


# Chapter 7


## AI-Driven Player Behavior Analysis and Personalization

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### ABSTRACT

*This chapter explores the application of Artificial Intelligence (AI) to analyze and customize the behavior of individual players in contemporary digital games. It explains the application of AI tools such as machine learning, deep learning, and reinforcement learning to personalize interactions, upgrade systems, dynamic story generation, and gamification to reduce player churn. The chapter also examines sociological and computational theories of player profiling, ethical issues regarding the use of data, and the personalization of immersive gaming experiences through AI technologies. The chapter places particular emphasis on inclusive and adaptive design, and responsible innovation.*

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# **AN INTRODUCTION TO THE EVOLUTION OF THE GAMING INDUSTRY OVER TIME**

## **a. Evolution of the Gaming Industry over Time**

Every decade creates new innovations centred around technological capabilities, such as adding narrative elements and user interactivity, made possible by the increasing computational power over the past few decades. Reflecting on this, I am reminded of the well-known video games, Pong and Space Invaders (Kent, 2001). Although dismissed by many as mere two-dimensional graphics and basic mechanical lines, both of these video games were pioneers and pathfinders for subsequent decades. All changes are closely related to technological discoveries such as 'real-time rendering', the internet, and input sensors for video games, whether motion capture, VR, or otherwise (Sifa et al., 2018).

Over the past two decades, there have been many advancements in video games, such as online multiplayer video games, cloud gaming technology, and the latest generation engine, Unreal Engine 5, which brings video game graphics closer to reality (Sifa et al., 2018). Although the world is still struggling to overcome COVID-19 post-lockdown, Newzoo, a survey institution focused on video game and esports analysis, projects in its latest survey that by 2023, the value of the video game market is projected to reach 184 billion dollars. With revenue estimated to exceed 184 billion dollars, it has been crowned as the largest entertainment industry for the tenth consecutive time. Based on data collected by Newzoo, video games, such as educational and social games, which were once infrequently used, can now be leveraged for conveying history, shaping public opinion, and forming social identity (Gee, 2003).

## **b. The Early Role of AI in Games: Simple Enemies and NPCs**

In the early stages of its development, artificial intelligence in games operated as a static logic system that only aimed to provide basic challenges to players. Non-Playable Characters (NPCs) and enemies in the game did not possess 'awareness' and operated based on scripts and rigid or static patterns, such as Finite State Machines (FSM) and simple pathfinding algorithms like A\* search (Rabin, 2013). A classic example is Pac-Man, where all the ghosts act rigidly, that is, within the confines taught to them from the player's position relatively, without learning or responding to context.

AI at that time was more akin to a marionette that moved by being pulled from one position to another, rather than walking like a creature that has the benchmarks of an imaginative goal. Within this limitation, we could discipline uninspired skepticism.

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