

Knowledge-Based Classification of Land Cover Using GIS and Remote Sensing

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Abstract:

Credible classification of remotely sensed data is currently one of the most studied issues in the geo-information science. This challenging issue incorporates various scientific disciplines (such as geodesy, computer sciences, geography etc.) in order to collect and process digital data regarding various terrain phenomena. Although these phenomena vary in size and extent, it is difficult to separate them one from the other. The significant advance in remotely sensed data quality and its availability, enable the study of a large number of phenomena, simultaneously. In addition, there is a rapid growth of available data sources (more satellites, new airborne scanners, advanced ground scanners and field surveys). This multitude of available data has assisted to overcome traditionally problematic issues such as incomplete data, absence of data and contradictions between observations. On the other hand, the increase of these multi-source complex data necessitates the automatization of image understanding processes. The adoption of the knowledge-based analyses concept as proposed here, may serve as a novel solution to this problem. This conceptual approach makes it possible to incorporate, semantic and quantitative data (spatial and spectral) in one autonomous system. These data could be even an expert's professional opinion or quality evaluations relying on knowledge of the studied objects. The aim of integrating these data with national and regional thematic GIS layers is to quantify the present status of the studied phenomena, quality assesment of existing classification and monitoring of land-use/land-cover temporal changes. Furthermore, the ideal envisaged autonomous algorithm will include advanced logical formalization of knowledge-based analyses principles. Thus, traditional "operator" intervention in the classification process may be omitted.

The objective of this study is to develop an efficient approach for multi-spectral image classification. More specifically the goal is to develop automatic and autonomous algorithms and procedures, as much as possible. Proposed is a new information fusion algorithm for the extraction and representation of natural and man-made objects from high-resolution satellite imagery. The proposed classification system is envisaged to improve processes of change identification, thus leading toward automatic updating of existing spatial databases. Also, this approach may produce land-use/land-cover and other thematic maps with clear interregional boundaries.