

COMP813 Artificial Intelligence Final Project – Option A (Development)

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I intend to make a program that allows users to play the well-known strategy game Battleship against an AI that has been trained to play it. I will be making this independently and will not be building on others' work.

So far, I have implemented many aspects of the game, such as the board, ship placement and shot firing mechanics for the player. I expect to implement an AI model into the system and will be able to expand the current functions to allow the model to use them against the player in a game. I am using Python to develop the game. I believe the rest of this project is doable before the due date, I will hopefully be working on training the AI very soon.

The topics this project could cover are:

- Game Theory
 - The AI system will attempt to perceive its situation and act in a way that is most beneficial to it (Sinking all enemy/player ships on the board).
 - A player is more likely to win if they have a strategy, a point for Game Theory.
 - The game involves payoffs (sinking ships can lead to a win for the player, and placing ships well can help prevent defeat for a player)
 - The game is zero sum, every success for one player is an equal sized problem for the other player.
- Game Search
 - Most likely, I will use Monte Carlo Tree searching, due to the nature of Battleship, with the game's relatively complex board, lack of information, and incremental real time play.
 - Another option I have considered is Minimax searching with Alpha Beta pruning.
- Reinforcement Learning:
 - Learning how to play by maximising reward signals.
 - Missing a shot gives no mark.
 - Hitting a ship gives a small positive mark.
 - Sinking a ship gives a large positive mark.
 - Winning the game gives a maximised positive mark.
 - An equal sized negative mark is given if the player does any of these things against the AI.
 - Tracking negative marks given by the player succeeding against the AI can train the AI to place its ships more optimally.
 - Tracking positive marks given for the AI succeeding against the player can train the AI to make its shots optimally.
 - I will attempt to implement these reward signals to help me train the AI to play the game. I will try to save preferences and parameters between games to allow the AI to improve between program executions.