Proceedings of the 4th International Conference on Signal Processing and Machine Learning
DOI: 10.54254/2755-2721/47/20241384

The application of artificial intelligence in MOBA games

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Abstract. With the development of science and technology, artificial intelligence (AI) has developed rapidly and made great progress in various fields, and its application in the field of electronic games has also continued to expand. Currently, front-end companies in all major gaming fields are trying to apply AI technology to games. This article will review some specific application projects of artificial intelligence in Multiplayer Online Battle Arena (MOBA) games, and explore its application, impact and future development direction in games. The paper found that AI can currently adapt well to the game development rhythm of MOBA games, helping developers solve many problems related to game design or enhance the fun of the game, such as: using AI to improve the intelligence of intelligent non-player characters (NPCs), helping to adjust and improve Game balance and adaptability, as well as helping to predict game results and improve players' gaming experience. In the future, AI will not only be further used in MOBA games, but many games will also apply AI to games to achieve game development and market competitiveness.

Keywords: AI, MOBA, NPC, Balance, Forecast.

1. Introduction

As one of the most popular multiplayer online game types today, Multiplayer Online Battle Arena (MOBA) games attract many players through team collaboration and strategic battles, and are an important part of the gaming field. The development of artificial intelligence technology has brought many new innovations and opportunities to this type of game. This article will focus on the application of artificial intelligence in MOBA games, including intelligent non-player characters (NPC) characters, game balance and adaptability, game outcome prediction, and improving player experience. This paper conducts research in the form of survey method. Studying the application of artificial intelligence (AI) in MOBA games can provide a deeper understanding of the role and development prospects of AI. MOBA games are complex team cooperation and control games. The use of AI can help players better understand and master the rules of the game. Relevant game industries can use AI to solve complex problems in games and improve the game environment to enhance their competitiveness; this paper will explore the application of AI in MOBA games and provide valuable reference for subsequent researchers.

2. Background relationship between current artificial intelligence and MOBA games

Currently, artificial intelligence and MOBA (Multiplayer Online Battle Arena) games are in a stage of rapid development. In the field of artificial intelligence, more and more technologies are being used in game development to enhance the game experience. Artificial intelligence can be used to improve game

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graphics, generate game content, balance game difficulty, etc. For example, through deep learning and computer vision technology, game graphics can be more realistic and enhance the sense of substitution. In addition, artificial intelligence can also generate game scenes, tasks, characters and other content to enrich the playability and sustainability of the game. At the same time, artificial intelligence can also be used to analyze player data, adapt to the player's gaming style, and provide a personalized gaming experience.

MOBA games are also booming. This type of game features 5-on-5 real-time online battles, attracting the participation of a large number of players. There are many popular MOBA games on the market currently, such as "League of Legends" and "Honor of Kings". These games provide a variety of characters and strategic gameplay. Players need to reasonably control their characters, cooperate with teammates, and attack the enemy's base to win.

As technology advances, artificial intelligence and MOBA games will continue to develop. The application of artificial intelligence will further optimize the game experience and improve game quality. MOBA games will continue to innovate, introduce more innovative elements, and also bring in the help of artificial intelligence to meet the needs of players.

3. Application of artificial intelligence in MOBA games

3.1. Intelligent NPC character

Intelligent NPC (non-player characters) are one of the common applications of artificial intelligence in game development. By using artificial intelligence technology, game developers can give NPC more realistic, natural and intelligent performances, improving the interactivity and play ability of games. Intelligent NPC can continuously learn and adapt to player behavior through machine learning and deep learning algorithms, with more realistic and intelligent performance, bringing players a richer gaming experience.

The application of artificial intelligence in intelligent NPC has the following aspects:

Behavioral decision-making: Artificial intelligence can provide intelligent NPC with intelligent decision-making capabilities, allowing them to respond appropriately to different situations in the game. Through algorithms and logic, intelligent NPC can judge when to attack, defend or escape based on the player's behavior and game rules, making the game more challenging and interesting.

Autonomous learning: Intelligent NPC can continuously learn through machine learning algorithms to improve their intelligence level. Developers can use reinforcement learning algorithms to allow intelligent NPC to continuously trial and error in the game, constantly adjust strategies, and improve their own skill levels. This makes intelligent NPC more intelligent and adaptable in the game [1].

Conversational interaction: Artificial intelligence can also be used to achieve natural conversational interaction with players. Through natural language processing and speech recognition technology, intelligent NPC can understand the player's instructions and questions, and give corresponding answers and feedback, increasing the immersion and realism of the game.

Emotional expression: Artificial intelligence can also give intelligent NPC the ability to express emotions. Through emotion recognition technology, intelligent NPC can express emotions such as joy, anger, sorrow, and joy based on the game plot and player behavior, increasing the emotional resonance and sense of immersion in the game.

The application of intelligent NPC makes the non-player characters in the game more realistic, intelligent and personalized, bringing players a better gaming experience.

