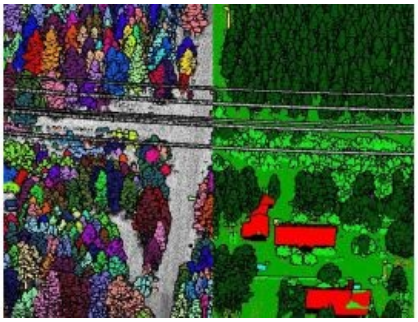
The Point Cloud Phenomenon in 5 Premium Papers



Point clouds acquired with a laser scanner contain millions or even billions of geospatial data points representing the x, y and z coordinates. Using advanced point cloud processing software, the captured geospatial data can be visualized in a digital elevation model (DEM), digital terrain model (DTM) or 3D city model, for example. Which key trends and technological developments have we seen recently? We've selected five articles published by '*GIM International*' to give you an overview of the direction in which the point cloud phenomenon is heading.

Point Clouds and Smart Cities

The 'smart city' concept entirely relies on a permanent stream of massive amounts of data acquired by a great variety of sensors distributed throughout the city. Smart use of all this data requires integration with 3D city maps for which point clouds, acquired by laser scanning or photogrammetry, are the main sources. The author of this article identifies the abilities of point clouds to support the smart city concept.

The benefits of point clouds for monitoring urban processes were recognised quite early on. Back in the early 1990s, airborne Lidar could accurately provide the height component which is so important for many urban needs. Not only the geometric accuracy appeared to be amazingly high, but also the point density. The needs include design and inspection of utilities such as water mains, sewer systems, tunnels, bridges, roads, railways and power lines, and the creation of 3D city maps in which the shapes of buildings and other objects have been reconstructed with high spatial detail. One prerequisite is the availability of geodata, which represents the environment in its full spatial and time dimensions at a highly detailed level. Before being ready for use, geodata has to be acquired. This seems trivial, but is far from it. Read the full article here

Object-based Classification of Point Clouds

Today, the analysis of 3D point clouds acquired with topographic Lidar or photogrammetric systems has become an operational task for mapping and monitoring of infrastructure and environmental processes. Numerous applications require the identification and delineation of landscape objects and their properties. So far, many software solutions have been focused on the analysis of constructed and man-made objects, which are characterised by a regular and well-defined geometry (e.g. buildings, roads and other infrastructure). In comparison, the detection and analysis of natural landscape objects is challenging, since object boundaries might be fuzzy and the object characteristics within one class can be very diverse. This article explores the potential of object-based classification of point clouds as an alternative to classification of individual points. Read the full article here

Automatic Object Detection in Point Clouds

Automatic Object Detection in Point Clouds

Point clouds are used as a data source for mapping tasks in various application fields. Before an object can be mapped, it needs to be detected in the point cloud, preferably by automatic means. The development of detection methods is a complex task due to the significant diversity of objects, the random structure of point clouds, and the different characteristics of point clouds created by airborne, mobile or static systems or image matching. This article introduces classification approaches for automatic object detection and highlights several challenges related to the topic. Read the full article here

Point Clouds: Laser Scanning versus UAS Photogrammetry

Are photogrammetric point clouds superior to Lidar point clouds, or is it the other way around? To address this topic of ongoing debate, the authors conducted a terrestrial laser scanning (TLS) survey together with an unmanned aerial system (UAS) photogrammetric survey of a gravel pit. Comparison revealed that TLS is superior when the highest level of detail is required. For larger surveying projects, however, RTK-enabled UAS photogrammetry provides sufficient levels of detail and accuracy as well as greater efficiency and improved surveyor safety. Read the full article here

Digital surface models generated from point clouds derived from TLS (left) and RTK-only UAS (100m flying height).

Point Clouds from Smartphones

Smartphones are omnipresent, and many people can no longer do without them. Smartphone cameras capture images suited for generating point clouds and 3D models. Apps running on smartphones and software running on a remote server enable easy 3D modelling from multiple images. The challenge is to train and guide laymen through a proper image capture strategy using their smartphones. The authors of this article investigated the potential use of smartphones for cheap and rapid generation of point clouds and 3D models exploiting a collaborative approach. Read the full article here

---

https://www.gim-international.com/content/news/the-point-cloud-phenomenon-in-5-premium-papers

---