Final Project Requirements

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1 Overview

The Final Project for CIS521 will be a class-run version of the Fall 2011 Google AI Challenge: Ants. This is a team-based project that will consist

of writing code, coming up with algorithms, and writing a final report about your experiments and findings. The goal is to allow students to utilize and explore the algorithms and tools that have been taught throughout the class is a more interactive environment. Students are encouraged to explore!!!

2 Requirements

Though this project is meant to be fun, we do have a few requirements so that we can evaluate everybody fairly.

2.1 The Teams

You may have up to at most 4 people per team.

2.2 The "Milestones" (35 pts and Extra Credit)

While there are no strict Milestones for this project, there are some basic requirements your bot and code must meet to be able to get full credit on this assignment.

2.2.1 Working Bot (10pts)

First you must submit a bot that works. By that, we mean once you submit the code to the class server there should be a confirmation located at the bottom of your "Profile" page that says the code successfully compiled. After that, when playing in a match, the bot must make moves in some seemingly intelligent fashion (must at least gather food near it, unless clearly avoiding enemies)

2.2.2 Beat Default Bot (20pts)

We will upload a few default bots to the server that you can test against (these will be taken from the sample bots directory). Your bot must be able to beat these bots most of the time (as in, after a day, your bot should be ranked higher than the test bots at least). Note this does NOT mean it MUST beat it 100% of the time, but should be more than 50%. The bot will most likely be GreedyBots and maybe some purely RandomBots. These should not be too difficult to beat.

2.2.3 Beat the TA Bot (5pts)

If your end rank is higher than the TA's bot (which will have a relatively simple A* implementation and some avoidance code). This will encourage teams to look into more advanced search techniques. Don't feel too bad if you can't beat it though, it's only worth 5pts for a reason.

2.2.4 Beat your classmates (+1pt EC per team)

For each human-team that you end up with a higher rank, your team will get 1 point of extra credit. There are approximately 15+ teams, so there is potential for a decent amount of extra credit.

2.3 The Report (50 pts)

For your final project, your team must submit a report outlining everything that you have done. The following sections are the minimum that must be included, the details of each are up to you, but try to be as detailed as possible.

2.3.1 Final Overall Strategy

Do you take a greedy approach? Teamwork? Do your ants have different roles (hunter vs. gatherer)? Let us know! Also let us know if you used a pure search, pure learning, or a hybrid approach to this problem (only the one you used for your final submitted bot please)

2.3.2 Final Architecture/Algorithms/Implementation

Did you use a finite state machine? Did you use A* or a variation? What types of models/states did you use? For example, perhaps you used a heatmap of the field (how many times a location has been visited by all ants, or a particular ant) to encourage them to spread out more? Maybe you used some sort of regression to predict the location of the enemy ant hills? Tell us here all the juicy details!

2.3.3 Tools

What kinds of tools did you guys program for yourselves? How were they used to help? Would it be simple for other teams to use? (Please upload the code so everybody can benefit as you develop them!) No points will be

docked for not having built your own tools, but they will be helpful and we would love to know about them!

2.3.4 What Other Things Did You Try?

What were some strategies or implementations that you tried that did not work? Why did they not work or why did you choose to take a different approach?

2.3.5 If you could try more stuff or improve anything, what would they be?

This is pretty self-explanatory.

2.3.6 Suggestions for the Course

What would you like us to change about the final project? Did you enjoy it at all? What did you like about it? What did you hate about it? How can we improve this experience for future classes (other than having the server setup earlier of course). Are there any particular types of tools you would have liked the TA's to try and provide in the future. This section will NOT be graded in any way.

2.4 Submission and Grading

Unless stated otherwise/if the concern arises, all members of each team will receive the same grade for the final project. The project as a whole will be weighted in your overall grade the same as approximately 2 homework assignments. The criteria discussed above must be met to receive full credit for the assignment:

- Working bot submitted to server, all code that was submitted must be zipped and submitted to blackboard as well (10 pts)
- Bot must be able to beat the default bot on the server (20 pts)
- Bot must be able to beat the TA bot (5 pts)
- Each team you beat in the final ranking (+1 pt EC)
- The report (50 pts)

The official due date for the final report and all code is April 24th (the last day of classes). This will give the server time to play many matches between each pair of students. We will leave the server running until about 1 day after the actual final exam. Teams will be allowed to submit code up until the final exam; Just beware that code submitted later will have less time to play matches on the server, meaning you will not be able to rise up in the rankings fast enough if you've made drastic improvements.

3 Useful Resources

- The report of the AI Challenge Winner: http://xathis.com/posts/ai-challenge-2011-ants.html
- The tools introduction: http://aichallenge.cis.upenn.edu/using_the_tools.php