

# A comparative study of distributed architectures for LiDAR-based change detection

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## Abstract

The advancement of remote sensing and Light Detection and Ranging (LiDAR) in the last few decades [1] offered a technology capable of rapid high resolution collection of surface altimetry data through airborne laser scanning [2]. While this provides an automatized, therefore more cost efficient and faster solution in contrast to expensive and time-consuming field surveys and manual data evaluation, the increasing quantity of measurements and requirements on quality raised new challenges regarding the computation and memory efficient analysis of massive point cloud datasets.

In our paper we compare the processing of massive multitemporal datasets on the high-performance computer LISA provided by the Dutch national collaborative ICT organisation SURFsara, and in cloud computing environments Hadoop and Spark at the big data laboratory of ELTE. As a case study, the multi epoch nation-wide AHN (*Actueel Hoogtebestand Nederland*) altimetry archive of The Netherlands was selected for demonstration. The AHN project provides publicly available altimetry data for the whole territory of The Netherlands, extending across approximately 40.000 square kilometres, containing data points on the magnitude of trillions and requiring several terabytes of storage space [3]. Since the launch in 2003 two data acquisitions were completed, while the third acquisition is still ongoing. In our example the change detection of built-up areas were evaluated between AHN-2 and the available parts of AHN-3 measurements, currently covering approximately 30% of the Netherlands [4].

*Keywords:* big data, distributed processing, cloud computing, lidar, AHN, geographic information systems

*MSC:* 68M20, 68Q85, 68W15

## References

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