戦略立案をサポートする
スコアブックの提案

根本研究室　第13期生

経営情報学科

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▷ （三　砂）　≪　練試　4セット　≫　（二　象）　◁

打順	サーバー	ポイント事由	得点	サーブ	得点	ポイント事由	サーバー	打順
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	13		21	
サイドアウト率	0÷◁ 5÷20	25%	43% 6÷14 0÷▷	サイドアウト率

研究目的

誰でも使える、
戦略をサポートするスコアブック

発表の流れ

システムの提案
- 類似研究の紹介
- 問題点を解決する提案

● ソフトについて
- 紹介
- プロトタイプの改善

● システムの実運用

● まとめ

類似研究の紹介

Analysis of the ball fall point in table tennis game

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Abstract: During a table tennis game, coaches give players some advice, based on their experience rather than objectivity. In this research, objective data are used to analyze the advice given to players. Coordinate data of the ball fall point in a National University Table Tennis Tournament, held in April of 2008, are analyzed with the help of a video camera. Attack and defensive patterns are analyzed, allowing weak points to be clarified. This research aims to extrapolate objective advice to the advice given by the coach from experience.
Keywords: Table tennis, Sequence of pitches pattern, Strategy, Ball fall point

1. INTRODUCTION

In a table tennis game, when coaches give players advice, they often advise the players using their experience, rather than by analyzing objective data. After recording the content of a game, and doing the statistical analysis, researchers think that it is important to examine the content of the game. Especially, in American football, previous games are analyzed in order to think about strategy. However, in a table tennis game, when the coach gives the player advice, he rarely uses objective data. As a characteristic of table tennis, it is necessary to record and add up the game data fast, so it is thought that the lack of time may be a problem. However there is some research that has actually done game analysis of table tennis. From the research done by objective analysis and subjective analysis, it is said that the basic material [1][4][5][6][7] of the training project plan clearly shows information such as the ball trajectory time, distance, speed, etc. However, according to recent research, the analytical method of tactics of table tennis can not be used directly in table tennis games because there are many problems in data collection and data analysis. The present study analyzes the data collected from an official university student tournament held in April 2008. In the present study the coordinate data of the ball fall point are analyzed for the attack and defensive pattern and weak points are clarified. *Later, the result of data analysis can be added to the advice based on the coach's experience, in order to give even better advice to players.*

2. MATERIALS AND METHODS

1.1 Analyzed subject: The analyzed subject was a male player from Niigata University Table Tennis Club. This player's ball fall point data in all games he performed in North Shinetsu National Championship tournament was analyzed. This player was chosen because he won his 5 games in the tournament and got the first place.

1.2 Data acquisition process: Using a video camera to record the 5 games, the following points were considered.
(1) The point to identify the fall area from a high position in the auditorium.
(2) The point for taking video from the right rear so as not to disturb the optical axis of the camera with which we take the video of the fall area as shown in Figure 1.
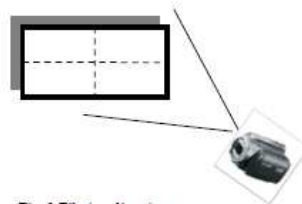(3) As the flow of the game is important, there is a need to record from beginning to end without stop.

Fig. 1 Filming direction

1.3 Methods of data analysis: According to the order of the player and opponent, we use alphabet capital letters to identify them. The player is A, and the opponents from 1st to 5th games are B, C, D, E, F, respectively. Then we divide each side of the table to 9 equal parts, and so the table has 18 blocks. In a game, the data where the ball bounded were collected. Every block was designated with a number from 1 to 9 on each side of the table tennis court. The block where the ball bounced was sampled for data analysis. For example, in Fig2, the game players are A and D, the first fall point block is 7 when D serves, and the second fall point block is 5 on the other side when D serves, so the fall point block is 7 for A to receive and for B's third ball. A missed the fourth ball as a result the route of fall point is 7-5-7-7. This method is repeated in all games, and so all the player's winning and losing routes during the game can be analyzed.
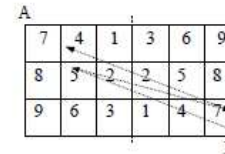

Fig. 2   Example

3. RESULTS AND DISCUSSION

At first, we analyzed the number of rallies that the player hits the ball at every play for each game. From Fig3 we can see that the play ends before or on the fourth ball on 80% of the games, which means only 20% of them have a fifth ball. According to this result, we can see that the most important part of the game is held up to the fourth ball. Table1 shows that the higher level player has, the more plays involved in the game. The player won the championship, so this data can show us the playing characteristics of a high level Japanese college student. This research analyzed the data of correlation between the ball from service to the fourth ball and winning.

Table 1   About rally in each game

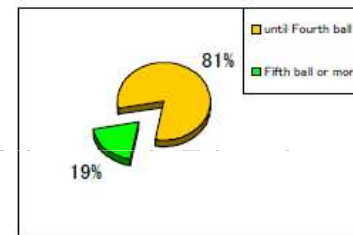| Match	Game match (game)	To forth ball	After fifth ball	Sum
AvsB	3	36	4	40
AvsC	3	39	9	48
AvsD	3	51	12	63
AvsE	3	54	8	62
AvsF	5	60	17	79
Sum	17	214	51	292

Fig.3 The rate games up to forth ball and longer then fifth ball.

3.1 Review of Player A and Player B.

Fig.4 shows there are 20 balls which A served including 8 misses when receiving by B. This is because B could not forecast the circumrotation of the ball which is served by A, and further more there is only 2 balls that can insist to the fourth ground in which A served. It also means B could not forecast the circumrotation of the ball which is served by A, even though B got the ball A served, it also a chance for A.

Fig.5 shows that in the 19 balls which B served, on only 3 he scored. In contrast, A got 19 scores from serving. All of these facts mean B's level is lower than A's. In those games, the necessity of tactical analysis is not so great.

システムの提案　問題点を解決する提案
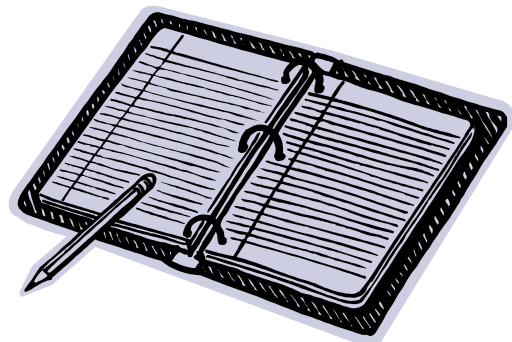
ソフトについて

ScoreP 4.2 (プロトタイプ)

試合記録画面

スコアブック,戦略立案画面

ScoreP 4.2の問題点

① 9点では入力ミス多
② やり直しができない
③ 表示がわかりにくい
④ 自然言語で表示したい

ソフトについて

ScoreP 9.7（完成版）

システムの実運用

全日本卓球選手権大会5回戦

出典：youtube

得点パターン　　　　　　　　　失点パターン

戦略の提案

スコアブックとして機能　　戦略立案のサポート

実運用からの課題

迅速性とのトレードオフ

打球点

+ 立つ位置

回転

まとめ

ScoreP 9.7

誰でも使える、
戦略をサポートするスコアブック

外部公開し
他のスポーツへ