

# Implementation and Evaluation of Recent Neuroevolution Algorithms

Master Thesis





## **Implementation and Evaluation of Recent Neuroevolution Algorithms**

Master Thesis  
June, 2023

By  
Samy Haffoudhi

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## Approval

This thesis has been prepared over five months at the Department of Applied Mathematics and Computer Science at the Technical University of Denmark, DTU, in partial fulfilment for the degree Master of Computer Science & Engineering. The project has been supervised by Prof. Carsten Witt and corresponds to 30 ECTS points.

It is assumed that the reader has fundamental knowledge of computer science.

Samy Haffoudhi - s222887

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*Signature*

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## **Abstract**

Neuroevolution is a method for optimizing the topology and parameters of neural networks by means of evolutionary algorithms. This technique is more general than white-box approaches, such as supervised learning, and can therefore be applied to a wider range of problems. It has been studied in research for decades and has been successfully applied to problems such as artificial life, evolutionary robotics and continuous domains of reinforcement learning. In this thesis, we present a framework that implements neuroevolution algorithms and that is used to evaluate these algorithms on a selection of benchmark problems. Algorithms and benchmarks were collected from the state of the art in applied and theoretical research in the field of neuroevolution. The framework, implemented in Rust, allows for a visualization of key problem characteristics and the evolution process through a graphical user interface. Selected algorithms and benchmarks are presented in detail. Results collected from the conducted experiments are analyzed, discussed and used to provide a series of guidelines for the choice of algorithms and parameters with respect to problem classes.

TODO Discuss results, guidelines...

## **Acknowledgements**

TODO

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# Chapter 1

## Introduction

TODO

### **1.0.1 Overview**

TODO

## **Appendix A**

### **Title**



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