



IT APPLICATIONS IN SPORT SESSION

SCOUTING IN BASKETBALL

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Abstract:

The development of information technologies has contributed to the application of more and more analyzes of opposing players and teams in the sports system, which is scouting. Scouting is the analysis and presentation of the most important results of a team or an individual player with the aim of improving performance, and thus the results of a team or players. In this study, based on the available literature, scouting and realization of certain software packages for analysis, scouting and creation of basketball actions are presented.

Keywords:

Scouting, basketball, player, information technologies.

INTRODUCTION

Throughout history since James Naismith invented a new game for his students in 1891. and to this day, basketball has undergone major changes, in terms of the game, the rules. Today basketball is a popular sport that requires, among other things, big analyzes and certain statistical parameters. One of the indispensable analyzes of a sports team is scouting.

The beginnings of scouting date back to 1948. In New Orleans. Then the scouts started to record only certain statistics, points and turnover percentages. There are at least twenty definitions of statistics in a basketball game. Statistics play a very important role in scouting because based on some events that have happened in the past, scouts try to accurately predict future events. In Europe, scouts appeared in 1969. in Italy. Nowadays, scouting has developed to unimaginable heights. Today, good and quality scouting cannot be imagined without the use of modern information technologies. "Advance scouting" has a special place in recent basketball history [1].

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Scouting is the analysis and presentation of the most important results of one team or a player with the aim of improving performance, and thus the results of that team or player. Scouting is collecting data and analyzing the competitive and training activities of athletes in order to achieve top sports results. Scouting is the specific preparation for data collection and analysis of competitive and training sports activities in order to select the best players [2].

Basketball scouting and analysis of one's own and your opponent's team has become an indispensable part of the preparation for all games in professional leagues. Using data mining programs in sports provides great benefits to its users. It allows you to see all the essential elements of the basketball game and to extract knowledge from the collected data. In this way, teams get to know themselves, because they are able to see what they need to win, where they most often make mistakes, and which elements of the game they need to improve [3].

"Advance scouting" has a special place in recent basketball history. It is one of the best basketball scouting programs that have appeared. Implementation of that program was completed in November 1989, and the first owners were the Chicago Bulls. Advance scouting costs a million dollars. Although they had strong individuals, with the best basketball player of all time, Michael Jordan, they did not manage to win any title. For a year, the Chicago scouts worked hard on that program. For the next three years, they were the undisputed rulers of the basketball scene. "Advance scouting 1.0" had the possibility of scouting during the game and after it [4].

The task of scouting is to collect, analyze, statistical processes as needed and use technical-tactical, physiological, motor, and sociological data in order to improve the performance of individuals and individual parts of the team, and then the performance of the team as a whole.

The importance of scouting is reflected in the fact that by systematically monitoring competitive activities, coaches receive a certain amount of exact information, unlike previous practice where conclusions were made based on subjective assessment of individuals, which is not enough in modern sports.

By using basketball analysis and data mining as the highest level of analysis, teams can get to know their opponents and prepare for the next opponent or tactics for the next game. [5]. The tools and techniques that are being developed aim to better measure the performance of both the player as an individual and the entire team. These new methods of measuring performance attract

the attention of the largest sports associations because there is a large amount of money in sports today. Prior to the benefits of data mining, sports organizations relied almost exclusively on the expertise and knowledge of the people in charge of scouting. Statistics play a very important role in scouting itself because based on some events that have happened in the past, scouts try to accurately predict future events [4].

In the past, basketball statistics were a luxury available only to big professional clubs. For the average trainer, statistics were a real nightmare, requiring a large amount of time and effort, first in the collection of statistical data, and then in the manual calculation of various aggregate statistical parameters. For most coaches, statistics simply weren't worth that much effort [5].

However, computers have changed all that have removed a great burden and responsibility for keeping statistics from coaches, while at the same time providing them with a wealth of information that they have only they could dream of for fifteen years. And best of all, the prevalence and relatively low cost of computers and software make this information available to everyone. As the amount of data collected grew, sports organizations turned to find more practical methods to gain knowledge from the data [6, 7]. The second step was to find even more practical methods in order to extract valuable knowledge, is to start using data mining techniques. Properly applied data mining techniques can result in better performance of the whole team by preparing players for certain situations, identifying individual contributions of individual players, assessing play the opposing team and exploring any weaknesses. In order to be able to apply data mining, first of all data is needed. Depending on the amount and richness of available data, it is possible to extract appropriate knowledge [8, 9].

When we talk about basketball scouting, we have to point out some terms that are from essential for analyzing an opponent such as a team roster containing: last name and first name of the coach, last name and first name of the player with basic data jersey number, position which game, height, weight and year of birth, then the individual characteristics and habits of the player as well as the schedule of all matches with basic data (date, time and place of play) [10].



