

# Using Genetic Algorithms to Evolve Othello Heuristics

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## 1 Introduction

Board games have long been an area of interest for the computer science and machine learning communities. I want to use genetic algorithms to evolve a heuristic for an alpha-beta minimax search agent playing Othello. Othello, a board game with the simple objective of owning the most pieces, is an ideal platform to experiment with as it retains sufficient complexity while having significantly less search space than chess.

## 2 Areas of Exploration

Since Othello is a game with a fixed board size and two players, we can treat the game as a multi-agent environment. Each generation, we can run games against other evolved agents. The genome will be an 8x8 square heatmap-like array that weighs the recommended next move for an agent given that its search is cut off due to time constraints. At the end, we should converge to a heuristic that can beat easy opponents and tie advanced opponents. Due to the 2-D nature of this genome, we should also be able to produce meaningful videos highlighting changes in the genome over time.

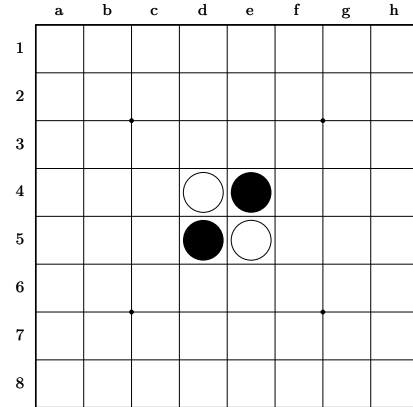


Figure 1: Starting Othello board

## 3 Additional Techniques

This project is conducive to several interesting evolutionary techniques including forming islands and species. Population dynamics within the board game are likely to be interesting as populations that have never met before would likely have one-sided games, despite having similar fitness, as that is totally relative in this case.