

Jafar — Intelligent Othello Agent

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COMP3130 Research Project

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Jafar —
Intelligent
Othello Agent

Joshua Nelson,
Tim Cosgrove,
Andrew Haigh

Outline

Problem
Overview

Solution
Structure

Static Evaluation

Learning
Algorithms

TD- λ
Feature Weight
Graphs
The EloArena

Future
Improvements

Design
Methodology

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- 2 Solution Structure
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Problem Overview

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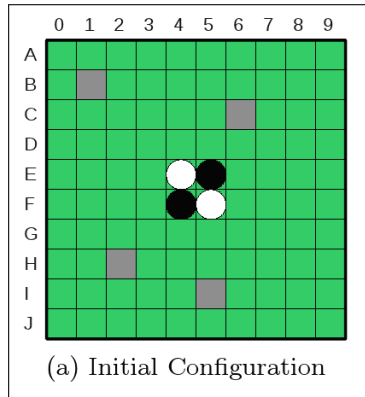
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- The Game — 10x10 Modified Othello



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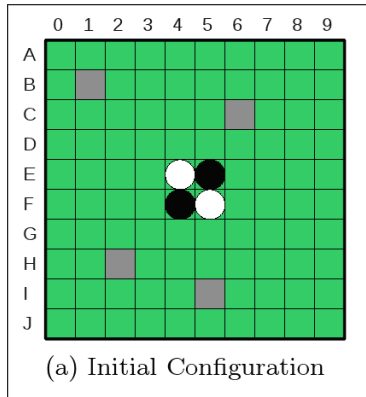
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- The Game — 10x10 Modified Othello
- The Problem — Intelligent AI player



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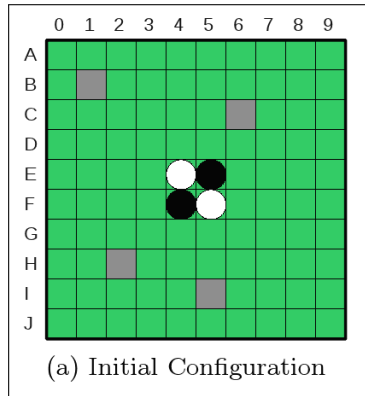
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- The Game — 10x10 Modified Othello
- The Problem — Intelligent AI player
- Solution basis



Solution Structure

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- The MetaPlayer class — Utilises knowledge of the game state and creates instances of other players accordingly

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- The MetaPlayer class — Utilises knowledge of the game state and creates instances of other players accordingly
- NegamaxPlayer (varying depth argument)
- OpeningPlayer
- GreedyPlayer

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- The FeatureSet class — Maintains a list of *features*; functions which evaluate a game state based on some criteria of strength

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- The FeatureSet class — Maintains a list of *features*; functions which evaluate a game state based on some criteria of strength
- LegalMoves
- Visibility
- StoneCount
- BlockedAdjacent, CornerPieces, SidePieces

TD- λ

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- Remaining challenge: decide how important each feature is (the feature 'weights')
- Negative weights not considered (for simplicity)

Feature Weight Graphs

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The Elo Rankings Arena

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- Custom made genetic algorithm
- Pits a group of randomly generated agents against each other for Elo style ranking points
- Creates new agents from those who perform best

The Elo Rankings Arena

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- Custom made genetic algorithm
- Pits a group of randomly generated agents against each other for Elo style ranking points
- Creates new agents from those who perform best
- Used more as a demonstration of the learning process
- Interesting to see it come to the same conclusions as TD- λ

Future Improvements

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- More attention to blocked squares

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- More attention to blocked squares
- Negamax optimisations (better transposition tables, ... etc.)

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- Negamax optimisations (better transposition tables, ... etc.)
- Better use of pre-computed data

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- More attention to blocked squares
- Negamax optimisations (better transposition tables, ... etc.)
- Better use of pre-computed data
- More board features (locked squares, open squares, etc.)

Design Methodology

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