Robot navigation via support vector machines

Friedrich Eisenbrand

January 20, 2017

Abstract
The goal of this bachelor project is to program a robot, equipped with a raspberry pi and an on-board camera, such that it follows a line drawn on the floor. The method that is to be implemented is based on classification, in particular on support vector machines.

Setting
A robot, equipped with a raspberry pi and a camera. The camera observes a region of the floor in front of the robot. The floor is white with a black line on it. The robot navigates based on training data on its own and follows the line.

Milestones
• Assemble hardware
• Calibrate robot (pulse modulation)
• Master basic theory of support vector machines and the kernel trick
• Model the observations (pixel pattern of three horizontal lines)
• Generation of training data
• Implementation of algorithms and 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