

Semi-automated analysis of remote sensing data - an approach for supporting planning authorities

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Abstract:

One of the major accompaniments of the globalisation is the rapid growing of urban areas. Whereas at the end of the 1970th only 38% of people lived in cities, this number increased up to 50% in 2008. In 2030 two third of all people worldwide are expected to live in cities. Urban sprawl is a major environmental concern affecting these cities and urban regions across differing characteristics and continents. Besides a quantitative reduction of land consumption, sustainable handling of the limited resource land and “smart growth” are acknowledged as key tasks for urban planning. Coping with these tasks requires precise and adaptive planning instruments.

The study is part of the GAUS-project (Gaining additional urban space (GAUS) – Detection and valuation of potential areas for inner urban development with remote sensing and GIS. The project is dedicated to the development of a Multi-criteria Decision Support System (MDSS) as a tool for supporting the municipal management authorities with regard to urban consolidation and smart growth. The presented classification framework aims at feeding the MDSS with up-to-date LULC information.

This work deals with the strategy and workflow (data, preprocessing, classification processes, accuracy assessment) towards a semi-automated LULC classification of urban areas, following an object-oriented approach. Furthermore, an overall goal of this work is to figure out generic methods and strategies towards LULC classification with VHR optical data to ensure robustness and transferability, which are crucial preconditions in order to automate processes. Different QuickBird scenes of the Ruhr Area (Nordrhein-Westfalen, Germany), Berlin (Germany) and Istanbul (Turkey), allow to consider potential variabilities of the input data (spatial resolution, seasonal effects, plurality of LULC occurrences) when developing the framework for the classification.

Since the availability of VHR remote sensing data with spatial resolution from 1 m and higher new application ranges were explored. Within the context of urban planning, there is a need for semi-automated processes. Because applied urban planners are often inhibited to use satellite data because of absence of remote sensing software and know how. Therefore a semi-automated LULC classification was developed.

Keywords: urban areas, urban sprawl, very high resolution satellite data, object-based land use classification, multi-criteria decision support system