CPSC 481 Project
Summer 2019

Learning Objectives:

1. Identify an AI algorithm to solve a complex problem.
2. Design and implement data structures that will represent important features of the environment.
3. Implement an AI algorithm that utilizes the data structures you designed to solve the problem.

Description

The goal of this project is to apply the knowledge you gained in class to solve a complex problem. You are free to choose any problem that can be solved using any of the AI approaches discussed in class. Undergraduate students will work in teams of four, while graduate students will work individually.

Milestones

The project will be distributed into three milestones to help keep us on track.

Milestone 1 (July 17, 2019)

Form a team of four students and create your repository on GitHub (https://classroom.github.com/g/KA4fjOrg). I suggest you follow the POGIL roles we use in class to help you organize yourselves and ensure that everyone contributes to the project.

Brainstorm as a group to identify a project you want to work on. Consult with me to help you scope your work and ensure it is something that can be completed within the summer session. Finally, complete the details in the README.md file on your GitHub repository to formalize your project.

Milestone 2 (July 25, 2019)

I expect that by this time you should have a simple prototype of your project. The prototype should run at least half of all major functionalities required by your project. I care more about the logic behind the code and less on the graphical aspects of the project.

Milestone 3 (July 29, 2019)

I expect that by this time you have a fully working prototype. It is ok to have some bugs or minor issues, but all functionalities should have already been implemented.

Final Project and Presentation (July 31, 2019)

I expect that by this time you have completed your project. I will leave some time for you to present your work in class. I will give extra credit for those who are able to do a demo in class. This does not mean that your project needs to be perfect; just that it is in a state that it can be demonstrated. However, be prepared to answer questions about the issues with the project and know how you would address it if given more time.

Grading

You will be graded using the formula below

*Final submission grade = (Design + Implementation + Documentation) * Contribution*
*Final grade = Final submission grade * 0.8 + Average milestone grade * 0.2*

Design (40%)

I will take a look at whether your selected algorithms appropriately address the problem you are trying to solve, whether your data structures sufficiently cover information that is required to run your selected algorithms, and whether your agents' actions are designed to correctly solve the problem.

Implementation (50%)

I will take a look at whether your code sufficiently solves the problem you proposed. Ideally, your code should be runnable, but I will give partial points when there are minor issues.

Documentation (10%)

I expect that each team will provide a description of the project, a discussion of the different algorithms used in the project and how they were used to solve the problem, and instructions on how to run the code on the README.md file on your GitHub repository. Missing requirements will incur deductions on the documentation grade.

Contribution - 100%

Describe each member's contribution to the project on the README.md file. I expect that all members of the team should contribute to the project. I will mainly look at your commits on GitHub, but will also look at the list of contributions that may not be reflected on GitHub.

Average milestone grade - 100%

You will receive a grade for each milestone according to how much you accomplished its requirements. The average milestone grade is computed by getting the average grade from each of our three milestones.

Submission

Each team will create a repository on GitHub and submit their code there (https://classroom.github.com/g/KA4fjOrg). Please make sure to push your code on the repository so I can see your project. It is ideal that each one pushes their changes to the repository so I can distinguish each one's contribution. Let me know if you need help how to do this on Git.

Sample Project Ideas

Travel Planner

Create a list of places that you can visit and provide multiple ways to move between cities. You can take a plane, train, boat, or drive. Each method of transit provides a price and travel time. The user will provide a starting location and destination and indicate their preferences -- fastest way to reach the destination, slowest way to reach the destination, cheapest way to reach the destination, and most expensive way to reach the destination. You can make use of heuristics and a best-first search to implement this.

Tic-tac-toe Game AI

Implement Tic-tac-toe and create a game AI using alpha-beta pruning that can go against a human player.

Machine Learning

Predict a students' end semester percentage grade using various academic performance measures and demographic information using an existing data set (https://archive.ics.uci.edu/ml/datasets/Student+Academics+Performance). Use three different machine learning algorithms and compare each one's performance.

FAQs

What programming language should we use?

You can use any programming language of your choice.

What if we want to change our project?

You can change your project only until Milestone 2 to make sure you have sufficient time to complete it.

We are having trouble distributing the work amongst our team.

I highly suggest that you adopt the four POGIL roles we use in class. This way each one has a responsibility. It will be good to rotate the roles as well to ensure that everyone has the same contribution. Take note that I will still be grading you individually according to your contribution to the project. I will look at the GitHub commits so make sure everyone contributes to the team's code base.

Can we use existing libraries or code?

Feel free to use any libraries or code as long as it does not already solve your problem. A good rule of thumb is that your team should write at least 70% of the code used in your project. I also expect you to fully understand the code you are using. If you are unable to answer my questions I will not be able to give you credit for that component or functionality.