



Robotics and Embedded Systems

Master/Bachelor Thesis

Reinforcement Learning for Adaptive Locomotion of Snake Robot

Motivation

For a moving robot, locomotion is the most important feature. Still, robotic movement control has a long way to go: It is usually “slow” in comparison to animals and the diversity of possible moves is low. Also the ability to adapt to different terrain is mostly non-existent.

One approach to solve these challenges is machine learning and especially reinforcement learning. In recent years, reinforcement learning has made big achievements: Most popular the win of Alpha GO against the current world champion of Go. Also real-life robotic tasks can be solved with reinforcement learning algorithms. Companies like Google and Tesla invest heavily in the research in reinforcement learning for robotics. Advanced locomotion and behavior is learned actively by the system.



Fig.1 Nature AlphaGo



Fig.2 Inverted Pendulum in this thesis



Fig.3 The snake robot in this thesis

Task

1. Study the most effective algorithms for reinforcement learning and implement them in a simulated environment and an classic inverted pendulum platform;
2. Design and simulate an effective learning strategy for joint-broken snake-like robot;
3. Test your algorithm in real snake-like robot;

Arrangement

1. Learn reinforcement learning algorithms and frameworks
2. Thesis time frame is around 6 months.
3. Weekly discussion and cooperation with another Master candidate
4. This work is in English

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