Term Project Proposal G6

Tiny Islands (Unity) https://dr-d-king.itch.io/tiny-islands

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Describe the problem you are trying to address:

Make an optimal AI that completes the game with a high or even optimal score of the Game Tiny Island.

What is the ideal outcome of the project? What do you expect to show?

Stretch goals

- Make an optimal AI that completes the game with a high or even optimal score

Minimum viable product

- Create a model of the game
- Given a seed, compute the optimal possible score using graph search to compute all goal states.
- Create some sort of AI that can complete the game (may not be the optimal solution) - Utilizing the optimal possible score, train an agent using reinforcement learning to be able to get close to that score without prior knowledge of the set of actions to choose from.

What algorithms do you expect to use?

A* algorithm for traversing search graphs and generating goal states.

Custom Evaluation Function for pruning of “invalid” states where the score is penalized

A fine-tuned/parameterized evaluation function for opening moves
Convolutional Neural Networks for optimizing ML models.

What topics / libraries / platforms, if any, will you have to learn in order to undertake your project?

Numpy, Sci-learn, Tensorflow

Define milestones for your project:

Milestone 1:

- Set up repo and project structure
- Object Oriented Approach to generating data representations of the Game Board and Tile

Milestone 2:

- Experimental Function Search Agents
- Start with use of a* algorithm with evaluation function to traversing search graphs and generating goal states to find optimal highscore.
- Due to the amount of possible goal states (without eval function) being somewhere around 54^27, we might need to switch to probabilistic search with some degree of pruning.

Milestone 3:

- Applying possible reinforcement learning concepts to optimize path solving for randomized seeds (with knowledge of the environment)