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Object-based image segmentation in photogrammetry for cartographic use

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The use of aerial photography in topography has started in the first decades of the 20th century. Remote sensed data have become indispensable for cartographers and GIS staff when doing large-scale mapping: especially topographic, orienteering and thematic maps. The use of UAVs (unmanned aerial vehicles) for this purpose has also become widespread for some years. Various drones and sensors (RGB, multispectral and hyperspectral) with many specifications are used to capture and process the physical properties of an examined area. In parallel with the development of the hardware, new software solutions are emerging to visualize and analyse photogrammetric material: a large set of algorithms with different approaches are available for image processing.

Our study focuses on the large-scale topographic mapping of vegetation and land cover. Most traditional analogue and digital maps use these layers either for background or highlighted thematic purposes. We propose to use the theory of OBIA – Object-based Image Analysis to differentiate cover types. This method involves pixels to be grouped into larger polygon units based on either spectral or other variables (e.g. elevation, aspect, curvature in case of DEMs). The neighbours of initial seed points are examined whether they should be added to the region according to the similarity of their attributes. Using OBIA, different land cover types (trees, grass, soils, bare rock surfaces) can be distinguished either with supervised or unsupervised classification – depending on the purposes of the analyst. Our base data were high-resolution RGB and multispectral images (with 5 bands).

Following this methodology, not only elevation data (e.g. shaded relief or vector contour lines) can be derived from UAV imagery but vector land cover data are available for cartographers and GIS analysts. As the number of distinct land cover groups is free to choose, even quite complex thematic layers can be produced. These layers can serve as subjects of further analyses or for cartographic visualization.

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