Research on Football Training Monitoring and Evaluation System Based on Improved Potential Field Method

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Abstract: Football training monitoring and evaluation system is a burial machine management system based on the actual needs of football team training and competition. Therefore, based on the improved potential field method, the author studies the football training monitoring and evaluation system. The research shows that the improved potential field method is helpful to monitor and evaluate the pursuit of training. It can effectively monitor the whole process of football training to promote many unreachable problems that can effectively solve the problem of target unreachability when there are obstacles nearby. In addition, it is also suitable for the coaches to design and evaluate the training course, so that the training is more systematic, standardized and scientific, and has good application and promotion value.

1. Introduction

The number of athletes is large and the training content is complicated. This feature determines that football training needs to be grasped and grasped, and it is difficult to teach students in accordance with their aptitude [1]. The football competition is a high-tech confrontation activity carried out in recent years. As a platform to study the multi-agent system and its coordination problems, in the course of the game, in order to win the game [2]. How to plan the athletes' movement to prevent the athletes from colliding with each other to "top cow" and meaningless collision, so the athlete path planning is an important part of the athlete's football game [3]. Athletes' collision avoidance control is an important part of the athlete's football competition. The methods include improved potential field method, grid method, genetic algorithm, etc. [4]. With the continuous study of artificial intelligence, various types of athletes are gradually applied to industry, agriculture and people's daily life [5]. Among them, how athletes get there is the so-called path planning problem, which is an important branch of the athlete research field. It mainly refers to how to obtain information about the external environment and find a way to avoid obstacles from the starting state to the target state in their works pace [6]. His purpose is to study artificial intelligence and intelligent athletes through football matches. The development of science provides a symbolic and challenging subject.

In the current competitive environment of professional league, coaches have too many problems to consider. How to do a good job in spring training every year, how to find satisfactory foreign and domestic aid, how to do a good job in the education and management of the team, how to train around one or two matches a week, etc. [7]. The International Federation of Athletes and Football (IFRA) holds the World Cup of Athletes every year. MIROSOT is one of the events. Repulsive force keeps athletes away from obstacles. Because of its simple structure and easy real-time control at the bottom, potential field method has been paid much attention to in football path planning, and has achieved good results in some colleges and universities [8]. Deep Blue won the chess championship in 1982 and was hailed as a milestone in the field of artificial intelligence. After the 1990s, with the development of artificial intelligence methods and extensive application [9]. Artificial intelligence has also made great progress in the path planning method of athletes. The most widely used algorithms are fuzzy methods, neural networks and genetic algorithms. Under the heavy and complicated work and the great mental pressure of the league, the coaches can concentrate on training and become an important part of the level of the team. The traditional

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improved potential field method cannot meet the requirements of the competition [10]. The collision avoidance method proposed in this paper is an improved improved potential field method for the collision avoidance control of football players.

2. Assessment of training sessions

The purpose of the training class assessment is to improve the quality of training and improve the technical level of football. On the one hand, it can be used as a coach to understand the training situation and the basis for designing the training course. On the other hand, it can also be used as a means for the Football Association or the superior authorities to understand the training situation. There are irrelevant obstacles, cooperative obstacles, competitive obstacles. When one of the athletes of the party is performing the action, the ball is an irrelevant obstacle for the other athletes of the party. When one of the athletes of the party is exercising, the other athletes of the party are its cooperative obstacles; the other athletes are competitive obstacles of the athletes of the party. In this way, the athlete is pushed away and cannot reach the target. In the previous literature, this situation was rarely considered. The improved potential field method was first proposed by Khatib, and the potential function related to position was used to control the obstacle avoidance of athletes. However, the local poles will inevitably be generated by using potential functions only related to position. Because adding speed information can eliminate local poles to a certain extent and eliminate unnecessary interference to obstacles that do not pose a threat to athletes, the hypothesis of potential field is more reasonable and more suitable for application in dynamic environment. The purpose of path planning is to enable athletes or other agents to follow the map information stored in them. Or a better collision avoidance path can be planned according to the guidance signal provided by the external environment, that is, the information obtained by real-time detection of the external environment, and can move along the path to the predetermined target point without manual intervention.

As for this kind of research, the number of research literature in our country is increasing, which is escorted by Chinese scholars. Fig. 1 shows the increasing and decreasing trend of research on football training monitoring and evaluation in recent years.

