

DETECTION OF FOREST MANAGEMENT OPERATIONS USING BI-TEMPORAL AERIAL PHOTOGRAPHS

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ABSTRACT:

Increased need for timely forest information is leading to continuous updating of stand databases. Thus, changes in forest stands caused by, e.g., operations and storm damages should be detected in order to ensure the accuracy of forest data and beneficial decisions related to the treatments of the stands. This justifies the application of aerial photographs in change detection as being reasonable because they are already used in forest management planning. This study presents a semi-automatic method based on bi-temporal aerial photographs and registration at the stand and segment levels for the detection of changes in boreal forests. The field data consisted of 2,362 forest stands, from which the changes between years 2001 and 2004 were collected from different databases and checked in the field. The aerial photographs were acquired in years 2001 and 2004 with almost the same image specifications. Altogether 69 features both at stand level and at segment level were extracted and used in change detection analysis. Linear stepwise discriminant analysis and the non-linear k-nearest neighbour (k-NN) method were tested and statistically compared in classification. The classification results at the stand level were found to be better than at the segment level. Compared to previous studies, the results of this study demonstrate remarkable improvement in the classification accuracy of moderate changes. The results showed that change detection substantially improved when the registration at the stand level was used, especially in the detection of thinned stands. To some extent, the method can be already applied operationally.

TOPIC: Change detection and process modelling

ALTERNATIVE TOPIC: Not Specified