Path following by reinforcement learning

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January 20, 2017

Abstract
The goal of this bachelor project is to program a mobile robot, equipped with a camera to follow a path drawn on the floor. We are going to investigate reinforcement learning technique, more specifically Q-learning for selecting the optimal action-selection policy.

Setting
The environment is consisted of a white surface on the floor with a path described by a white line. The robot is run by two micro gearmotors, controlled by a Raspberry Pi and getting to know the environment through a camera. Camera data have been used to learn an action-value function which assigns a value to each action taken. Due to the learning process no camera calibration is needed.

Milestones
- Assembling the hardware.
- Investigating the literature including "Reinforcement Learning for a Vision Based Mobile Robot" by Gaskett, Fletcher and Zelinsky.
- Generation of training data.
- Implementation of algorithms and a working prototype.
Grading
The grading is based on

- Quality of presentations (2 of them, each 30 minutes)
- Quality of (literature) research and understanding of the material
- Quality, readability and re-usability of code (git repository)
- Quality of the report (at most 15 pages).

Prerequisites
Basics in

- Optimization
- Linear Algebra
- Programming