



MASTER^{IN}
COMPUTER
SCIENCE

Deep Reinforcement Learning Othello

Thesis subtitle

Master Thesis

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Month and Year

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Abstract

Abstract (max. 1 page)

Name of the Supervisor, Group, Institute, University, Supervisor

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Introduction

With recent successes such as AlphaGo defeating the reigning world champion and fast progress towards fully autonomous cars by Tesla as well as Weymo it is clear that Reinforcement Learning is the solution to many problems that could not even be tackled before. Many of these powerful implementations rely on equally powerful machines in order to train them, often requiring over hundred CPUs and GPUs for weeks on end. Inspired by these grand achievements and the technology behind them but lacking comparable resources I settled on a more achievable goal: Othello. This simple board game has accompanied me since the first semester when we were tasked to implement a search based Othello player. During my masters studies I suspected that a superior player could be created using machine learning techniques. This thesis documents the way to such a player and its key components.

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Related Works

2.1 Othello

According to [1] Standard Othello is a game played on a board made up of eight by eight tiles. Two players, black and white, take turns setting a stone in their respective color to the board. All opposing stones that lie between the newly placed stone and a friendly stone already on the board Stones can only be placed on a free tile

The possible moves are very limited...

2.1.1 Search based Algorithms

2.1.2 Learning based Algorithms

2.2 Machine learning

2.2.1 Convolutional Neural Networks

2.3 Reinforcement Learning

2.3.1 Monte Carlo Learning

2.3.2 Temporal Difference Learning

2.3.3 Monte Carlo Tree Search

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Thesis Objectives

1. Framework for othello agents 2. Playground for RL algorithms, network optimizations, regularizations, etc. 3. High performance Othello Agent

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Implementation

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Validation

6

Conclusion

7

Future Work

Bibliography

- [1] British othello federation. <http://www.britishothello.org.uk/rules.html>.