Invitation to Ph.D. defense

Morten Bornø Jensen will defend his Ph.D. dissertation:

Building Brains for Visual Traffic Analysis

Wednesday, March 27, 2019 at 11:00 in Room 3.529, Rendsburggade 14, 9000 Aalborg

Summary of the Ph.D. research

Making a computer detect and understand traffic objects automatically - be it vehicles, pedestrians or traffic lights - are essential components for self-driving cars or automated traffic analysis. This Ph.D. thesis addresses four computer vision topics in respect to traffic analysis, which are Video Acquisition, Object Detection, Semantic, and Knowledge for the World. In Video Acquisition, a multi-modal and multi-view recording setup is developed which has been used for capturing several months of video data in Europe. To aid less occlusion-prone capturing view-angles, we provide an overview of available portable poles, which shows a lack of a lightweight yet robust portable pole. To this end, we develop one satisfying these requirements. Finally, we have assembled a traffic intersection dataset with synced view-angles from both a drone and existing infrastructure. Preliminary results using Mask R-CNN show that the drone view-angle is superior when detecting vehicles but inferior when detecting pedestrians and cyclists. Within Object Detection, a traffic light dataset has been assembled and published together with an extensive survey of state of the art within traffic light recognition. The survey indicated that detecting traffic lights had not followed the same machine learning advancement as in similar detection areas. To this end, we by brought the traffic light detection up to par using the Aggregate Channel Features detector and the You-Only-Look-Once detector. For Semantic, we propose a human-in-the-loop traffic analysis watchdog tool for non-practitioners of computer vision. The tool is based on traditional computer vision methods and is made very user-friendly causing it to be used worldwide. Further, an automatic data-driven traffic analysis tool based on the Single Shot MultiBox Detector is proposed. The tool produces object trajectories in world coordinates enabling further conflict analysis or the likes. In the last topic, Knowledge for the World, a non-peer-reviewed popular science paper on Deep Learning has been published targeted towards high school student, spawning several inquiries on the perspectives and how to get started. Further, we attended the Danish Folkemøde 2018, "The People’s Meeting." We showcased the latest advancement within computer vision which led to two live TV interviews.

Assessment Committee

Claus B. Madsen, Associate Professor (Chairman)
Department of Architecture, Design and Media Technology, Aalborg University, Denmark

Brendan Morris, Associate Professor
Department of Electrical and Computer Engineering, University of Nevada, USA

Anthony Hoogs, Senior Director of Computer Vision
Kitware Inc., USA

Supervisor

Thomas B. Moeslund, Professor
Department of Architecture, Design and Media Technology, Aalborg University, Denmark
Agenda

The public Ph.D. defense will be hosted and moderated by Associate Professor Rikke Gade, Department of Architecture, Design and Media Technology, Aalborg University. The agenda of the Ph.D. defense is as follows:

11:00 - 11:05  Moderator Rikke Gade welcomes the guests
11:05 - 11:50  Public presentation from the Ph.D. candidate
11.50 - 12.30  Coffee Break
12.30 - 14.30 (latest)  Q&A from the assessment committee and the auditorium (if time permits)
14.30 - 15.00  Meeting in the assessment committee - Room 5.346
15.00 - 16.00  Announcement, speeches and reception - Common room 5.355

After the defense, the Department of Architecture, Design and Media Technology will host a reception in common room 5.355 (lunch area, level 3).
Questions can be directed to Senior Secretary Malene Friis (mafr@create.aau.dk / +45 9940 7176).