ASTEROID INC. 2ND AI SELECTION

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Contents

AI Implementation

AI Type

Evolutionary algorithm

Why it was chosen?

Due to an evaluation of the available AI algorithms to be implemented, the algorithm that stood out and best suited my game is an evolutionary algorithm. With an already implemented and working state machine, a platform was created for the easy integration of an AI technique that changes the way the state machine works, in terms of evolving it and adapting it on the performance of the AI player. An evolutionary algorithm will work best in terms of tweaking values of the state machine to ensure that the best states have a higher chance of being chosen, resulting in a more aggressive and difficult opponent when playing against the state machine.

How it works?

The evolutionary algorithm integrates with the state machine, changing:

- The influence each state has between -1 and 1, making states that are better for the player have a higher chance to be selected using the state machines evaluation function

The way in which training works is as followed:

- The state machine plays a game
    - During the game, the resources the state machine obtains in each state is recorded
- At the end of the game, an evolution method is run that:
    - Looks for the state that obtained the most resources and increases its range between -1 and 1 by 0.01.
        - E.g. If the state machine obtained the most resources in state 1, instead of state one being between 1 and 0.5 (a range of 0.5) it is now between 1 and 0.49 (a range of 0.51)
    - To balance out the weights each state has and punish the worst, this 0.01 awarded to the best state is subtracted from the influence the worst state has between -1 and 1.
- These new weights (ranges each state is called) are then written to a training textile *(EvolutionTesting.txt)*

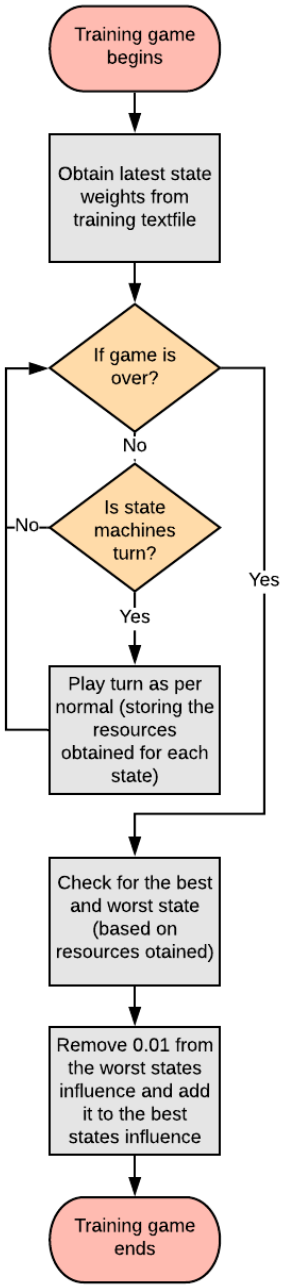
At the start of a new game, the latest weights are obtained from the text file and used as the ranges in which the states are chosen based on the evaluation function.

Playing against the evolutionary algorithm

If the player decides to play against the trained state machine (by the evolutionary algorithm), the trained influences of each state will be used when the state machine selects a state to use. If the player decides to play against the normal untrained state machine, the state machine will use the default weights as the influence for each state.

Training Diagram

State Machine training game



Training