CS 461 - Fall 2016 - Problem Statement

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Abstract

Artificial Intelligence is a broad problem with many different applications. This project is to create an agent to play the game Starcraft Brood War. Starcraft Brood War is a real time strategy game created by Blizzard Entertainment. The end goal is to enter and compete in a competition using an agent created by Oregon State University students. After this project is complete, it could be expanded upon by future students in a club setting.The first step is implementing a scripted strategy. This is initially just building one offensive unit, or something that can be generalized. The next step is to have multiple scripts for the AI to choose from. The team would write a decision tree that takes in abstract information about the state of the game and decides if switching strategies would be more beneficial to the game. This is a similar strategy to the one implemented by DeepMind on AlphaGo.

We are testing our progress in steps and checking with our client about the quality at each step. The final product is put through various situations and is compared to already existing artificial intelligence algorithms in a Starcraft AI competition. This fulfills the clients want for a general template for any future OSU clubs to use in order to create AIs for competitions or research. Our stretch goal is to adjust our scripted strategy based on live game data and previous match data if it is not a best-of-one series.

I. Introduction

Automation is a difficult but highly sought after goal that we as humans work for. The idea of getting objects we create to do work for us is what constantly pushes us to delve into this topic. Due to the high amount of variables in almost all the actions in our everyday lives, automation can be fairly difficult. In order to deal with the wide range of possibilities that must be covered before automation can be realized, artificial intelligence was developed. Artificial intelligence then became an interesting topic for others that want to see what they can automate. One of these areas that people decided to automate was video games. It initially started as developing personalities to interact with the user. Naturally, a more competitive setting emerged as developers began to see who could make a more accurate and highly responsive AI to play the game for them.

II. Problem Definition

Our client wants a template designed for artificial intelligence that plays Starcraft Brood War for future clubs that may want to enter in competitions. The template will essentially be some core mechanics and code taken from our attempt to create our own artificial intelligence. Our project must at minimum cover the basics of machine-learning as well as some more advanced practices in order to have a well-built starting example. We of course will use this starting example to make an actual working artificial intelligence but the important part that our client wants is a strong and easily reusable base for others to quickly pick up and understand. After completing the project we will also be providing our results as a way for others to test and compare with their own AI to see if they are on the right track. The program should also be a good base for a future club to quickly and accurately familiarize themselves with the BWAPI. The BWAPI, also known as Brood War Application Programming Interface, is the provided interface for users to interact and import their artificial intelligence into the game. It also lets the coders access the information stored in Starcrafts code so they can use that information in their algorithms.

III. Proposed Solution

Our base objective is to create a sandbox for learning and experimentation focused on artificial intelligence with regards to Starcraft. The objective also includes the development of a rudimentary AI agent capable of competing in a Starcraft tournament against other AI opponents. In order to do this, we will be using our sandbox, essentially, building a basic product for the club our sandbox will be used for in the future. Furthermore, by the end of the project, the agent should be able to execute a scripted strategy. This will fulfill Dr.Ferns desire for an environment to support a future artificial intelligence club at OSU. At expo, we would like to present the replay of our competition and explain in more detail how exactly we have designed our bot and created our sandbox. Creating a sandbox for the BWAPI is important because it allows us and future developers, full control over our own environment which our agent will run in. Essentially, we are developing both the agent, and the game environment the agent operates within. Using this, we can design and execute the algorithms necessary to making a dynamic AI. But at a slightly lower level, our agent will be optimized to the specifications of the competition standards that can be found in our performance metrics.

IV. Performance Metrics

The project needs to perform the following metrics in order to be complete. An agent must be made that can follow a specific script and can be entered into a tournament for starcraft brood war. There must be multiple scripts that the agent

can choose from. The agent must be able to decide if it needs to change script at all based on current or previous match data. The agent must not slow down the game by having 1 frame longer than 10 seconds, 10 frames longer than 1 second, or 320 frames longer than 55 milliseconds as per the tournament rules. The bot must be a runnable exe or dll file that can run on a windows 7 32 bit machine. These are based on the requirements from the BWAPI tournament that is held every spring.

V. Conclusion

Following our proposed solution we will have completed the clients criteria and thus completed our problem. We will also have a replay from our competitions that we entered so we can display it for expo. We will know our project is successful by whether our client is pleased with the final product that we provide for him. Our client will then have his requested template for future clubs to use to help build their own AI.