New Features of Airborne Lidar Data Processing in DTM Generating, Forest Inventory and Civil Engineering Works

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The modern aerial lidar productivity and accuracy have increased greatly recently, which makes it possible to achieve principally new results while their applauding for power line survey. This field of investigation is typical for Altex Geomatica company since 90th decade.

The new modules on power line processing are included into software package Altexis 7.1 and nowadays they are commercially available. New program modules provide the following possibilities:

- Almost 100% probability of wire detection, geopositioning and vectoring thru lidar points processing;

- Automated geopositioning of most power lines infrastructural elements: tower, insulators with 1-2 cm accuracy;

- Automated tower type recognition by point cloud, if tower frame model is available.

- Detection of tower mechanical deformations and departure from normal vertical position.

- Combining airborne and on-ground lidar survey as well as thermal survey for wire temperature measurement.

The new software features are achieved by applying of new mathematical methods, in particular Kalman filter.

Nowadays there is no doubt concerning optimization of forestry management and inventory. A good solution assumes intensive use of high productive aerial monitoring. Practical application of the monitoring solves two problems: allows finding of actual forestry assessment and estimates effectiveness of regenerative efforts.

Leading position among other modern aerial monitoring technologies belongs to aerial laser scanning. Despite it common good reputation, traditional aerial photography can not be used widely in forestry due to the fact that majority of objects of interest are obscured by canopy and so are invisible for usual cameras. The most prominent application of digital aerial photography assumes a mixture of color channels (red, green, blue and near infrared) in such a way that output image looks

like a film shot that allows experts to separate trees by species and estimate health condition of an individual tree.

Aerial laser scanning at contrary basing upon direct range measurements by means of coherent beam of light that allows extracting data under canopy including land heights. Highly detailed and accurate information about forestry geometry available at any season for vast spaces allows user to use both well-known method of data processing and new ones for upcoming technologies.

Traditional usage of aerial laser scanning data assumes modeling of canopy height over a relief, which allows applying elaborated techniques of statistic methods in forestry. In this regard modern algorithm of laser data processing permits to specify the canopy model up to a separate tree starting from highest trees and finishing at underwood. Moreover, this algorithm provides additional separation of trees by species. As a result, it is possible to operate not only with forestry statistics but a separate tree model as well, that greatly increases accuracy and efficiency of aerial monitoring.

There is another novelty concerning the use of a total set of laser beam reflection during forest scanning which, in its turn, allows modelling forest layers with a high accuracy. Basing upon laser beam propagation and reflection, it is possible to expand layer model at total area to realize biomass assessment.

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