The Research on Exploitation of Spot Statistic Data Visualization Software in Volleyball Match by Utilizing Microsoft Visual C++ 6.0

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Abstract. The characteristics of computer software are objective, detailed, accurate and synchronization. Microsoft Visual VC + + 6.0 is a strong compatibility, visualization and object-oriented process oriented development tools which could be utilized in exploitation on-the-spot Statistic data visualization software in Volleyball Matches. Visualization software is an objective, accurate, synchronization, economy, Compatible and easy to operate, which conveys a full digital, scientific information to the coaches, the software not only deliver comprehensive digital, visualization, scientific information to coaches, which increase the possibility of winning the match, but it also could be applied in preparation before matches and training after matches.

Introduction

Visualization technology have been applied in the twentieth Century 80's, which means to show the complex data or graphics / image in the form of high immersion (or telepresence) display environment in real time, make the person have an intuitive, accurate understanding of the data, and provide the means for interaction with the data. The ideas of visual object oriented VC++ language, development of computer visualization software as a tool, with simple operation on both sides turn key details and corresponding spot synchronous description and statistical processing, namely, quantitative analysis. Coaches can get high efficiency visual image message, thereby increasing the chances of winning. At the same time it can also collect intelligence in preparation and provide full-scale digital and images information training after matches.

Development and Running Environment

Development Platform. Software: operating system is Microsoft Windows XP Professional, development tools is Microsoft Visual C++ 6, database system is a Microsoft SQL Server 2000.

Hardware: P4 level of PC machine and notebook computer.

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Development Tools. Development tools Is the Microsoft Visual C + + 6.0, which is a very good development tools. Visual C + + using the object oriented programming language C + +, therefore its expression ability is very strong, mainly reflected in the programming statements and error handling process.

Microsoft has combined C + + and their distinctive visual programming technology in early 90s last century. After these years development, Visual C + + has become the first choice for many program designers. Visual c + + now is more than a C + + compiler. Visual C + + is a comprehensive application of integrated development environment, which make full use of the C + + object-oriented features to develop professional Windows program. It can provide edit function for auto generation code and visualization resources.

The Database System. The database system is a Microsoft SQL Server developed by Microsoft Crop. SQL Server is a database management system by using Transact SQL as its database query and

programming languages. TSQL is one of the SQL (structure query language), support ANSI SQL-92 standards. SQL Server has many advantages, easier inputting message, good compatibility, etc., it also has a good performance in electronic commerce and data warehouse management simultaneously. SQL Server security mechanism is perfect. Those merits make SQL Server has been widely used in many fields. We choose this system in consideration of MS SQL Server large amounts of historical data could be stored. Microsoft Access was adopted in developing system at Preliminary work; Microsoft Access is a small database system which can basically meet the requirements of the system running normally.

System Design

System Structure. This system is used for collecting vary data in match, statistics will be displayed in form of visually data graphic on the screen, the coaches and athletes will learn accurately what happens in a constantly changing environment simultaneously, which help the coaches and athletes made a correct and scientific decision on-site. It is called "To know the enemy and know yourself, and you can fight a hundred battles with no danger of defeat."

According to the actual requirement in practice, this system consists of the following four relatively independent function modules: Data visualization acquisition module; the classification display module; Statistics present module; Data caching module. The links between modules as shown in Fig. 1.

It can be seen from the graph, there is no direct link between the first three function modules, and they are all sharing data through the data cache center. The advantage of this system is that there is no interference between modules, the modules are running well. Data cache is the bridge among various modules, which store the figures; some of the data will be permanently stored in the database. These data will contribute to future decisions making.

Visualization data acquisition. Visualization data acquisition module mainly contains the following sub-modules:

The court simulation modules: to display data acquisition of the playing court. Users can click the left mouse button in the "court " to represent drop point of the ball, through operate the keyboard stand for the types of hitting style, including passers, setters, attacks, etc. Every click or type on the keyboard information will be stored in the data cache, where collected data further process and analysis were made.

The team member name list module: to show the team's players information .Arrange the player to proper position in simulation "court" by dragging players in "rectangle" court. The starting lineup can be determined and substitution (include libero defensive player).

Score chain module: to show the score chain. Scores in the chain of different background colors represent the different means of scoring, including serving, attach, offensive tactics, blocking, fails, and so on.

The controls module: to coordinate the above three sub-module's. Control module can be used in tracking the course of the game, such as score, substitution and so on, which completely synchronizes with real match.

Classification data display. Classification data display module is composed of five similar functional sub-modules; they are used to record and display the serve point, attach and defense process, the counter-attack of setter and the passing pattern of the toss respectively. To achieve the above five modules are relatively simple, which obtain synchronal real match data from the data cache center, and show this digital information on the screen.

Statistics show. Statistics show function is simple, which obtain synchronal real match data from the data cache center, and show this digital information on the screen.

