

Cpt575_SurveyPaper

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1 Abstract

With the development of Artificial Intelligence, various of video games also attract a lot of people. This article introduces the application of Artificial Intelligence technology in different aspects of video games like intelligent virtual game roles and the development and promotion of games. And finally discuss the future of the application of AI on video games, put forward some direction of the development.

2 Introduction

Artificial Intelligence is a kind of technology that can help machine to think or act like human. It tells machines how to analyze situations and make corresponding actions. In the past, it learn models from developers' codes, what model people write down is the behavior it will take. But nowadays, with the appearance of Data Science, it start learn models and experience from data. People don't need to enter fixed behavior pattern anymore, which make machines more human and rational.

Video games, a kind of game that has attracted countless people since its birth. It depends on digital technology and equipments, so AI has a very close relationship with it. From its development method, game construction to planning and promotion, also includes the basic technology like Virtual Reality, all of these fields are using Artificial Intelligence technology and Data Science.

3 Development Progress

3.1 What it used to be

In the 1980s, the appearance of "Pac-Man" and "Half-Life" set off a frenzy among players. But at that time, Artificial Intelligence was not strong enough, so what the game roles in "Half-Life" are really simple. It like a single reflection machine that when facing with a situation, it will check the if-then rules written by developers and do the reaction according to the if-then rules. So, it looks like a gear, if we don't touch or move it, it will not act. These game roles do not have any complex action and only have really easy mode of action, it will let players feel so boring. Since when people keep

playing they will find the game stay the same as before. It also bother the game developers, because if they want to let the game to be diversification, they need spend a lot of time to enter the reaction rules for the game roles, but it just slows down the players' boredom, it does not solve the problem.

3.2 The main application nowadays

However, the AI technology in video games has become quite developed and has been used to a lot of different fields. The most significant difference from the past is that the sometimes the virtual game roles are more powerful than humans. Another application is on the development of the cheating detection mechanism. Cheating is really an abomination that most of the players hate these cheating man. If all of the cheating in video games can be identified, most of the FPS games will save many disappointed players. This is reflected in many of my friends. I used to paly PUBG, a famous video game, but there are too many cheaters in this game. With the accumulation of disappointment, my friends and I eventually abandoned this game, although it is really interesting. The third application is in game design and operation. There are so many games nowadays and how to make their comanies' games stand out become a severe problem to the game developers and operators. The appearance of Data Science has been a big boost. They used to use traditional business analysis before, but sometimes it's hard to know what can really decide the sales. But Data Science make it be possible for these companies. The model from the data can help companies know how to design games that can make players keep interested and participating in the games. Also, Artificial Intelligence can help game companies know how to design the advertisement and put in them.^[1]

3.3 Why would have such improvement

What let human can build such powerful robot now? The development of devices is one of the most important reason, because now we have larger memory and faster operators, which help our robots can do more things than before. However, another one reason is that now we have Data Science, with Data Science, we have ability to analyze the large scale data, which contains a lot of information we cannot use before. Also, we can get some new models by algorithms.

4 In Adversarial Game

4.1 Act as a real human

4.2 Analysis how to be a good player

4.3 Defeat the top game player

There is a virtual palyer built by deep learning, called "AlphaStar", it has defeated some of the top players in a human way. It is a new robot build by machine learning like "AlphoGo", but it do not know how to play Go, it can play "StarCraft II", a really complex real-time strategy adversarial game. Which is not possible with the single if-then reflection rules before, because this game has too many status that even more than Go game. The state space of Go is about 10^{170} and the state space of "StarCraft II" may have 10^{1685} . It is far more beyond what human can totally think about. Also, it is an incomplete information game, what we should consider is almost all of these state every second.

5 In Checking Cheaters

5.1 Really a struggle

5.2 What can be done is not possible before

6 In Game operation and Promotion

6.1 What makes people want to play a game

6.2 What let the game make money

7 In the future

7.1 Used in game roles

7.2 Used in gaming device

7.3 Used in checking cheater

8 In conclusion

9 Reference