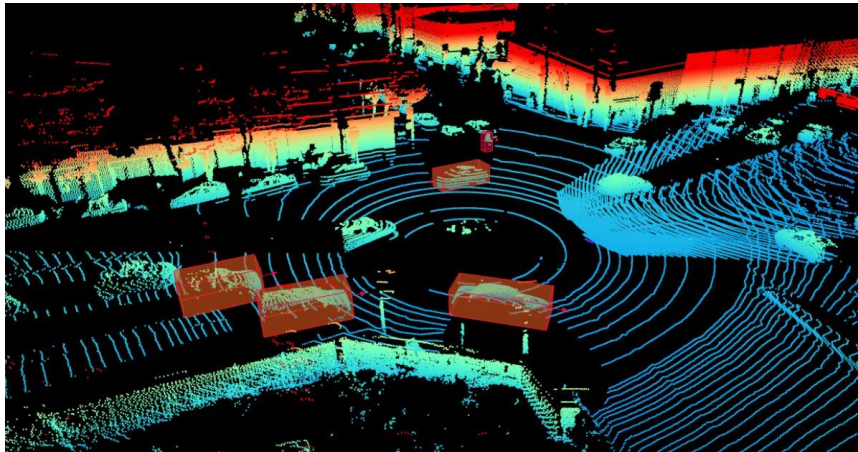


Master's Thesis

Learning-Based Parameter Estimation for Kalman Filters in Object Tracking for Autonomous Driving



Kalman filters are widely used in object tracking, but their performance often depends heavily on parameters that are manually set — a process that can be tedious and suboptimal. This thesis looks into learning these parameters directly from data to make the tracking system more accurate and adaptable. There are already approaches in literature available, however they have not been adapted to the domain of autonomous driving.

What you'll do:

- **Review and analyze** the leading current tracking methods used in autonomous systems – Kalman filter and learning based
- **Develop and test** approaches to learn model parameters (noise covariances) from a data set consisting of detected objects and the ground truth
- **Compare** optimized Kalman filters with standard hand-tuned filters and learning based approaches on the nuScenes benchmark

What should you bring:

- Curiosity for autonomous driving and machine learning
- Experience with Python and Pytorch will definitely be helpful
- An engaged and independent working attitude

This project offers a unique opportunity to contribute to a **novel and impactful area of research**, as this optimization potential has not been used so far in the field of autonomous driving. Therefore, this thesis could lead to a publication.

If you are interested, please send your **CV** a **transcript of records** and a **short motivation** (max 5 lines) to: cornelius.schroeder@tum.de