Project Plan for Degree Projects
Department of Computer Science

General Information

Title:	Reactive strategy selection in a Real-Time Strategy game
External company:	-

Persons involved

Student 1:	Sarah Kerrigan	sake98@student.lnu.se
Student 2:		

Supervisor:	Jim Raynor
External supervisor:	

Background

Real-Time Strategy (RTS) games are a sub-genre of strategy games where the game runs in real-time, in contrast to turn-based strategy games such as the board game Chess or the video game Civilization[1]. Example of popular RTS games are Command & Conquer and Starcraft 1 and 2. Since the game is running in real-time, the player has to make often complex decisions in very short time and also be able to quickly react if something unexpected happens in the game. The vast amount of possible actions and strategies and the fast pace of the game is probably one reason why RTS games are very popular in e-Sports. Players can play against other human players or against computer-controlled opponents, usually called bots.

Problem formulation

The goal of this degree project is to expand an existing bot for the RTS game Starcraft[2] with an adaptive, reactive strategy selection. The bot currently only has a static strategy that never changes regardless of what its opponent does. The reactive strategy selection will analyze what the opponent does

using fuzzy logic and, if needed, modify the current selected strategy. To limit the scope of the thesis project only one of the three fractions in Starcraft, known as Protoss, will be used. We will also only consider how effective the implemented system is in terms of winning games, and not take player enjoyment into consideration. We expect the adaptive, reactive strategy selection system to outperform the same bot using a static, non-adaptive strategy.

Motivation

Developing computer-controlled opponents in RTS games is a very challenging task. It can broadly be divided into two main parts: micro- and macro-management. Micro-management involves controlling single units in the game, for example moving, shooting and using special abilities. Macro-management involves taking decisions on a higher level, for example which units to use in the attacking army and when and where to attack the opponent. Of these two macro-management is the most complex for a bot. Ontanon et al. states in their extensive survey of the field that reacting to opponents is today one of the most important challenges for RTS bot developers[3].

Fuzzy logic is a method that is well suited for reactive systems[4]. Instead of giving a boolean answer, yes or no, fuzzy logic uses real numbers between 0 and 1 and can therefore be true or false to some degree. This is useful in strategy selection since it is very common that more than one strategy suits a particular situation.

Objectives

O1	Implement an adaptive, reactive strategy selection into an existing Starcraft bot
O2	Select a number of suitable maps to use in the experiment
O3	Run an experiment where the modified bot is compared to the original, static bot on the selected maps

Method

The problem will be answered by conducting a series of experiments that provide quantitative data. The modified bot will play a number of games against the original bot and the number of wins, losses and draws will be measured. A pool of different maps will be used to ensure the result is reliable.

Time plan

Week	Milestone
3	Literature review finished
7	First version of fuzzy controller
8	Draft of introduction and background chapters
9	Testing session 1 finished
12	Second version of fuzzy controller
13	Draft of methodology and implementation chapters
13	Testing session 2 finished
15	Implementation finished
16	Experiments finished
17	Draft of results, analyzis, discussion and conclusion chapters
19	Report finished

References

[1] Civilization (video game). https://en.wikipedia.org/wiki/Civilization_(video_game) URL last visited on 2015-08-12.

[2] Starcraft:Broodwar. https://en.wikipedia.org/wiki/StarCraft:_Brood_War URL last visited on 2015-08-12.

[3] S. Ontanon, G. Synnaeve, A. Uriarte, F. Richoux, D. Churchill, and M. Preuss. A survey of real-time strategy game ai research and competition in starcraft. *IEEE Transactions on Computational Intelligence and AI in Games*, 2013.

[4] K. M. Passino and S. Yurkovich. Fuzzy control. 1998.