New Metaverse games based on Artificial intelligence

Supervisor: Prof. Hiroyuki KAMEDA
Omar Alotaibi D2120001

1. Introduction of the Metaverse

The metaverse has circulated with the Internet and other technologies for decades. depicts the growth of the metaverse from the inception of the Internet to the first virtual world project with Second Life and contemporary developments by Microsoft and Facebook. Metaverse is a combination of Meta and Universe that was first used in Snow Crash in 1992 to define the matrix. The metaverse is a shared virtual 3D environment or many cross-platform worlds that offer immersive, interactive, and collaborative activities. Many more elements, like items, user identities, and digital goods, can be exchanged between virtual worlds and reflected in the real world.

Recent years have seen an unprecedented explosion of the metaverse, mostly derived from 3D gaming. This is fueled by improvements in hardware (e.g., big data storage infrastructure, wireless communication networks, built-in sensors, and GPU) and software (e.g., resource allocation in communications, language processing, and computer vision) to build the virtual world more solidly and creatively. Unlike the traditional metaverse modality, which limits immersive experience due to insufficient data, the new one not only generates a huge new source of user and behavioral data for enterprises (where users freely make creative content), but also provides a solid foundation for deploying artificial intelligence (AI) in natural language processing, computer vision, and neural interface. A standard metaverse platform should have a virtual world, persistence, scalability, always-on synchrony, financial allowance, decentralization, security, and interoperability.
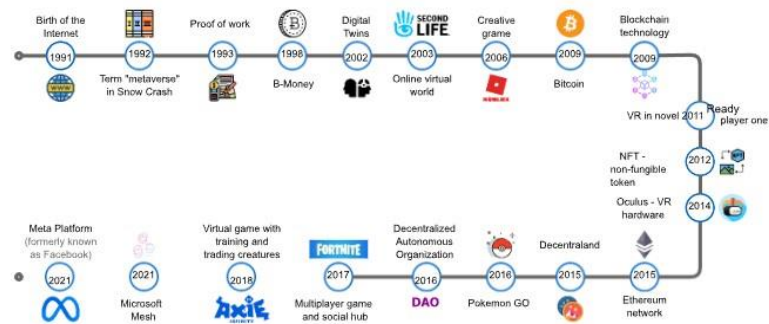
1.1. Artificial intelligence in video games

Artificial intelligence (AI) in computers and video games is the technology that makes non-player characters seem smart (NPCs). AI is used in video games to make opponents for players to play against. If the computer player is too easy or too hard, the game will not be as fun. The goal of artificial intelligence in video games is not to beat the player, but to provide entertainment and a mental challenge. When advanced AIs are used, games get harder, which isn't always fun. Artificial intelligence in video games and artificial intelligence in academic research are very different. AI in games and AI in the real world have very different goals. When it comes to AI, real AI is more concerned with machine learning and making decisions than with making NPCs look smart.

1.2. Current Methods of Game AI

Game AI is currently made with methods like neural networks, the Bayesian method, genetic algorithms, finite state machines, and Pathfinding. All of these ideas are possible, but they won't work in every situation. Research is still going on in the field of artificial intelligence (AI) in games, and developers are still getting better at using all of these methods in any situation.

1.3. Pathfinding and Steering

Pathfinding solves the problem of finding a good way from the starting point to the goal while avoiding obstacles and enemies. Movement tackles the problem of choosing a path and moving along it. At one end of the spectrum, a smart pathfinder combined with a simple movement algorithm would find a path as soon as the object started moving, and the object would follow that path without caring about anything else. On the other hand, a movement-only system would not look ahead to find a path (the initial "path" would be a straight line), but would instead take one step at a time, taking into account the local environment at each movement. The gaming industry has discovered that the best results come from using both pathfinding and movement algorithms.
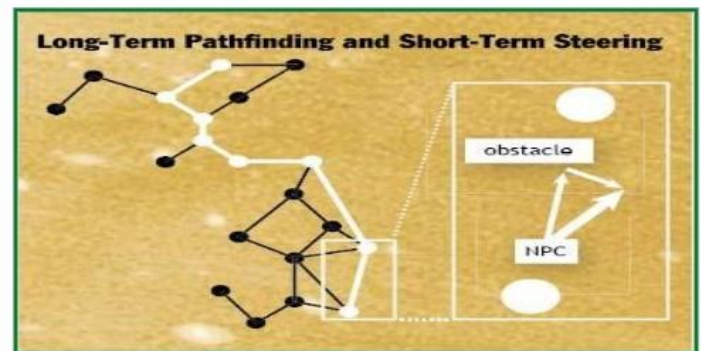
1.4. Research goal

Propose a new AI model that can learn in-game.

AI can control many parameters of scenes, stories, sound, etc. instantly and adaptably. AI can learn about not only the player's habits and tactics to win, but also can learn or guess the player's state of mind to make sure the player is having a fun time, which is the ultimate goal of video games.
If AI can understand the player's mind then AI can support the player by giving tailor-made/user-adapted fun of games.
AI should not be a competitor only but also a co-player seeking satisfaction of the player. How? The AI can collect a lot of data, learn from it, then adapt the game to the player.

2. Why the Metaverse

My original research was to propose a learning AI in a video game to develop a new type of game experience/genre.

but the gaming community (game developers, game creators…etc) rejected the idea because if AI started self-learning in a video game, the game will be either unplayable due to the unpredicted actions of the AI, or the game will be very difficult and there will be no chance to tell a story or establish a feedback system that satisfy the players.

2.1. Potential of the Metaverse

The metaverse has the potential to facilitate the building of more varied virtual worlds as well as a more engaging educational setting. The metaverse, however, is still in its infancy, and there are still fundamental problems regarding the technology, such as whether it is feasible and safe for users to utilize and their privacy. Due to COVID-19, the Metaverse is being used as a platform for game-based learning, which allowed for the construction of new educational environments.
The Metaverse has amassed an enormous amount of secondary and tertiary data. This data has a unique identifier and is utilized as traceable data in the game-based Metaverse.
In the Metaverse, this type of data is increasingly useful for building artificial intelligence

I believe in this vast endless universe of Metaverse, a game-based AI with the ability of learning would allow the players to experience new type of games and maybe full games made from scratch by an AI.

3. Future Work

1.Research about AI in the Metaverse foundation and find the potential the AI has to enhance the virtual world's immersive experience for users.

2.Attending a workshop held by Mr. Chris pruett the director of content of Metaverse in tokyo next month to better understand the inside world of Meta.

3.Survey on learning AI for games and game developers in the Metaverse.

Reference

1) J. Wang, L.-C. Yu, K. R. Lai, and X. Zhang, "Tree-structured regional CNN-LSTM model for dimensional sentiment analysis," IEEE/ACM Transactions on Audio, Speech, and Language Processing, vol. 28, pp. 581–591, Dec. 2019.
2) K. Kataoka, T. Yamamoto, M. Otsuki, F. Shibata, and A. Kimura, "A new interactive haptic device for getting physical contact feeling of virtual objects," in Proc. IEEE Conference on Virtual Reality and 3D User Interfaces (VR), Osaka, Japan, Aug. 2019.
3) P. Wu, W. Ding, Z. You, and P. An, "Virtual reality video quality assessment based on 3D convolutional neural networks," in Proc. IEEE International Conference on Image Processing (ICIP), Taipei,