2. METHODS

Given the introductory remarks, a bibliographic-descriptive method was used for the purposes of this study. Based on the available results of relevant previous research, the presentation, definition, theoretical framework and possibilities of implementing scouting in basketball are given, as well as its importance for further development of sports analytics and application of scientific knowledge in modern sports.

3. DATA ANALYSIS AND SOLVING BASKETBALL SCOUTING PROBLEMS

Scouting can be done at the level of team, scouting teams - coaches are under constant pressure during the season and are always looking for a deeper insight into the abilities and tactical ideas of their opponents. Analytics can help coaches organize information they use regularly in a more efficient way. As video systems improved, so did coaches get more complete information at their fingertips. By analyzing video materials, it is possible to gain insight into the templates of the opposing team, as well as special actions that need attention. In addition, analytical systems can automatically detect trends in the upcoming opponent's performance and can determine the cause of any changes. For example, a series of wins or losses says nothing if the opponents and details from each game are not taken into account. It is not at all simple for a coach to go through each of these matches to determine patterns and causal relationships, which is greatly facilitated by the existence of Analytical Systems [12].

Individual Player Scouting - Standard player evaluation often involves scouting reports, studying videos, measuring the market value of players, and projecting the role of players in a team. As the information needed for analysis comes from different sources, only collecting it can be a challenging process. Analytics enables the integration of these information flows. Using analytics while reading a player's scouting report as a potential reinforcement, a decision-maker can effectively see statistics and videos from the game, the level of play relative to standard player games, and see if a scout's rating matches his own observations. In addition, analytics allows decision-makers to consider different scenarios of the player's role in the team and the type of contract offered, thus assuming the player's long-term impact on team performance. Assessment of abilities, primarily physical through various forms of testing players.

Talent Scouting – Decision-makers need to identify areas of play that the player should focus on in their development, determine player routines that need to be improved, and set goals so that the player and decision-makers know if the player is progressing according to plan. Analytics can play a key role in this process by assisting decision-makers in identifying goals for the player, as well as in monitoring, analyzing and projecting progress so that all stakeholders know if the player is evolving. In addition, analytics allow coaches and staff managers to know what a player is able to achieve in different areas and how that potential fits into the team's future. Combining development information with video analysis, in-game statistics and scout reports will further help decision-makers regarding the current and future value of players. A scouting program is shown. The project is modeled according to the UML (Unified Modeling Language) is a standard visual modeling language to document processes and software specifications. For the static aspect of the system, the Use Case Model and the Class Diagram were used, and for the dynamic aspect, the Activity Diagram was used. As today's operating systems have the feature of great user interaction, the natural choice is a graphical action editor where the desktop will be a drawing board. The main advantage of this application over the drawing board is the ability to record the action, print reports with observations during the exposure to players, as well as record actions in video format and the ability to play them at different speeds. Although similar editors have appeared on the market that meet such requirements, here is a framework (template) that can become universal for all graphic editors of this type for all team sports (football, basketball, handball). The paper presents a specific editor of basketball actions, but with minor changes, it can become a universal graphic editor of actions. The implementation was implemented in the Borland Builder 6 software package in the C++ programming language. The open-source API – Open CV was used to create the video [1].

4. GRAPHIC EDITOR FUNCTIONALITY

One of the first steps in the process of designing and modeling the problem is the analysis and specification of requirements. In the process of analysis, it is important to get answers to the following questions at the beginning:

1. The main purpose of the software package that is being implemented, essential requirements of users regarding the functionality of the system. The application



is a graphical editor that allows the user to add elements to the desktop, adjust properties, and add actions to each element. Also, charts and their phased display must be displayed, then video creation and report printing.

2. Hardware complexity of the software package.

An object-oriented model is a graphical analysis of a system that uses UML symbols and symbols. UML is the standard language for object-oriented modeling. The language has well-defined syntax and semantics, which is clear and easy to use in object modeling. In the object-oriented model, the following are designed: usage case diagram, class diagram, sequence diagram, activity diagram, state diagram (dynamic) and development diagram. The usage case diagram represents the user requirements for the system.

It consists of Use-cases - They describe the sequence of actions that cause an effective change in the system. They are marked as horizontal ellipses; Actors - An actor is a person, organization or external system, who plays a role in one or more interactions with the system. Actors symbolize figures; Connections - Connections between Actors and Use-cases with solid lines with the possibility of placing an arrow at the end of the line. The connection always exists when the actor participates in the action, which is described by Use-cases. Cases of use for player reports and updates are listed. Analogous to player updates, other updates are also performed [1]. In Table 1 can be seen as adjustment options for players.

