

## Game AI (GADV8003) Research Report

Write a short (7-8 page) report on a given topic. Your report should give a fairly high level overview of the given topic but not completely avoid technical details. The report should also include reference to specific applications of your topic particularly as they pertain to computer games and references to available software libraries (especially open source) are particularly welcome. Your report should be structured appropriately and include references.

You may choose from the topics below or can suggest an alternative yourself.

1. **Deep Reinforcement Learning in Game AI:** Explore how deep reinforcement learning techniques have been applied in game environments, such as training agents to play complex games.
2. **Procedural Content Generation in Games:** Investigate how AI algorithms can generate game content dynamically, including levels, maps, textures, and even narrative elements, to enhance player experience and replayability.
3. **Behavior Trees and Decision Making in Game AI:** Analyze the use of behavior trees as a decision-making framework in Game AI.
4. **Monte Carlo Tree Search in Game AI:** Discuss the application of Monte Carlo Tree Search (MCTS) algorithms in Game AI.
5. **Pathfinding Algorithms in Game Development:** Examine various pathfinding algorithms used in games, such as A\*, Dijkstra's, or potential field methods, and their applications in games.
6. **Evolutionary Algorithms in Game AI:** Investigate how evolutionary algorithms are used to evolve game strategies or design game elements.
7. **Natural Language Processing in Game AI:** Explore how NLP techniques are utilized in games for dialogue generation, player interaction, or procedural narrative generation.
8. **Neural Networks for Game Content Generation:** Examine how neural networks are used to generate game content such as textures, characters, or game levels.
9. **Dynamic Difficulty Adjustment in Games:** Analyze how AI techniques are employed to dynamically adjust game difficulty based on player skill or preferences.
10. **Swarm Intelligence in Game AI:** Discuss how swarm intelligence algorithms, such as particle swarm optimization or ant colony optimization, are applied in game AI for tasks like enemy coordination or resource allocation.
11. **Machine Learning for Dynamic Game Balancing:** Explore how machine learning techniques are used to dynamically balance multiplayer games by analyzing player behavior and adjusting game parameters.
12. **Genetic Algorithms for Game Character Evolution:** Investigate how genetic algorithms are employed to evolve game characters with adaptive behavior or evolving traits.

- 13.**Markov Decision Processes in Game AI:** Examine how Markov decision processes are used for modeling decision-making under uncertainty in games.
- 14.**Multi-Agent Systems in Online Gaming:** Explore how multi-agent systems are used to model complex interactions between players or NPCs in online multiplayer games.
- 15.**Emotion Modeling in Game AI:** Discuss how emotion modeling techniques are utilized in games to create more immersive and engaging experiences.