Data cache center. Data cache is center the core part of the whole system. It's the data transfer center and data processing station. The information collected from mouse clicking and keyboard inputting, it is necessary to combine the real match and synchronization data, moreover, all data should be preprocessed so that the system can generate and display related statistics data, which are strictly synchronized with real match.

Statistical and Analysis. Some of the statistics and analysis work in this system were shown synchronized with real match, some of the statistics depended on data query function. In this system, statistics and analysis function include following parts: Figures: the sets of the match, serve point, attach and defense process, the counter-attack of setter and the passing pattern of the toss. Description words: attack situation in each position, scores, the passers quality and defensive situation of the players/team, scores and lose of the players/team, and the situation of the Libero defensive player. Here is a brief introduction of some statistics, analysis rules for reference:

Serve point: a serial number were adopted to record the certain ball hit sequence in current record, The serial number starting from 1, recorded each hit of the ball, from serving ball to fallen on the ground. It's obviously that the Numbers 2's Serve point in each set must be the Serve point as well as the position of passer.

Passer's accuracy. When selecting the passer's location, you just need to press the space key to record this information on condition that the passer is in designated spot, otherwise, don't do any operation. If you found that the record of each hit is complete, and then you can start to do the corresponding statistics mission.

The toss lines. Similar to the Passer's position method, the difference lies in press "S" key to record tosses'' pass route after choosing position. When we found the S marker in analyzing work, the wire links between the position of this hit to next hit is the tosses' pass route.

Attacks statistics: We need to press "F "in every attack as well as mark the position (except no offence or handling the ball, because it's not attack from technical point view), when we analyzing the collected data, the attack times should increase with the increase F mark(decided by the fall point system).

All of the rules above can be traced the ball hit players.

Query. More information synchronously shows up in the match, so the query function primarily provide technical statistics, including serve, pass route , attack route, blocking, defensive lifting, Libero defensive player, passer's and defensive circumstances, scores and lose, continuously scores or loses, tactics, every scored information of the team. Unlike statistics and analysis, we need use query function which extracts information from the database to analyze the result rather than synchronized operating process.

Database Design. According to the characteristics of the volleyball match, coaches must focus on analyzing the various comprehensive elements in attacks and defensive rhythm, learning more information on-site, with the simplicity input mode program. Thereby we can establish various statistics databases with the help of visualization statistical analysis software. Every score gains through attacks and defensive in volleyball match, each set is in a particular condition. Statistics data collected on such platform are more scientific. After full understanding of the offensive information, coaches can select critical details in attack and defensive rhythm depend on the different situation on-site. Such as every players serve point, toss route in each set, first attack, counter-attack, the route and fall point of the ball during the first attack and counter-attack, and display the fall point details in the form of visual image as the main content. By using convenience query function, we can compare both sides scores in a certain set, Chain, score future, the players attack statistics, passers' statistics, defensive statistics, strategy and block statistics, etc.

Data used in this system mainly include: team information competition information, detailed record of the match, scoring record, etc. Their structure is as follows:

The team information: id, name, coaches, team leader, athletes arrangement (one-setter or two setters)

Match Information: sequence number, abstract, team 1 and team 2, winner, scores in each game, and date.

Detailed record of the match: serial number, sets, ball touch sequence of the team and players, the team's current score , the ball fall point information.

Score record: the serial number, sets, scores, scores (team and players), score method.

These graphs associated with each other through some shared information.

The Mode of Operation. The main operating mode is using mouse click operating area in match scene on the screen, volleyball match simulation scene include: site, players of both sides (players and substitutes), Pause, substitution, exchanged field and other elements concerned, so that the operator can possibly complete all operation through click the mouse. For convenience operation, the starting lineup is arranged by drag one of the player in the list to the specify position on simulation court. Substitutions (include Liborio) are arranged in the same way. The merits of such mode are that the computer technology requirements of the operator are relatively low. This operating mode can avoid many inconveniences of keyboard operation; it's suitable for all level coaches, and the software is easy to popularize.

Summary

To use VC + + program a volleyball visualization statistic analysis software is practicably and scientifically, it has excellence features in correspondence situation of the both sides in each sets, strengthen the automatically visible of statistical data, enhance the arrangement tactical more scientifically, etc. With powerful functions, sharper images, the visualization software's statistical data become more intuitive and instructive.

Software programmed by the VC + + programming tools is simple, inexpensive, intuitive and fast response, etc. It can create related volleyball game statistics software, which help coaches and athletes have a comprehensive, synchronize and intuitive understanding of both sides, such as compare of attack and defense details. Coaches and athletes could correlate past experiences so as to adopt suitable tactics in different situation. It can enhance the scores opportunities in tail wind situation, and ensure score much higher, and vice versa. That is called to win through foster strengths and circumvents weaknesses.

Easy to operate and practical, the operator can collect information by click the mouse, this operating mode avoid many complicated operation, with relatively low computer technology requirements, which can be very skilled in a short time practice. And it's suitable for different kinds of coaches.

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