3.2. Game balance and adaptability

Artificial intelligence in video games can help maintain system balance and improve adaptability. Specifically, the following are applications of artificial intelligence in this regard:

Balance testing and optimization: By using artificial intelligence algorithms, the game can be balanced tested to simulate players' gaming experience under different situations to discover imbalances and propose optimization strategies to provide a more balanced gaming experience.

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Dynamically adjust game difficulty: Artificial intelligence can adjust the difficulty of the game in real time based on player performance and feedback data. By analyzing the player's skill level and game behavior patterns, artificial intelligence can automatically adjust the intensity of enemies, the design of levels, and the distribution of props to make the game more challenging and interesting, and ensure that players do not feel bored or too difficult [2].

Automatically generate game content: Artificial intelligence can be used to generate game content such as maps, tasks, and characters. Through deep learning and generative models, artificial intelligence can automatically generate rich and diverse game content based on game settings and player needs, increasing the playability and sustainability of the game.

Intelligent enemies and allies: Artificial intelligence can give intelligent behavior to enemies and allies in the game. Intelligent enemies can make intelligent decisions based on the player's behavior and strategies, providing a more challenging battle experience. Smart companions can collaborate with players to provide better game interaction and combat strategies [3].

To sum up, artificial intelligence in electronic games can help the game maintain system balance and improve adaptability through balance testing, dynamic difficulty adjustment, generating game content, and imparting intelligent behaviors, so as to provide players with a better gaming experience.

3.3. Prediction of game results

In the field of artificial intelligence, the establishment of mathematical models is important. Through digital models, data can be analyzed and predicted more accurately, thereby improving the intelligence level of artificial intelligence systems. At the same time, the development of digital models also helps artificial intelligence continue to advance, making it more reliable in practical applications.

The process of artificial intelligence using mathematical modeling in game outcome prediction is as follows:

Collect game data: Artificial intelligence first needs to collect various data in the game, such as character attributes, map design, player behavior, etc. These data will form the basis for building mathematical models.

Establish mathematical models: Based on the collected game data, artificial intelligence will use mathematical methods to establish corresponding mathematical models. Mathematical models can be various forms of mathematical equations, statistical models or machine learning models.

Training the model: Next, the AI uses the training data set to train the established mathematical model. Training datasets typically contain historical game data and corresponding game results. By analyzing and learning from this data, AI can adjust model parameters to improve prediction accuracy.

Predicting game outcomes: Once the mathematical model is trained, artificial intelligence can use this model to predict game outcomes. Based on the current game situation and existing data, artificial intelligence can be input into the mathematical model and output corresponding game outcome predictions [4].

To sum up, the process of artificial intelligence using mathematical modeling to predict game results includes steps such as data collection, mathematical model establishment, model training and result prediction. Through these steps, artificial intelligence can analyze and predict various outcomes in the game, providing a better decision-making basis for game developers, while providing players with a better gaming experience.

The following is a practical example of AI in game outcome prediction. One study used mathematical modeling and machine learning methods to predict winners in Overwatch. The researchers collected a large amount of game data, including information about players' character choices, in-game activities, and final game results. They then used mathematical modeling and machine learning algorithms to analyze this data and build a model to predict a player or team's probability of winning in the game.

Specifically, they used a machine learning algorithm called a support vector machine. This algorithm predicts the winner of a game by analyzing various data characteristics of a player or team, such as team composition, character selection, and in-game activities. By training the algorithm, the model can learn

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and identify the relationship between different features and victory probability, and make predictions based on the current game state.

The results of this study showed that the model they built achieved high accuracy in predicting the outcome of Overwatch matches. This shows that using mathematical modeling and machine learning technology in game outcome prediction can provide game developers with a better decision-making basis and help players obtain a better gaming experience [5].

This is a practical example of artificial intelligence building a mathematical model to predict the outcome of a game. By collecting game data, building mathematical models, and using machine learning algorithms for training and prediction, artificial intelligence can help improve the accuracy of game outcome predictions and provide better references for game developers and players.

3.4. Improve player gaming experience

3.4.1. Optimized matching algorithm. During the peak period of the game, AI can optimize the matching algorithm and improve the player's matching experience. When the matching cannot be balanced, AI can add some robots to the game to ensure the player's matching experience. In addition, AI can optimize the matching mechanism and arrange opponents of equal strength into the same game to improve player experience [6].

3.4.2. Improving the performance of robots in the game. Through AI learning technology, the AI in the game can perform better. For example, in the game "Arena Breakout", the official used AI technology to optimize the behavior of the robots in the game. Not only do they walk and attack enemies but they also seek cover and send out signals when attacked. This change undoubtedly enhances the realism of the game and improves the player's gaming experience.

4. Conclusion

This paper mainly discusses the application of AI in MOBA games. The application of artificial intelligence in MOBA games is gradually becoming an industry trend. Through the application of intelligent NPC characters, game balance and adaptability, game outcome prediction, and improved player experience, artificial intelligence has brought more innovation and opportunities to MOBA games. This paper has not conducted in-depth discussion and research on the role of AI in the initial stage of game development. In the future, the further development of artificial intelligence technology will continue to improve the expressiveness and entertainment of MOBA games, bringing players a more exciting gaming experience.

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