ITSC 2020 Workshop Proposal:
Probabilistic Prediction and Comprehensible Motion Planning for Automated Vehicles – Approaches and Benchmarking

Organizers

Maximilian Naumann[1,2] (Main Organizer), maximilian.naumann@kit.edu
Ö. Sahin Tas[1,2], tas@fzi.de
Dr. Martin Lauer[2], martin.lauer@kit.edu
Dr. Liting Sun[3], litingsun@berkeley.edu
Dr. Wei Zhan[3], wzhan@berkeley.edu
Prof. Masayoshi Tomizuka[3], tomizuka@berkeley.edu
Prof. Arnaud de La Fortelle[4], arnaud.de_la_fortelle@mines-paristech.fr
Prof. Christoph Stiller[1,2], stiller@kit.edu

[1] FZI Research Center for Information Technology, Karlsruhe, Germany
[2] Karlsruhe Institute of Technology, Karlsruhe, Germany
[3] University of California at Berkeley, Berkeley, USA
[4] MINES ParisTech, Paris, France

Aim of the Workshop

The research field of Automated Vehicles has experienced vast progress over the last decades and today, first prototypes are sufficiently safe to drive on selected roads in public traffic. Nevertheless, safety comes at the price of overly conservative behavior, leading to inconvenient situations, for example, at unprotected left turns or merging scenarios. Presumably, the main reasons for this behavior include (a) errors in the prediction of other traffic participants, especially in interactive scenarios and (b) the lack of probabilistic considerations in motion planning.

While safety should of course never be put at risk (which is the focus of the ITSC2020 Workshop on Automated Vehicle Safety: Verification, Validation and Transparency), worst case behavior of others should not be considered the basis for the motion plan of an automated vehicle. Rather, it must be ensured that a safe reaction to such worst case behavior remains feasible, allowing uncomfortable trajectories in these guarantees, while the intended trajectory as a reaction to the expected behavior of others is comfortable and thus less conservative.

As a basis for such behavior, and thus closely related, sophisticated behavior prediction approaches for other traffic participants are necessary, which go far beyond constant velocity assumptions. The predictions provided must be of probabilistic nature and potentially based on or classified in maneuver options for other vehicles. In many scenarios, there is not "the right prediction", but many maneuvers are possible. The actual choice is influenced by the destinations of the other traffic participants, their individual driving behaviors and maybe even the drivers' mood. Thus, a simple evaluation against a ground truth is not possible for such approaches. Recently, the organizers have published the InterACTION dataset as - to the best of the organizers' knowledge - the first dataset that provides precise trajectory data of highly interactive traffic scenarios along with a high definition map. Prediction approaches, including but not limited to machine learning based approaches, as well as proposals for their evaluation, are the main goal of this workshop.

Program

13:30 –13:45	Introduction
13:45 – 14:30	Invited Talk: Pedestrian Prediction by Planning using Deep Neural Networks (Eike Rehder, tbc)
14:30 – 14:45	*Coffee break*
14:45 – 15:05	Paper Presentation: Two-Stream Networks for Lane-Change Prediction of Surrounding Vehicles (David Fernandez Llorca, Mahdi Biparva, Rubén Izquierdo, John Tsotsos)
15:05 – 15:25	Paper Presentation: The PREVENTION Challenge: how good are humans predicting lane changes?(Álvaro Quintanar, Rubén Izquierdo, Ignacio Parra Alonso, David Fernández-Llorca, Miguel A. Sotelo)
15:25 – 15:45	Paper Presentation: Vehicle Trajectory Prediction in Crowded Highway Scenarios Using Bird Eye View Representations and CNNs (Rubén Izquierdo, Álvaro Quintanar, Ignacio Parra Alonso, David Fernández-Llorca, Miguel A. Sotelo)
15:45 – 16:00	*Coffee break*
16:00 – 16:30	The Interaction Dataset: Naturalistic Driving Data Along with Semantic Map Information
16:30 – 17:15	Moderated Panel Discussion: Requirements for Interactive Prediction and Planning Benchmarking