Comparing game tree search techniques for general videogame AI (GVGAI) Literature Review

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***Abstract*—The abstract goes here.**

I. Introduction

THIS Literature review will cover what questions I will be asking for my dissertation topic as well all the literature I have found that is related to my research questions.

II. Research Questions

TODO: Simplify research questions

- How does game tree search techniques compare for GVGAI?
- Where does GVGAI succeed best in set games?
- Where does each tree search technique do well in each game?
- What are the most challenging areas for GVGAI in the GVGAI competition?

III. Hypothesis

//TODO: Hypothesis

IV. Literature Review

A. The General Video Game AI Competition

In most modern video games the AI is tailored specifically for that game and can't easily be modified for use in a different game type. However this is what GVGAI aims to create an AI that can play any game.

There have been quite a few AI competitions before in video games, such as Unreal Tournament [1], Super Mario Bros [**?**], Starcraft [2] [3]. However most of the winning AI stratagies used in those games are very domain specific and it is often more about knowing the game than developing good general AI [3].

Another competition that was similar to GVG-AI was the General Game Playing (GGP) competition [4]. However almost all of the games in the GGP are board games, and the Game Description Language (GDL) used is not designed for video games.

The GVG-AI Competition is a competition framework that proposes the challenge of creating controllers for general video game playing. The controllers must be able to play a wide veraiety of video games, many of them will be completetly unknown to the controller. This means the controller must have some general AI to discover the merchanics and goal of the game, so it can increase it's score and win the game. [5], [3]

The framework contains a library of 2D Java based video games some of which are based of classic arcade games, there are currently as of writing this, 62 games that AI controllers can be tested on.

The controllers are allowed upto 40ms to compute the agents action(s) [6], [5].

B. Game Search Techniques

Breath First Search
Depth First Search
MCTS

C. Goal Orientation

This paper [7]

D. Analyzing the Robustness of General Video Game Playing Agents

This paper [8]

E. Efficient Implementation of Breadth First Search for General Video Game Playing

This paper proposes an efficient implementation of Breath First search, however it only works well for deterministic game sets. The paper proposes a method of BFS where a node that has already been visited in other nodes will not be expanded, this is stored in a hash function. The algorithm uses hash codes to improve the efficiency and performance.
[9]

F. HyperHeuristic

Hyper Heuristic methods are [10]

V. Conclusion

The conclusion goes here.

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APPENDIX A
FIRST APPENDIX

Appendices are optional. Delete or comment out this part if you do not need them.