Probabilistic Prediction and Comprehensible Motion Planning for Automated Vehicles Workshop

IEEE Intelligent Transportation Systems Conference 2020

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Agenda

13:30 - 13:45	Introduction
13:45 - 14:30	***The Interaction Dataset:*** Naturalistic Driving Data Along with Semantic Map Information
14:30 - 14:45	Coffee break
14:45 - 15:10	***Paper Presentation:*** Two-Stream Networks for Lane-Change Prediction of Surrounding Vehicles (David Fernandez Llorca, Mahdi Bi parva, Rubén Izquierdo, John Tsotsos)
15:10 - 15:35	***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)
15:35 - 15:45	Coffee break
15:45 - 16:45	***Invited Talk:*** Pedestrian Prediction by Planning using Deep Neural Networks (Eike Rehder, Daimler AG)
16:45 – 17:00	Coffee break
17:00 – 17:30	***Moderated Panel Discussion:*** Requirements for Interactive Prediction and Planning Benchmarking

The Interaction Dataset

https://interaction-dataset.com/

Paper Presentation:
Two-Stream Networks for Lane-Change Prediction of Surrounding Vehicles

Dr. David Fernández,
Professor at University of Alcalá

Two-Stream Networks for Lane-Change Prediction of Surrounding Vehicles

David Fernández-Llorca[1], Mahdi Biparva[2], Rubén Izquierdo-Gonzalo[1] and John K. Tsotsos[2]

***Abstract*— In highway scenarios, an alert human driver will typically anticipate early cut-in and cut-out maneuvers of surrounding vehicles using only visual cues. An automated system must anticipate these situations at an early stage too, to increase the safety and the efficiency of its performance. To deal with lane-change recognition and prediction of surrounding vehicles, we pose the problem as an action recognition/prediction problem by stacking visual cues from video cameras. Two video action recognition approaches are analyzed: two-stream convolutional networks and spatiotemporal multiplier networks. Different sizes of the regions around the vehicles are analyzed, evaluating the importance of the interaction between vehicles and the context information in the performance. In addition, different prediction horizons are evaluated. The obtained results demonstrate the potential of these methodologies to serve as robust predictors of future lane-changes of surrounding vehicles in time horizons between 1 and 2 seconds.**

I. INTRODUCTION

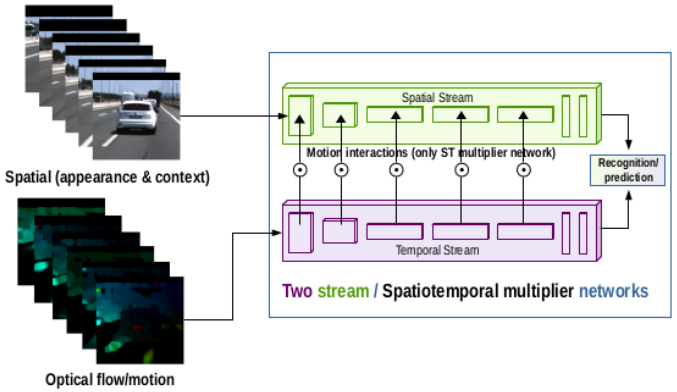


Fig. 1. Overview of the proposed video action recognition approaches for lane change recognition and prediction of surrounding vehicles, including Two-Stream Network and Spatiotemporal Multiplier Network.

Paper Presentation:

Vehicle Trajectory Prediction in Crowded Highway Scenarios Using Bird Eye View Representations and CNNs

Rubén Izquierdo,
University of Alcalá

Vehicle Trajectory Prediction in Crowded Highway Scenarios Using Bird Eye View Representations and CNNs

R. Izquierdo, A. Quintanar, I. Parra, D. Fernández-Llorca, and M. A. Sotelo

***Abstract*— This paper describes a novel approach to perform vehicle trajectory predictions employing graphic representations. The vehicles are represented using Gaussian distributions into a Bird Eye View. Then the U-net model is used to perform sequence to sequence predictions. This deep learning-based methology has been trained using the HighD dataset, which contains vehicles' detection in a highway scenario from aerial imagery. The problem is faced as an image to image regression problem training the network to learn the underlying relations between the traffic participants. This approach generates an estimation of the future appearance of the input scene, not trajectories or numeric positions. An extra step is conducted to extract the positions from the predicted representation with subpixel resolution. Different network configurations have been tested, and prediction error up to three seconds ahead is in the order of the representation resolution. The model has been tested in highway scenarios with more than 30 vehicles simultaneously in two opposite traffic flow streams showing good qualitative and quantitative results.**

