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RESEARCH ARTICLE

RESEARCH ON THE TEACHING SYSTEM OF TABLE TENNIS BASED ON ARTIFICIAL INTELLIGENCE

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ARTICLE DETAILS

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ABSTRACT

Research on the evaluation index system of the technology and tactics of table tennis match. Based on previous studies, we constructed the table tennis technical and tactical Index System, which combines technology and technology system placement, including the serving technology, forehand loop technique, backhand loop technology, pick playing techniques, splitting technique, short swing technology and block shot technology. Placement was defined according to the technical characteristics, respectively. Tactical system is the integration of the tactical behavior and hitting timing. Tactical behavior includes four categories: attack, defense, control and the balance of power. Hitting timing was divided into three kinds of classification.

KEYWORDS

Artificial intelligence; table tennis match; technique and tactics; diagnosis; evaluation; prediction; application research.

1. INTRODUCTION

Research on the techniques and tactics of table tennis match has subject to achieve from qualitative to quantitative and then to the combination of these two methods in research of transition. Means also developed from relying on the past manual statistical to the modern computational methods and computer technology. The ball games computer simulation diagnosis provides a new research idea for table tennis game tactics diagnosis. Some studies have attempted to combined artificial neural network methods with computer simulation diagnosis of all games, but technical and tactical indicators generality restrict its training and competition practice application (Mangasarian Discovery.2012).

The essay selects the best table tennis players in World Championships over the past five years, the world cup and the Olympic Games and other 368 screenings. It uses the task group developed 'table tennis technical and tactical collection system' and collects the tactical and technical index of data in every game.

The technical and tactical analysis of the research process and the development of related software follow the software engineering method. Mathematical modeling method mainly refers to the rejection of neural network method, the decision tree method and rough set method, which was studied for the table tennis match (Chakrabarti S, Sarawagi S, Dom b. 1998).

2. MATERIALS AND METHODS

2.1. Research on diagnosis and evaluation of technical and tactical

In the table tennis competition, only objective analysis and understanding of the technical and tactical characteristics of opponents, and specific training and arrangement of competition tactics could help people defeat the enemy. Table tennis technical and tactical diagnose and the significance of assessment lies in setting a starting point for training plan providing reference for game Paibingbuzhen, ranking table tennis game tactics diagnosis and assessment generally experienced from qualitative to quantitative to qualitative and combined quantitative through determining the training effect by the analysis of the competitive strength of both sides by the index of general to specific analysis, from manual to computer aided analysis to human-computer interaction, by simple mathematical statistics to data mining and decision support process (Mackay D J C.1992) the strength of the players. The overall process of the design is shown in Figure 1:

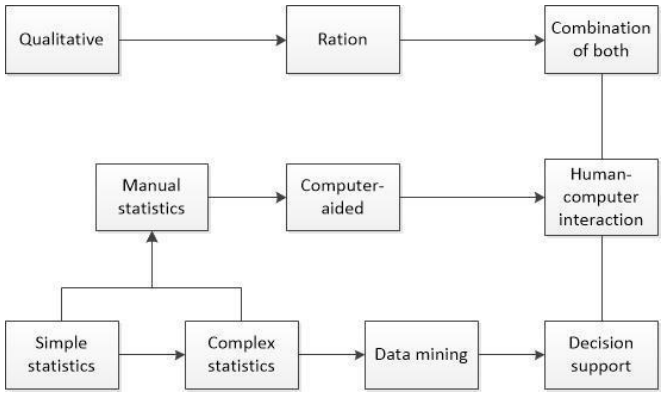

Figure 1: evolution of technical and tactical diagnosis and evaluation methods

2.2. Methods of artificial intelligence

Artificial intelligence is to use artificial method to achieve the intelligence

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on a machine. The research field of artificial intelligence includes knowledge representation, expert system, machine learning (decision tree learning and rough sets learning), pattern recognition and artificial neural network and so on. Machine learning mainly focuses on how to make the computer is similar to people's ability to learn. Artificial intelligent decision-making method will be introduced to the idea of artificial intelligence in knowledge representation and processing in decision theory. Applying theories and methods of management science, computer science and related disciplines to analyze and compare data, which provides intelligent help for managers to make the right decision (FaSryad U M.1996).

Because of its high accuracy and high modeling speed, the artificial neural network has been applied in the sports field. Existing research areas include the game modeling, diagnosis and prediction and so on, such as predicting results of ball games, racing ranking and greyhound racing in the winner.

With the development of computing technology, the artificial neural network has a great development potential. At present, some scholars have used it in the field of data mining and pattern recognition. A specific neural network can meet a specific field of application through training, such as pattern recognition, data classification, etc..

Rough set is a mathematical tool to deal with inconsistent and uncertain knowledge. The main idea is: to keep the same classification ability and give an approximate description of the existing problems. Its greatest advantage is that it does not need to provide any prior information about the analysis of the problem. Rough set theory has been widely used in process control, decision support and knowledge discovery (Aggarwal C C2002).

Research on the evaluation and prediction of table tennis match technology and tactics based on artificial intelligence. On the basis of technical and tactical diagnosis, we try to evaluate the table tennis match.

