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CSCI 390

Project Proposal

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**Project Description**

My project is to write a bot to play the game 2048, which can be played online or as a phone app. My goal is to implement an AI program that can use several different heuristics to play the game that way, at the end, I can compare and contrast how the various methods perform to pick the “best” one. My idea for the program is an extension of the AI class I took with Mikey last year. It will search a state space for the next “best” move based on the heuristic implemented (such as merge the most tiles as possible, get the most points possible, keep the highest tile in the corner, etc.). The other method I would like to implement is a Monte Carlo algorithm, where the bot would have 4 possible moves to make, so it would play x number of random games following each move. Then, based on which move led to the most successful games, it will choose that move to make next. This would be another method that I could then compare and contrast at the end, as well as variations of each of these methods.

**Resources**

<https://github.com/gabrielecirulli/2048>

Neller, Todd W. "Pedagogical possibilities for the 2048 puzzle game." Journal of Computing Sciences in Colleges 30.3 (2015).

Chowdhury, Gayas, and Vignesh Dhamodaran. "2048 Using Expectimax."

Kohler, Iris, Theresa Migler, and Foaad Khosmood. "Composition of basic heuristics for the game 2048." Proceedings of the 14th International Conference on the Foundations of Digital Games. 2019.

Yarasca, Efrain Noa. "Comparison of Expectimax and Monte Carlo algorithms in Solving the online 2048 game." Pesquimat 21.1: 1-10.

<https://medium.com/@bartoszzadrony/beginners-guide-to-ai-and-writing-your-own-bot-for-the-2048-game-4b8083faaf53>

**Division of Tasks**

* Implement the game OR understand the source code and learn JavaScript
* Implement the AI algorithm to check the 4 possible moves with a dummy heuristic
* Implement the various heuristics
* Run the AI with each heuristic and take down stats
* Make any tweaks to the heuristics based on what worked and did not
* Repeat getting stats and tweaking

**Timeline**

* 1-2 weeks understanding and running the source code, learning JavaScript (backup plan: implement the game from scratch in Python or Java)
* 1-2 weeks implementing the algorithm with dummy heuristic
* 1 week implementing heuristics and starting to run them
* 1 week implementing Monte Carlo method
* 2-3 weeks running methods and modifiying/combining heuristics to improve the AI