I. Introduction and Related Work

Highways are among the most common driving scenarios in which autonomous vehicles are starting to develop their

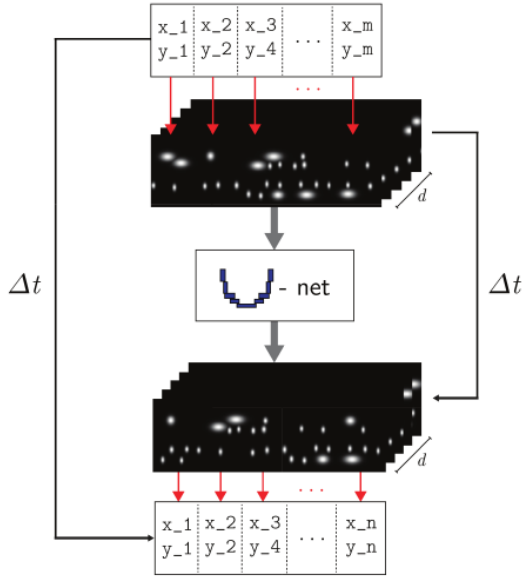
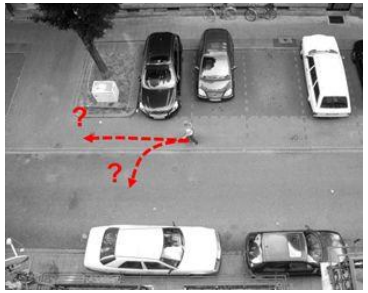
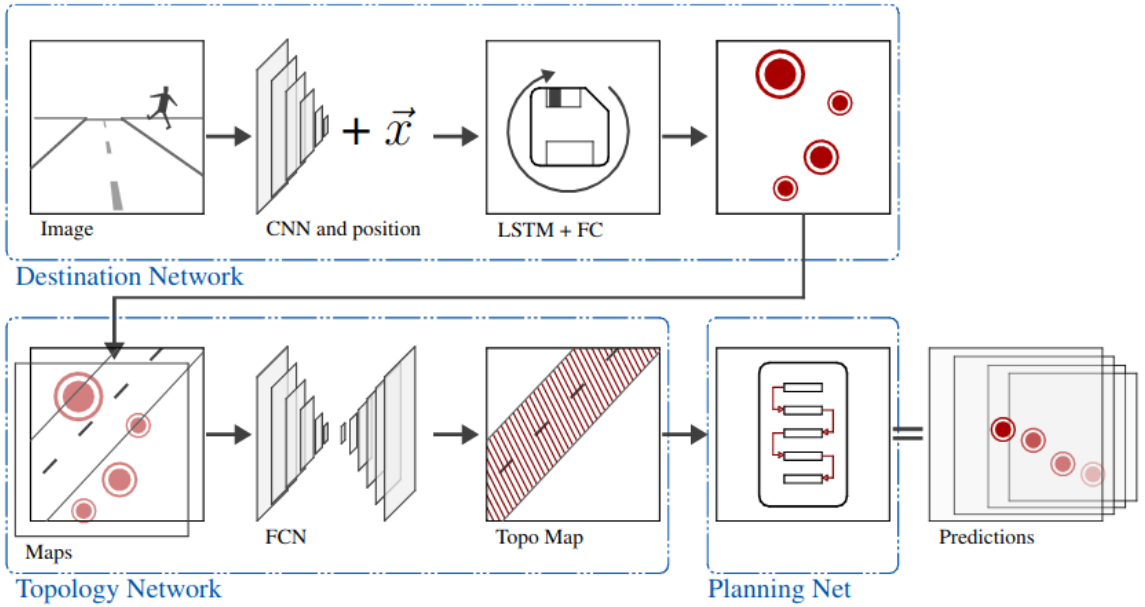


Fig. 1. System overview.

Invited Talk:
Pedestrian Prediction by Planning using Deep Neural Networks

Eike Rehder,
Daimler AG





THANK YOU

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