The significance, method, principle and operation process of the technical and tactical evaluation of table tennis match are discussed. The evaluation process is divided into two ways, the evaluation of different players and the evaluation of a player's own. The results show that the evaluation method based on artificial neural network is workable, and the results of the evaluation reflect the fairness, which can reasonably distinguish the technical and tactical strength of the two sides of a game. On the basis of technical and tactical assessment, we do a preliminary prediction of table tennis match. The meaning, classification and process prediction are discussed. We studied methods based on the combination of decision tree and artificial neural network forecast method, and used it to predict the state of skill and tactics of the excellent table tennis player. The two methods of neural network prediction and combination forecasting are compared and analyzed from the training time and forecasting precision.

The prediction results of the crime of criminal field show that the precision of the combination forecasting is 0.9285, which is close to that of the neural network, but the time is 18.61%.

2.3. Research on sports forecast

Sports forecast refers to the future tendency of sports decision makers adopting some kind of prediction method to predict the future of sports development. Mathematics and computer science are more and more involved in sports prediction. Technical and tactical diagnosis and evaluation of table tennis match can explore other areas of the more mature technology, models and methods and use them. The use of computer software can make the data collection more accurate, simpler and faster. The application of database technology can store vast amounts of data in the form of relational data $X_1, X_2, X_3, \cdots, X_n$, which can provide a safe and stable basis for the establishment of evaluation model $X = \sum_{i=1}^{n} X_i$.

$$\frac{1}{f(t)} = e^{-iat} \tag{1}$$

$$f_X(t) = Ee^{it(X_1+X_2)} = Ee^{itX_1} \cdot Ee^{itX_2} = f_{X_1}(t) \cdot f_{X_2}(t) \tag{2}$$

The use of mathematical models can find the hidden information that cannot be found in many mathematical statistics methods from the point of view of data mining.

The technical and tactical diagnosis and evaluation of table tennis match should be used to explore a method which can not only measure the overall strength of the players but also understand their individual ability. Current research is developing in two directions: abstract and concrete. The former is to make a simple and efficient assessment of the competition and the requirements of the system is as simple as possible. The latter is to assess the game technology and tactical characteristics more detailed and strive to make the assessment system to become specific, which also makes the evaluation of the effectiveness of the table tennis match significantly reduced. This requires the researchers to find the proper middle layer between the two.

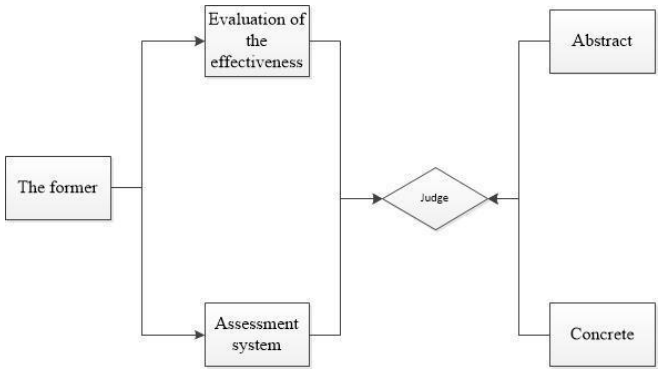

Figure 2: The distribution function can be determined by the characteristic function.

3. Results

The most important tactical behavior of men's table tennis players is the third shot for attacking and receiving control. The tactical behavior that Women's table tennis athletes use mostly is aggress and receiving after the formation of the balance of power. The most important tactics is to rob a stalemate and balance of power. Compared with foreign athletes, Chinese men athletes serve after controlling for catching and control has better; but the defense significance to the foreign athletes is relatively large; offensive tactics is still that Chinese elite women table tennis players mainly adopts the tactics; Receiving the ball after formation of stalemate tactics is very important to the decision of foreign women.

The study of artificial intelligence methods in the table tennis game tactics diagnosis, evaluation and prediction of the the system research, method of artificial intelligence diagnosis were comparative study. It improves the technique and tactics of table tennis match based on artificial neural network and realize the technical and tactical diagnosis of elite table tennis players. It is used for the preparation of the competition and the opponent analysis. In the end, the results are recognized by the coaches, but there are still some research that needs to be further explored.

(1) Predicting the future trend through the current state of technology and tactics is the direction of technical and Tactical Research, which could be used to discuss other methods that used for the prediction of table tennis match.

(2) Deepening the understanding of the inherent law of the techniques and tactics of table tennis, this easy uses plate (beat) way of diagnosis technology that can objectively reflect the technical and tactical players ,and board (beat) for tactical sequence research will make the diagnosis more convenient for decision support.

4. Conclusion

This paper is on the basis of the construction of table tennis technical and tactical diagnose. The method based on artificial intelligence diagnosis method has carried on the comparative study of table tennis technique, and on this basis, a preliminary assessment of the prediction research, based on artificial neural network method in diagnosis of table tennis technique is improved. Diagnosis results are more clear, and evaluation results is more likely to match the reality and prediction results are more scientific, which can be easily used to diagnosis and decision support technology and tactics.

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