LINKÖPING UNIVERSITY

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M.Sc. Thesis Project
Online learning of maritime traffic patterns based on AIS data

Background

For autonomous vehicles, it is essential to predict the intentions and future trajectories of other vehicles. In road vehicle applications, there are numerous data repositories containing road network information which can be used to create simple motion models and reason about vehicles' intentions, to some degree. In maritime applications, there is essentially no such static information to exploit. However, maritime traffic adheres to a strict set of rules, which essentially restricts the vessels to well-defined routes. By exploiting this route information, vessel trajectory estimation and motion planning can be made more robust. Particularly, it is of interest to jointly estimate vessel trajectories and routes, to enable online adaptation.

The problem of jointly estimating a vessel trajectory and route can be cast into a system identification task. Essentially, the route is thought of as an external input acting on the system. Recently, algorithms have been developed that can jointly estimate vehicle states and the external input. They have been applied to and show promise for tracking icebergs and estimating ocean currents, estimating car trajectories and their acceleration in a traffic scenario, etc.

Project Description

The aim of the project is to evaluate these algorithms in a maritime setting for learning traffic routes while jointly estimating vessel trajectories. The project will use real world AIS transponder messages (essentially a sort of maritime GPS which also provides information such as vessel speed, heading etc.) to evaluate the feasibility of using such an algorithm in a real world setting. The project also aims to develop an interface between these algorithms and real world maritime traffic management systems.

Needed Skills

The potential candidate needs to have good knowledge in

- Sensor fusion

It is also beneficial (but not essential) to have knowledge of machine learning, Python and ROS.

Contact

If you find the described project interesting or have questions, feel free to contact Anton Kullberg at anton.kullberg@liu.se.

Linköping University
Automatic Control