Railway asset detection

Automating the registration and mapping of railroad and related equipment

This industrial PhD project is co-funded from COWIfonden and the Danish Innovation fund. It will be carried out at COWI A/S with the collaboration and the high-level scientific contribution of the Computer Science department of Copenhagen University. It has started on January 2017 and will be completed in three years.

The purpose of the industrial PhD project is to develop an algorithm that automatically detects and localizes assets along a railroad. Such assets may include poles and signs, wires, control cabinets, signaling equipment, platform constructions. The necessity of mapping railway assets has arisen due to the complexity of railways. In order to handle them efficiently, we need advanced management systems that automate some processes and improve decision support, minimizing the requirement for expensive and inefficient on-site activities. A detailed representation of the network, its assets and surroundings is key for an efficient management system.

Today, such mapping is a manual, very labor intensive and expensive process. Hence, the goal of this project is to automate a major fraction of this work while improving the quality and production speed of the output. The data used for mapping railways is normally both aerial and ground imagery. In this case, the data will be –but not limited to- videos acquired from a camera mounted on the train, laser scanned point clouds acquired from helicopter combined with RGB aerial images from helicopter as well.

There are many methods to approach algorithmically this project from the fields of image analysis and photogrammetry. Nowadays, the most modern way is using Artificial Neural Networks – methods that try to simulate the way the human brain processes what our eyes see. They are trained through positive and negative examples (thousands or even millions) of what we are looking for and eventually –when they are appropriately trained- can detect the objects of interest based on probabilities.

A success of this project will not only solve the above-mentioned problem, it will also open the way of automation in other applications, road asset detection for instance.