate the player or team's shooting percentage in a certain game. The shooting situation in a period of time, and then judge the stability of its performance. According to the strengths or weaknesses of the player reflected in the data, the coaches can make targeted follow-up training arrangements. High-level data analysts can judge whether the team's player configuration is reasonable, whether the cooperation between players is harmonious [7], and master the team's game rhythm by observing and analyzing the data. The results of these analyses can determine the tactical arrangement that the team adopts in the game.

In addition, basketball game data analysis, as an important link in promoting the development of basketball, can help coaches and players to discover some potential problems. Therefore, whether it is the usual basketball training or the real basketball game, the application of data analysis methods is crucial [8].

Horizontal data analysis method. Horizontal analysis is also called horizontal analysis, which specifically refers to the horizontal study of information resources in the same period, without considering other influencing factors, aiming at the salient features of something, and studying its change law and development trend based on objective information [9]. In the process of basketball games, the horizontal data analysis method mainly studies five data of athletes, namely rebounds, points, assists, steals and turnovers. For example, if we study the assist-to-turnover ratio horizontally, the higher the assist-to-turnover ratio, the more successful assists will be. The horizontal analysis of data is actually to realize the full integration of theory and reality and promote the development of basketball technology on the premise of ensuring the effectiveness and scientificity of basketball technology.

Longitudinal data analysis method. Longitudinal analysis, also known as vertical analysis, refers to analyzing the development speed from the vertical direction, which can not only analyze the five important data of a certain player in the basketball game, but also analyze the team will show in a

fixed period of time. Data trend. For example, the average score of an athlete shows an upward trend with the growth of the month, which also indicates that the athlete is in a stage of rapid development. From another perspective, it can be seen that the athlete's ability and literacy in all aspects need to be improved; If the average rebound of the team shows a gradual decrease, it reflects that the intrinsic motivation of each athlete is declining. Therefore, it is necessary to strengthen the training of athletes in rebounding.

## 3. Construction of Data Analysis System

### 3.1 Analyze the Scoring Situation in NBA Games

Under normal circumstances, sports media only evaluate the team's offensive efficiency based on the average score per game [10]. However, compared with the average score per game, the score obtained by each offensive and defensive transition can more objectively and accurately reflect the team's performance. Offensive Efficiency and Defensive Efficiency.

### 3.2 Analysis of Mistakes in NBA Games

There is a significant correlation between turnover rate and athlete's ball-handling performance, which can accurately reflect ball-handling performance. The total number of errors has no practical significance and also affects the coach's judgment. In addition, in the process of studying the team's mistakes, you should pay attention to and analyze the points obtained by the competitors.

### 3.3 Analyze the Offensive Efficiency and Defensive Efficiency in NBA Games

Offensive efficiency is the number of points earned per 100 transitions. Defensive Efficiency is the number of points a competitor earns per 100 offensive and defensive transitions. What they have in common is that they combine the number of offensive and defensive transitions to ensure that the offensive and defensive efficiency of the two teams can be compared equally.

### 3.4 Analyze Lineup Combinations in NBA Games

Lineup combination analysis is an important tool with auxiliary functions, which can help coaches analyze the behavior and efficiency displayed by players under different lineup combinations [11]. By analyzing the lineup combinations in basketball games, coaches can be clear and reasonable. Deploy troops on the ground to achieve the previously established tactical objectives.

### 3.5 Analyze the Performance of the Players at Critical Moments

The critical moment refers to the first 3 minutes before the end of the game, if the difference between the two teams is less than or equal to 5 points, this period is called the critical moment. By studying the behavioral performance at critical moments, coaches can arrange players more objectively and rationally according to the advantages of each athlete, so as to achieve maximum efficiency for the final game performance.

## 4. Conclusion

In the NBA game, data analysis and statistics is a challenging task, which requires a large number of professional workers to complete through close cooperation and coordination, adopting a variety of different methods to update the data in time and present it. In order to achieve the rapid development of basketball, in addition to improving and perfecting statistical methods, objective analysis of various data should be carried out to promote the effective development of basketball.

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