Viscando: Some proposals for diploma projects

About Viscando

Viscando specializes on developing innovative sensors for traffic monitoring and intersection control for Smart Cities. We believe that objective data on road user behavior and interactions is crucial for granting efficient transports and traffic safety. By combining state-of-art Computer Vision and Machine Learning methods we provide unique insights into how intersections and other complex traffic situations perform and how the traffic flow can be optimized. In this way, we contribute to saving lives, money and making cities more sustainable and livable.

Viscando’s core competencies are Computer Vision, Machine Learning, Object tracking and Data Analysis. Viscando is a young and growing company. Our products and services are provided in a growing number of countries in Europe. We have a clear ambition to be a global company within the coming years.

Today we are eight highly skilled specialists working close to Lindholmen Science Park in Gothenburg. During 2018 Viscando won the Inission Innovation Award and also became part of the 33-list of most innovative startups in Sweden.

Contact information

If you are interested in any of the proposed topics below, or have ideas of your own, contact us.

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Project with main focus on algorithms and software

For all of the following projects, students need to have strong skills in:

- Mathematics
- Statistics
- Computer Vision
- Programming (C/C++ and/or python)

Road user classification using deep learning on images and 3D data

There is a great deal of academic research and articles concerning object classification in 2D images using Deep Learning. Much less is available on deep learning on 3D data. The aim of this project is to study how one can perform efficient deep learning using 3D data, perhaps combined with tracking data. For example, can the 3D information be used to transform the object bounding boxes to a common scale. 3D object data also gives additional information about actual size and form of objects, which is normally hard to get using just 2D images.

Example of studies to be done:
Can 3D data reduce the amount of needed training data to get a given level of classification accuracy?
Can the neural networks be smaller in depth if 3D data is used, instead of 2D data?

The project can be based on existing 3D stereo vision system at Viscando as well as already annotated data.

3D stereo vision and tracking – focus on handling of occlusion and multi-object tracking
In order to understand road user behavior and interactions, Viscando tracks each individual road user through, for example, an intersection. However, in most traffic situations the normal condition is that there are many road users moving around who may at times occlude each other. Besides that, there are normally also a multitude of fixed occlusions, e.g. sign boards, parked vehicles, etc.

This diploma projects takes its starting point in Viscando’s existing platform for traffic monitoring and tracking. The aim is to improve the multi-object tracking in the presence of occlusion and test on real-world data.

Projects involving work on hardware and algorithms
3D stereo vision with wide FOV, e.g. using fish eye optics
Viscando’s current stereo vision system, OTUS3D, has a field of view (FOV) of approximately 100 degrees. In many situations in the traffic environment even bigger would be highly beneficial, since fewer systems could cover larger areas.

In this project we would like investigate how efficient Stereo Vision can be performed in ultra-wide FOV, e.g. using fish eye optics. The work will involve both optics, computational hardware as well as development of stereo vision algorithms (in CPU or GPU, depending on student’s interest and background).

We think, this diploma project is suitable for two students – one with main focus on HW and the second with main focus on software.

Main focus on data analysis and visualizations of data
Detection and analysis of traffic conflicts using tracking data
Viscando’s OTUS3D system is able to register detailed data on movements of individual road users. This data can be used to study both behavior and interactions in an objective and repeatable way, providing useful data to cities for improving traffic safety and optimize traffic flow.

In this project we are looking for a student with an interest in object tracking and traffic safety. A great deal of the work involves the definition of good parameters on traffic safety to measure/extract from the collected object tracking data. Focus is also placed on accurate and visually appealing graphical visualization of the results.