

Chapter 4

AI in Gaming and Entertainment: Applying Artificial Intelligence Algorithms in a Game

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ABSTRACT

The chapter describes the understanding and the application of the concept of the various AI algorithms that also include reinforcement learning algorithms, which is a great contribution to the decision-making of the AI agents/AI bots. The game consists of player and opponent AI competing with each other in which the goal is to kill the opponent. The game is basically an Action RPG game (real-time combat between the player and AI agents). Wherever the performer has the ability to focus and see on his own stats and the stats of the character, accordingly he can determine the health, mana, strength, XP, and other abilities. The AI bots on the other hand are programmed to follow the player, and depending on the state that it is in and the player's last attack, it makes decisions accordingly and tries to defeat the player. Application of the various AI algorithms on the software Unreal Engine are achieved by C++ programming and blueprint/visual scripting. The game contains player and adversary AI competing with each other in which the goal is to slay the opponent.

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INTRODUCTION

Computer Games have been a great source of entertainment for the young generations and even adults. They have been a part of people's daily life and with an increase in technology, there is also an increase in the quality of the games. Gaming has evolved with time as it started as early as the 1950's when the chess and checker games were written on the computer program. The games gave opponents a run for their money, but the real onset of video games came with the game pong and space wars in the '70s. Back then, these games worked on discrete logic and had two players' concepts. This gave rise to single-player games, where the developer would have to make use of non-Player characters, just to make the game more interesting. These Non-Player characters were not controlled by the player or the user who was playing the game and to do this the developers used stored patterns to decide the action of the non-player character. These stored patterns were the pre-decided outcomes of the user input in the game. The concept of single-player concepts connected the gaming industry with artificial intelligence. Developers used artificial intelligence tools to create more advanced games for example the Pacman introduced air patterns in the maze game, which was a genre usually used by journalists at the time (*Sign in Page*, n.d.).

Nowadays, the advancement of games has increased and even the non-player characters are much more sophisticated and even comes with certain difficulty to win the game. The players and non-Player characters are designed quite precisely as we see the opponents in the games are stronger. Most importantly, the opponents perform according to the behavior of the player instead of following the pre-decided patterns. Artificial intelligence concepts like virtual reality and augmented reality have improved the feel and look of the players and opponents in the game along with achieving the foremost goal of user experience for the users. These concepts have also made room for research and the development of applications altogether. The non-player characters have become more intelligent with artificial intelligence, and they can provide answers according to the user's behavior. An example of this is Watson developed by IBM, a question-answering computer that can provide answers to the users in natural language. This has also led to an increase in user engagement towards the games with time. If we look back now, there is a huge change in the gameplay of the games in the '70s and that of now. The opponents are much more intelligent, and it is difficult to win the game. The computer as the opponent has been trained previously on data based upon the patterns, therefore the player needs to know better than the patterns that have been used. Artificial Intelligence helps to create a real-world environment, that has characters that exhibit human intelligence and behaviors. Apart from the graphics, sounds, and animations, the human-like intelligence and decision-making ability of the opponents provide a great deal of

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