

Lacrosse Vis: a visual analytics system for lacrosse players

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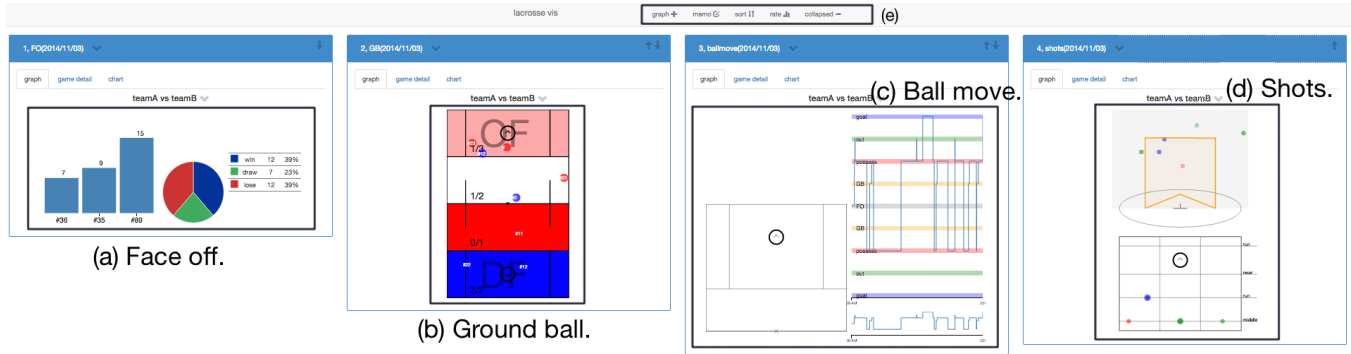


Fig. 1. Main screen of Lacrosse Vis: (a) shows the rate of winning of face off; (b) shows who and where release the ball from the ground; (c) shows players move and pass; (d) shows positions of shoots, points of shoots and results of shoots; (e) is dashboard tools bar.

1 INTRODUCTION

In recent research, visualization systems are well used in field sports. Those systems provide several tools to explore the game data and are used mainly by coaches, managers and journalists. The systems help coaches and managers to make decisions about plans concerned with game strategies and tactics [1-4]. Journalists who work for telling stories of the games and telling his findings on them can write the articles immediately after the game without bias [2].

However, when it comes to use these systems by players, there comes a problem. The players often discuss their performance, strategies and tactics with each other. When players make better use of these visual analytics systems, these systems may have such some problems to be solved as complexity, inaccessibility or incomprehensibility, and besides there are very few reports about sports visualization systems for players. Players also analyze their games to find out why they lose and whether their tactics were effective with experience. In this research, we focus on lacrosse since the first author plays lacrosse and strongly motivated by the development in this system. It is a challenging work because lacrosse strategies and tactics are complicated compared with sports on which previous systems have focused.

In this paper, we present Lacrosse Vis (called as LaxVis hereafter) to visualize lacrosse games especially intended to be used by players (see Figure 1). LaxVis is composed of several panels shown in main system screen. A panel represents each move. This system helps players to analyze games easily, interactively and intuitively.

The main characteristics of this system are as follows:

- The system requirements have been specified by interviewing lacrosse players.
- The system provides with an interactive user interface to explore the game data
- The system helps players to find a good or bad point by arranged and colored panels.

2 LACROSSE VIS

We inquire the requirements of analysis system of lacrosse players. Following those requirements, we shall try to develop LaxVis for lacrosse players based on plays represented as a panel. LaxVis is composed of several panels which show detailed moves in a lacrosse game. We call the base on which this unit of panels is put a dashboard. This dashboard has some tools. Each graph in a panel represents each move. We describe the detailed panel contents below.

2.1 Requirement

To develop LaxVis, we researched on 70 players demands in analysis by using the Evaluation Grid Method (EGM) [6] and questionnaire survey. The EGM helps to make an effective questionnaire.

2.2 Dashboard tools

In this section, we describe the dashboard tools (see Figure 1 (e) and Figure 2), which support users in exploring valuable knowledge.

