GIS-Driven Analysis of Remotely Sensed Data for Quality Assessment of Land Use/Land Cover (LULC) Classification

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The automatic integration of remotely sensed multi-spectral data into the process of spatial data bases maintenance is one of the key research issues of modern spatial data handling and analysis. National GIS systems contain large quantities of spatial and nominal information instances which demand constant maintenance and periodical updating. The maintenance operations of the Land-Use/Land-Cover (LULC) classification of the Israeli National GIS database are based on 1:40,000-scale air photographs and are executed manually within a four-year updating cycle. However, the accelerated development in some regions is manifested also with many and rapid changes that should be depicted in the LULC layer. These rapid changes call for a better effective updating mechanism, capable to provide continuous revision of the existing spatial data bases. The interaction between natural and anthropogenic factors related to urban expansion and agriculture development are quite complex. This is further magnified under the conditions of the Mediterranean semi-arid environment of Israel. As a result, there is a considerable amount of discrepancies between the "world reality" and the "database reality" even shortly after the updating and revision operations took place.The aim of the presented research was to define and develop a semi-automatic GIS-Driven methodology of remotely sensed data analysis for quality assessment of the LULC classification coverage. This methodology was translated into newly developed software to serve the Israeli National GIS database updating operations. During the study, statistical criteria of discrepancy conditions have been developed based on supervised GID-Driven classification of newly obtained remotely sensed data. The study was based on multi-spectral data obtained by CASI airborne scanner and IKONOS data. The research focused on vegetation phenomena typical to the northern part of Israel. The proposed method was developed on the basis of a study area (~50 sq. km.) and was tested on a larger control area. Image reality and field verification (both by land and air) proved the method of GIS-Driven quality assessment to be a promising solution for a revising process of large core spatial databases.