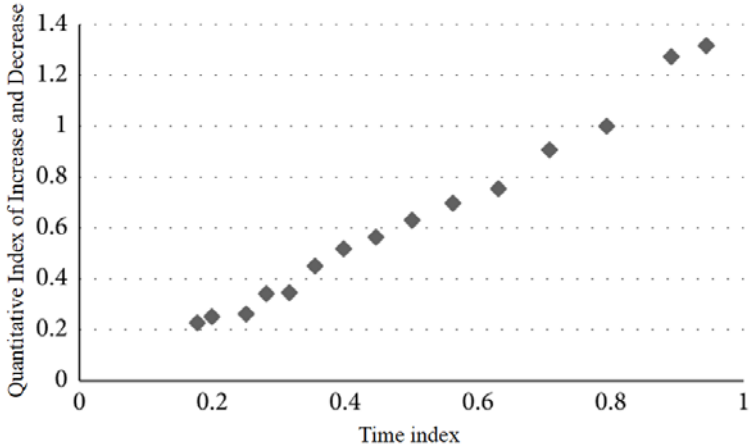

Figure 1 The Trend of Increase and Decrease in the Number of Research Projects in Recent Years

When the obstacle moves towards the target, its speed direction is opposite to that of the athlete, so the velocity potential field force is increased, so the athlete is pushed away. If the two directions are the same, the value of the velocity potential field force produced is very small, and it will only have a small impact on athletes, even can be ignored. There are circular virtual force fields around football players. Each ring is represented by the width of the ring and the coefficient of repulsion of the ring. The repulsion force between football players is shown. The force field around players can be adjusted by setting the parameters of each ring. Because the form of the training class and its training methods are various, the coach can only judge the training situation subjectively, which inevitably causes artificial deviation. The above characteristics of football players avoiding the

challenge pose a challenge to the traditional collision avoidance control of athletes. In particular, between the judgment class and the class, the evaluation of different classes between different teams is difficult to do. When summarizing the training situation at a certain stage or even the whole year, it is even more difficult to judge by only the artificial method. . Therefore, it is necessary to carry out research to correct the attractiveness and repulsion function representation. The training course evaluation method provided by this system can help the coaches overcome the above shortcomings and standardize the training course, standardize and scientific.

3. Football training monitoring and evaluation

This part is designed to provide coaches with a simple and practical team game management tool, which includes three aspects: team members, match categories, and game statistics. Since the obstacle is near the target, the value of the potential field function is not the smallest at the target point, and the athlete cannot reach the target. The core is the record of the game, including the time, location, category, field, opponent, home and away, goals, and number of goals. So the problem with this method is that when the obstacle is close to the target point, the attraction is reduced, the repulsion is increased, and the athlete is pushed away to reach the target, so it is necessary to make corrections. The application of path planning technology is very extensive. Whether it is a joint athlete or a mobile athlete, the application of path planning technology is necessary or necessary in all places where there are athletes. Athletes walk smoothly, without too many corners, and can completely avoid obstacles. Path planning is to give the initial position and target position in an obstacle-ridden environment, according to certain strategies, so that athletes can safely, collision-free and real-time through all obstacles to reach the target position. In the process of athletes' movement, there are many goals for the performance of the path, such as the shortest path, the best time, the best safety performance and the smallest energy consumption.

The players' competition situation mainly records the players' participation time, the number of goals, the number of red and yellow cards and the performance score. The purpose of introducing competition performance score is to give coaches a comprehensive evaluation method of players' competition situation. In complex environments, especially in dynamic time-varying environments, athletes' path planning is very complex and requires a lot of calculation. In order to achieve obstacle avoidance, it is necessary to know the position of athletes at the next moment. Combining traditional improved potential field method with inertia prediction method, dynamic obstacle avoidance can be achieved. There are geometric and physical constraints in athletes' sports. Geometric constraints refer to the shape constraints of athletes, while physical constraints refer to the speed and acceleration of athletes. Because the football game is a complicated process, subject to many factors, many aspects are invisible and intangible, and cannot be assessed with hard indicators. These aspects are often very important. The environment on the field of football players is constantly changing. The path planning belongs to an unknown and dynamic path planning and control of the working environment. The path planning method studied on such a platform can be applied to other athlete application environments to accomplish practical tasks. The path taken is completely straight walking. Only when obstacles are encountered, the obstacles are avoided, a superior curve appears, and finally the end point is successfully reached.

4. Conclusions

In summary, the football training monitoring and evaluation system is a computer management system developed based on the actual needs of football team competition training. In the traditional improved potential field method, the speed and acceleration vector of the obstacle are added to correct the angular direction of the potential field, which is equivalent to changing the original static potential field into a dynamic potential field, so it can meet the requirements of dynamic collision avoidance. In order to solve this problem, the new potential field method's repulsive potential field function is proposed to consider the distance between the athlete and the target and the obstacle. It ensures that the athlete has the least potential in the target position. When the obstacles are more,

the situation is difficult to predict. It is more difficult to control when adding the velocity field in the dynamic environment, which makes the use of the artificial potential field method very limited. Therefore, this research is a focus of our future work. Because the traditional improved potential field method is derived from the static obstacle avoidance research, its adaptability is poor. If there are irregular obstacles or competitive obstacles, it is easy to cause collision. Combining potential field method with inertia prediction method to control athletes and adding inertia prediction into traditional improved potential field method is equivalent to changing static potential field into dynamic potential field, which can better meet the requirements of dynamic obstacle avoidance. The system is convenient for scientific supervision and guidance of the training and management of various sports teams, and is conducive to the overall improvement of China's football level.

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