

MSc. Geomatics for the Built Environment

Projects to be presented on Geomatics Day, June 26 (1-5pm CET)

Improving the AHN3 gridded DTM/DSM



Clients:

Het Waterschapshuis

The problem. The AHN3 dataset is available as a point cloud (PC) and as gridded DSM and DTM. While we researchers use the PC, most users find them too large/complex and use the 50cm gridded DSM/DTM, which are derived from the PC. The issue is that a very simple algorithm was used for this, and in practice the DSM/DTM contain many errors, artefacts, and this hinders their use.

Assignment. The students will derive the DSM/DTM from the PC for the whole country (the PC comes in tiles so the process can be "easily" parallelised). They will have to find and improve ground filtering algorithms to extract the DTM, and then use a more suitable interpolation method than IDW (which is currently used). They will also have to make the process fast, and compare their results to what exists and also in other countries.

Machine learning & point clouds for indoor feature classification



Client:

The problem. Machine Learning (ML) is an hot topic within Geomatics, and more specific: within Point Clouds. One of the main GIS vendors, Esri, features within their ArcGIS Pro version "new deep learning tools that let users train their data in an external deep learning model and use the results to model or classify their imagery within the ArcGIS platform." The research focuses on the use of Point Clouds within Machine Learning with specific attention to the use Machine Learning, Point Clouds and Images for Indoor Feature Classification. The question is how to collect detailed information about city assets periodically and at a minimum cost? An answer may be in the LiDAR sensors mounted on the vehicles driving around the city collecting the point cloud data, and machine learning techniques applied to the collected points to extract accurately georeferenced vector features, which can be consequently used in traditional GIS analysis and systems of record.

Assignment: Esri Nederland would like to have more insight in the possibilities of the latest version of ArcGIS, combined with machine learning libraries, to classify features in point clouds.

3D noise simulation based on advanced input data using automatically generated TINs



Rijksinstituut voor Volksgezondheid
en Milieu
Ministerie van Volksgezondheid,
Welzijn en Sport



Rijkswaterstaat
Ministerie van Infrastructuur en Waterstaat

Client:

The problem. Modern noise models use 3D data as input for calculating noise levels generated by road, rail industry (including leisure noise) at dwellings. With the availability of more data like BAG and AHN these models have grown more and more complex. However the noise community is still very traditional. To calculate noise levels in simulation software, the terrain is modelled using height lines and buildings are 2.5D blocks (single height per polygon). The purpose of this project is to explore a new, advanced method of modelling the environment. This method is based on using different types of input data like a TIN or 3D surfaces to calculate noise levels (the method takes into account reflections and screening by barriers or buildings).

Assignment. For this project you will be asked to implement a new data scheme in a calculation method and explore shortcomings and advantages of TIN's and other data schemes. The 3D Geoinformation group has developed a methodology to automatically generate 3D input data that can be used in current noise simulation software. The students are asked to embed these data and the noise calculation method into a TIN solution.

Point cloud deployment for firefighting strategy

Clients:



Veiligheidsregio Rotterdam-Rijnmond



The problem. The need of geo-information and cartography within the process the indoor deployments during building fires is They state: "Information is key for a safe deployment of the fire brigade. Incorrect judgement could lead to decreased effectivity or even casualties. Because of the risks that are posed by building complexity and modern building materials, the Dutch fire brigade is increasingly hesitant to enter the building during a fire. While no two building fires are the same and personal judgement of the fire brigade will remain necessary, good information supply could aid the commanders in making the right choices. There are a of factors that come into play when choosing strategy, tactics and techniques. An effective information system should present the right information at the right moment, and it should do so in an intuitive and effective manner." However, this process starts with the availability of an up-to-date / real-time representation of the indoor space.

Assignment. The aim of this project is to use real-time, indoor, point cloud based geo-information, as obtained by (indoor) Lidar scanning, vision-based (e.g. Microsoft Hololens) devices, and possibly other data-acquisition techniques directly within the indoor deployments during building fires. For that, the so-called Mobile Information System should be supplied with the operational data as captures in real-time by the first responders entering the building. There is only on-the-fly time for further data-processing or 3D-modelling; the gathered data should be delivered and be interpreted as-is. This project should proof the captured point clouds can act as the explorative, direct, and cartographically rich ground-truth.

A strategic approach for site selection of waste facilities in Mexico

Client: **52°impact**

The problem. Satellite and non-satellite data sources are used to inspect where (illegal) waste occurs, how much waste is being dumped, the type of materials at these dumpsites and how dumpsites change over time. This is particularly interesting for companies and governments in developing countries that want to tackle the growing problem of waste.

Assignment. We like to broaden our scope and explore new possibilities regarding waste monitoring. This study is about how the occurrence of open dumpsites in Mexico is influenced by the accessibility of waste facilities by municipalities. Which factors influence the occurrence of open dump sites, and where should new waste facilities be located to prevent new open dump sites or diminish the number of current open dump sites. Ideally a decision support system is drafted that should support decision makers in determining the location of new waste facilities.