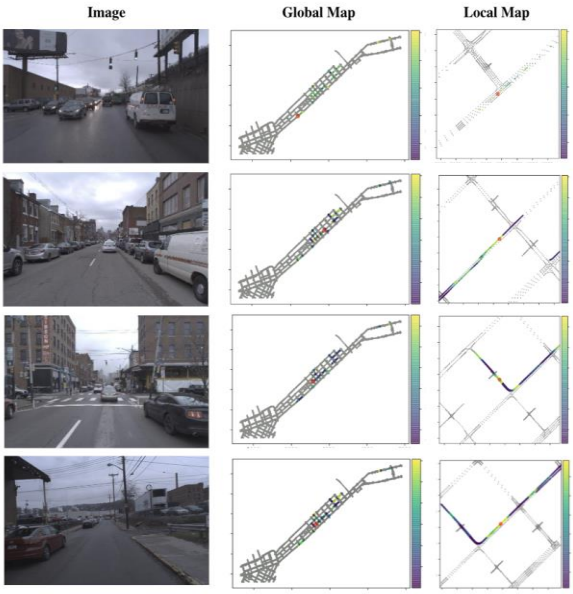
Institute of Automotive Technology
TUM School of Engineering and Design
Technical University of Munich

Lane Topology Localization for Autonomous Vehicles

BA/SA/MA (also Informatics), IDP, FP, ...



https://arxiv.org/pdf/2301.04224.pdf

This thesis opportunity explores the challenging task of global localization by integrating real-time generated lane information from online mapping services and offline road topology data from OpenStreetMap. Global localization, which involves determining the location of a vehicle in a global coordinate system, is a fundamental problem in autonomous navigation.

Online mapping services provide up-to-date lane-level information, including lane markings, lane boundaries, and lane geometry. This information can be leveraged to improve the accuracy and robustness of global localization systems. On the other hand, OpenStreetMap provides a comprehensive database of road networks and topological information, including intersections, road connectivity, and road classes. This offline road topology information can provide valuable context and constraints for global localization algorithms.

The primary objective of this thesis opportunity is to investigate methods for effectively matching the real-time generated lane information with the offline road topology information to achieve reliable global localization. The proposed methods will be evaluated and validated using real-world datasets and simulation environments, considering various scenarios, such as urban environments, highway driving, and complex road geometries. The expected outcome of this thesis opportunity is the development of a robust global localization system that leverages the complementary strengths of online mapping data and offline road topology information. Overall, this thesis opportunity offers an exciting research area at the intersection of computer vision, robotics, and geospatial data analysis. It provides an opportunity to explore innovative solutions to the global localization problem, with practical implications for autonomous vehicles operating in dynamic and diverse environments.

Qualifications:

You should be able to independently familiarize yourself with the topic and the tools and have a structured way of working. Ideally, you have programming experience in Python and knowledge of the frameworks PyTorch or TensorFlow. *There are no hard requirements, as everything can be learned if you are willing to put in the extra effort.*

Contact:

If you are interested in this project or have your own ideas on this topic, send your CV and transcript of records with a few sentences about your motivation or idea to:

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