**COMP813 Artificial Intelligence Final Project**

**Semester 2, 2023**

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For this project, I have opted to follow choice A, developing an AI program.

I intend to make a program that allows users to play the well-known strategy game Battleship against an AI trained to play it via machine learning.

The topics this project will 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 ships on the board)
* Game Search
  + Potential searching methods:
    - Minimax searching
    - Alpha-Beta Pruning to remove undesirable actions from the list of possibilities.
    - Monte Carlo Tree searching
* Supervised Learning
  + Letting the AI system learn based on real examples of inputs and outputs. Essentially training the system to play based on pre-played games. The AI will attempt to learn to approximate perfect game playing.
    - Currently, I intend to just play against the AI to train it, but I may research ways to train it independently.
* Reinforcement Learning
  + Learning how to play by maximising reward signals.
    - Missing a shot gives no mark.
      * The player missing a shot gives a small positive mark.
    - Hitting a ship gives a small positive mark.
      * The player hitting a ship gives a small negative mark.
    - Sinking a ship gives a large positive mark.
      * The player sinking a ship gives a large negative mark.
    - Winning the game gives a maximised positive mark.
      * Losing the game gives a maximised negative mark.
  + 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.