Dense matched 3D point clouds as a base for a national 3D topographic data set

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SUMMARY

In The Netherlands an initiative was founded to create a nationwide base 3D model. The main driver was that more and more issues require 3D data to be properly analysed and solved. A main constraint for the model was that all 3D objects should be directly related to the corresponding objects in the existing large scale topographic 2D map of The Netherlands. So, the idea was to '3D-fy' this 2D dataset by creating heights for all objects. The result should be a topologically correct 3D dataset.

The required height can be extracted from the national Lidar dataset (AHN) which is considered as the base height dataset for The Netherlands. However, due to the update cycle, this data was at that point in time partially be over 8 years old. The 2D model however is updated at least yearly for most objects. This means a potentially significant mismatch between the 2D objects and the used height information. Therefore, another route, using aerial imagery, was taken to obtain the height information.

The aerial imagery in The Netherlands is collected via a national initiative that collects photogrammetric aerial stereo images for the whole country with at least 10 cm ground sampling distance (GSD) every year. Based on this material a dense matching is performed. The results of the dense matching are used to create a gridded nationwide surface model (DSM).

To make this DSM fit for further processing steps the DSM is classified with respect to ground, vegetation, buildings, roads, water and bridges. This complex classification process is supported by using existing datasets, mainly existing topographic datasets.

The classified DSM is used to '3D-fy' the 2D topographic dataset.

Additional results of dense matching are nearly complete true orthophoto's and (n)DSM raster images. These additional results prove to be of great value in various developments related to environmental and economic developments. A few examples are change detection in general, detecting asbestos roofs, change in petrification of gardens.