Master Thesis

From Board Games to Real Life: Using AlphaZero for Decision Making of Automated Vehicles

Super-human performance in the game of Go was achieved by Deepmind’s AlphaGo and AlphaGo Zero algorithms [1,2]. Those algorithms combine the strengths of neural networks trained by reinforcement learning (RL) and Monte Carlo tree search (MCTS) in a powerful way. Those algorithms have been generalized to other board games [3] and have been used in the domain of automated driving before.

Following this work, the goal of the thesis is to explore further applications and improvements of AlphaZero for decision making in autonomous driving. Possible extensions are the implementation of a dynamic input representation [5], considering partial observability of the environment [6] or learning a model of the environment before solving the problem [7].

This sounds exciting? Then apply to us! Methods and scope of the thesis can be adapted to your interests and previous knowledge.

I am happy to answer any questions you might have. Feel free to ask for an appointment or directly ask at my office!

References


Institute of Measurement and Control Systems (MRT)
Prof. Dr.-Ing. Christoph Stiller

Advisor:
Johannes Fischer, M.Sc.

Programming language(s):
Python or advanced Julia

System, Framework(s):
Linux

Required skills:
- Solid mathematical foundations
- Work on your own

Language(s):
German, English

For more information please contact:

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Or directly send in your application including your current grades as well as our questionnaire!

1 skill levels:
beginner < 500 lines of code (LOC)
advanced 500 – 5000 LOC
proficient > 5000 LOC