STAICRAFT: a Starcraft-based educational platform for Artificial Intelligence

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KEYWORDS

1 INTRODUCTION

Nowadays Artificial Intelligence (AI) is everywhere. It has become an essential feature when developing products that humans use daily. Internet is full of libraries, software and tutorials related to AI. Same phenomenon has happened at Universities, where courses related with AI appeal the attention of the majority of Computer Science students. On the other hand, Video games have gotten attraction by the AI research community because they offer challenging environments to test different AI techniques. Specially, RTS video-games (RTSVGs), which have become popular due to competitions such as the SCAAIT Competition[1], the AIIDE Competition[2] and the CIG StarCraft AI Competition[3]. These competitions have APIs and tools to easily deploy different AI approaches into RTSVGs. The variety of AI techniques employed in videogames over time and the degree of engagement they generate within the gamers and young people, makes videogames a perfect environment to became an educational platform for students to learn and play with AI. Some previous works involving videogames on the learning process have been tested with good results on students [2], even some have been used to teach AI as well [1, 3].

2 CONTRIBUTION

This work focuses on Real Time Strategy (RTS) videogames, where usually two players compete against eachother. On this kind of videogames, sets of decisions need to be taken in shortest intervals of time in order to win the match. Some well-known videogames included on this category are: Warcraft 3, World of Warcraft, Age of Empires and Starcraft. We both had the experience to first learn and then teach AI at University. Thus, we are aware of the amount of abstract concepts, techniques and theorems that students are supposed to learn. In order to alleviate the process, we propose the combination of AI, videogames and education to foster the process of learning.

Our contribution is called STAICRAFT, an educational AI platform that allows you to create from scratch a Starcraft bot that employs different AI techniques. You can work on:

- path-planning using heuristic search;
- behavioral trees, decision trees, finite state machines, or automated planning in order to work on decision-making;
- influence maps, blackboard, data structures management and information sharing in order to support the decision-making module.

STAICRAFT works with any Starcraft race i.e. Terran, Zerg, Protoss. We chose to built the platform over Starcraft and BWAPI[4] as it already has on the back a strong community that supports the project. In concrete, we have used Starcraft:Brood War and Java 1.8 to develop the platform. The connection between the AI platform and Starcraft is managed by ChaosLauncher, a code injector. Figure 1 illustrates the architecture.
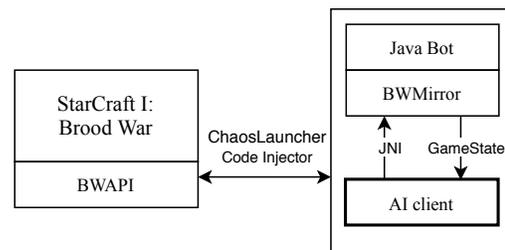

Figure 1: STAICRAFT architecture: AI client and Java Bot represent our contribution.

3 EVALUATION

STAICRAFT has been evaluated during the last four years in four different promotions of students obtaining successful results. They understand more easily the theory and feel more secure when being asked to develop any AI-related algorithm. This year, they have also participated in SSCAIT, the Student Starcraft AI Tournament. The students' bots can be found at SSCAIT. We want to remark two outstanding bots called Eghbert [5] and Goliat [6]. The former has won 806 matches and lost 595. Both use behavioral trees as its main AI decision-making technique. Their code can be found on their repositories.

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