Reports

Specification:

Chronology of actions:

By clicking on the appropriate button on the form of the new game or by selecting the report on the initial form, the report (s) is called

Extension points:

- 1.) a. If the game is still in progress, it is possible to call the game statistics for the periods of the game separately, as well as for the halftime or regular course. Only possible for an ongoing game.
 - b. i.) The game is not in progress. Invitation of various reports from the initial form.
 - ii.) The desired report is selected
 - iii.) The game is selected

Exceptions:

Does not have

Prerequisites:

Does not have

Table 1 – Adjustment options for players [5]

5. CREATING VIDEOS

Based on the specification of the request, it is necessary to enable the user to record his basketball actions as a video file. This file can later be played outside the application and on other computers where the application is not installed.

The Open CV library was used to solve this problem. The following is a description of the methods used:

- ◆ cv Create Video Writer - create videos with set parameters,
- ◆ cv Release Video Writer - completes video writer entry,
- ◆ cv Load Image - load an image from a file,
- ◆ cv Write Frame - adds a frame to a video file [1].



6. SCOUTING REPORT PARAMETERS IN BASKETBALL

Scouting report in basketball is an essential aspect of preparing a successful game plan in coaching basketball. There is no universal way to scout. It can be seen in the example basic reports parameters for a scouting report.

Scouting reports parameters considered for scouting report:

- 1) Result: Made, Missed, Fouled shots
- 2) Value: 2-pt field goals, 3-pt field goals
- 3) Additional: And one-shots, Blocked shots, Assisted shots, ATO
- 4) FG Play-types: Catch and shoots, Transitions, Cuts, Catch and drives, Pick 'n' rolls Handler, Isolations, Putbacks, Screen offs, Post ups, Hand-offs
- 5) Game periods: I quarter
(0 _____ 10min.); II quarter
(0 _____ 10min.) III quarter
(0 _____ 10min.); IV quarter
(0 _____ 10min.)
- 6) Seconds to violation: 0 _____ 24sec.
- 7) Contesting: Contested, Uncontested
- 8) Opponent

- 9) Hand: Right, Left
- 10) Shot type: Jumper, Tip in, Lay-up, Floater, Reverse, Dunk, Hook, Miscellaneous
- 11) Drives: Drives left
- 12) Assisted by
- 13) Dribble moves: Changing speed, Step back, Quick first step, Fake shot, Fadeaway, In & cut, Jab step, Changing direction, Spin move

Figure 1 shows an example of the analysis of successful shots chart percentage in a specific court zone of one team from the game. Figure 2 shows an example of marked successful and unsuccessful shots in the game. The black circles are successful shots, and the black x marks are unsuccessful shots.

7. CONCLUSION

In basketball nowadays, there are many different methods and ways of preparing a team for competitions. There is a physical, psychological, integral, technical, tactical type of preparation. Each of them is very important for the whole team and leads to a certain result and success. Today, good and quality scouting cannot be imagined without modern information technologies.