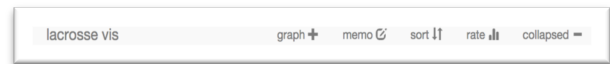


Fig. 2. Dashboard tools.

2.2.1 Overview of games and teams

We describe a dialogue screen in which users can overview past games at the first session of this system (see Figure 3). This dialogue screen shows game buttons coloured by game points, so users can recognize which games are scored well or not. When click a game button, LaxVis generates panels representing plays of the game showing on main dashboard screen.

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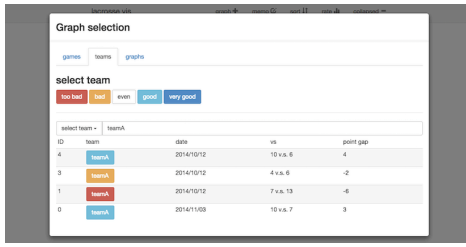


Fig. 3. Overview of games and teams.

2.2.2 Rating view

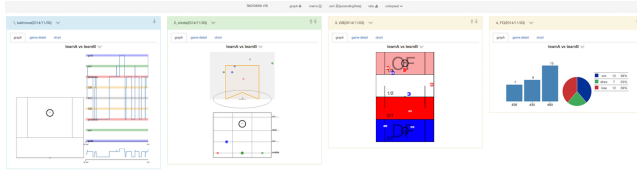


Fig. 4. Rated panels.

After generating the panels on the dashboard, players search good point or bad point in a game (see Figure 4). LaxVis supports players in finding good plays or bad plays by colouring and arranging panels in order of merit.

2.2.3 Comment

Users can add comment panels on the dashboard to write down their ideas.

2.3 Panels

In this section, we describe the following panels created with D3.js JavaScript library [5]. Each panel shows each graph and users can explore interactively.

2.3.1 Face-off

We visualize the rate of winning, losing and drawing in face off (see Figure 1 (a)). Users can know who wins the ball most and how the rate of teams total winnings. In a bar chart, a bar shows total trials of one player. The pie chart shows the sum of details of win, lose and draw. If users put mouse on a bar, they can see individual of winning rate face-offs. If users put mouse on a sector of a pie chart, players can explore the details.

2.3.2 Ground ball

In the graph, we draw field lines and plot dots where player release the ball from ground (see Figure 1 (b)). In this graph, dots represent players who release a ball, and when users click the dot, they can watch the video of the scene. Blue dot means a member of white team, and red dot means a member of colored team. The field color means a rate of releasing balls in each area.

2.3.3 Ball move

Ball move shows game situations and field situations (see Figure 1 (c)). Game flow shows the flow of a game. In short, it reveals situations on the time line. Field figure shows each player's moving and passing lines, and click player dots, players can see a video on that time. By brushing up specific time line in game flow, field figure generates lines and points in that time. From ball move graph, players can recognize a game flow and its details.

2.3.4 Shots

Shots graph gives two ways of viewing of shots, field figure and goal figure (see Figure 1 (d)). Field figure shows where a player

shoots a ball and the result that is shown by dots' colour. In goal figure, shooting ball points are plotted and the points are colour coded; red means shots are saved by goalie, green means missing the goal and blue means scored.

3 EVALUATION

We presented LaxVis to some lacrosse players in Kyoto University, and tested this system (see Figure 5) with HyperInfo which is interactive large display platform for informal visual communication [7] and such large display fostering the sharing of knowledge, skills, and ideas [8]. We received some evaluations. They indicated that LaxVis was useful because, "when we review a game, we can look down on the game and get information on detail of plays. By using LaxVis, when we do scouting on a enemy before a game, they can get information about his strong and weak points more easily and quickly than before." This system validity was confirmed by players.



Fig. 5. User as player study.

4 CONCLUSION

In this study, we research requirements for a sport visual analytics system for players, and we develop LaxVis. Finally, we confirm LaxVis's validity from lacrosse players in Kyoto University. As a future work, this system may apply for any other sports when other sports' players need analytics system.

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