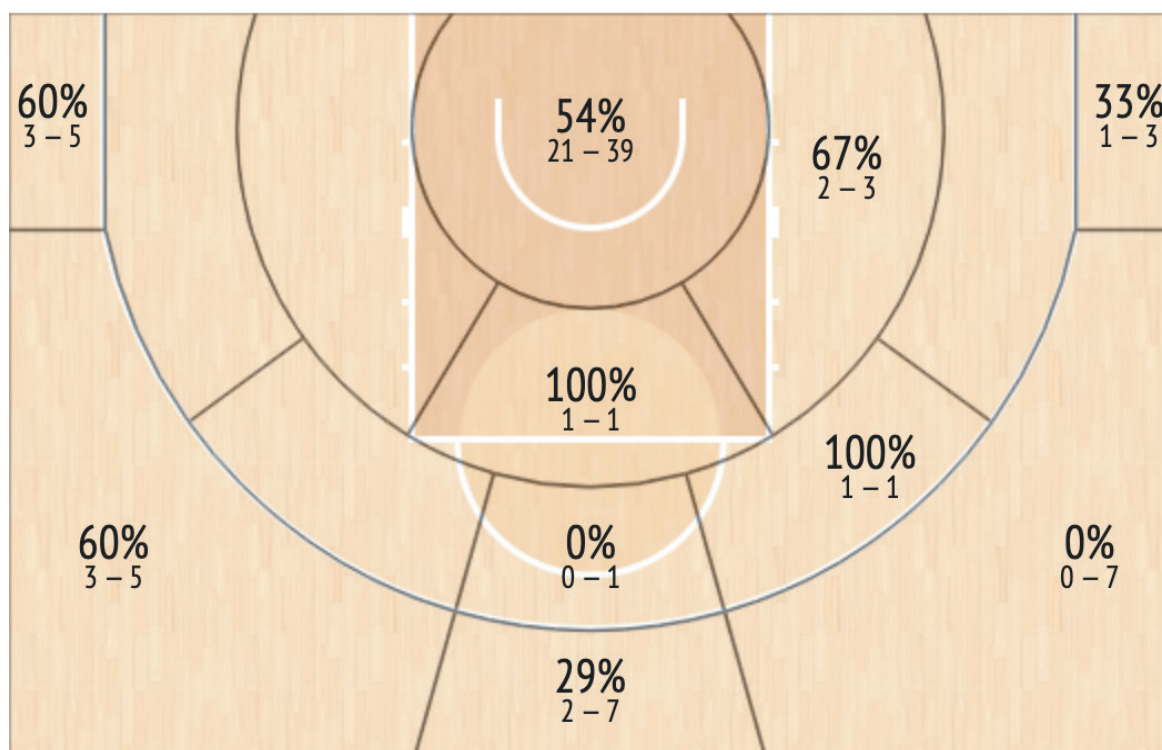


Figure 1 - Example of shooting chart percentage in specific court zones.

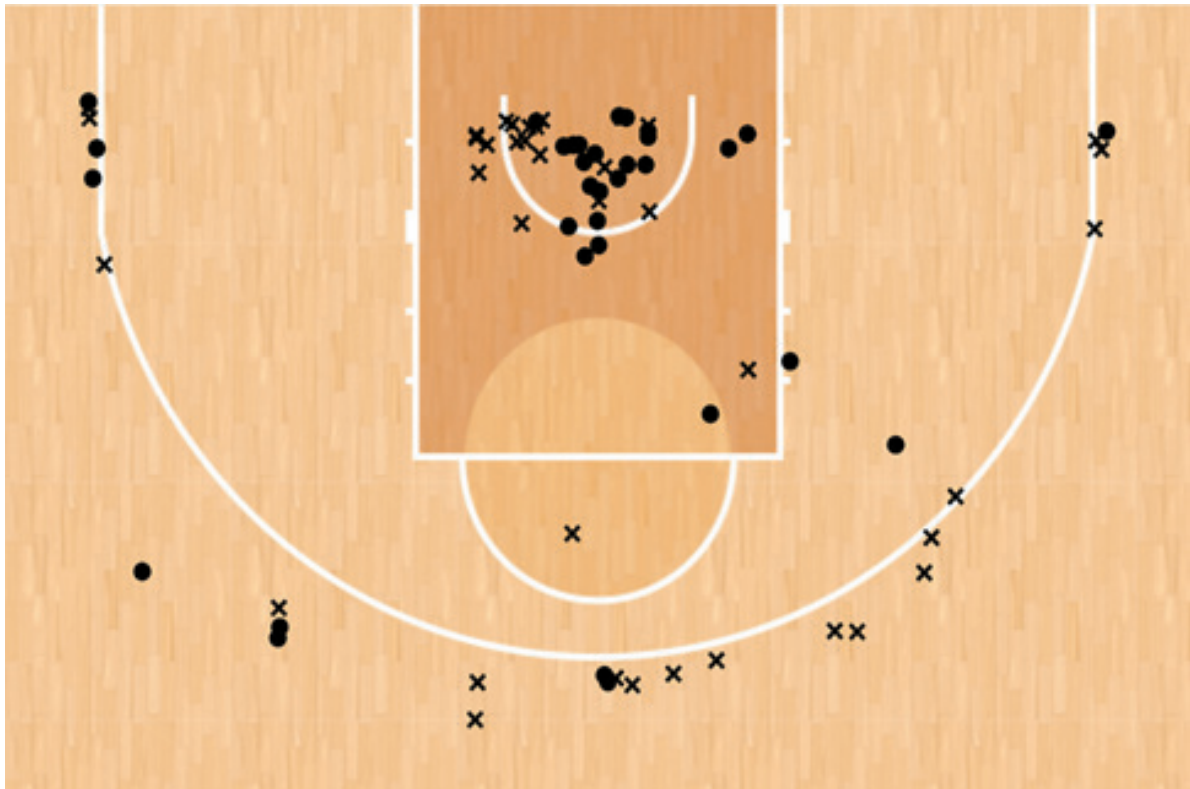


Figure 2 - Example of field goals shooting chart

With the help of scouting, all coaches are enabled to set the appropriate tactics in relation to the opposing team, as well as with the help of analysis of each opposing player, the coach draws attention to certain strengths and weaknesses of the opponent [4, 13]. The fastest and most comprehensive analysis should be the performance index. With the help of scouting, in addition to coaches, players, journalists, managers and others can get various information, including how many points were given in relation to certain types of defence, as well as what types of attacks a certain team used, how many points and counterattacks attack, pick & roll.

8. REFERENCES

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