

Analytical method for the land cover data using Ontology and GIS: A comparison of classification systems for Great Britain

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1. Introduction

Classification systems of land cover have been created by some research organizations. In this study, we compare different classification systems using Ontology and GIS, and propose an analytical method to integrate the systems.

2. Data

The data chosen are LCM2000 (Land Cover Map 2000: CEH; Center for Ecology and Hydrology) and CLC2000 (CORINE Land Cover 2000: EEA; European Environment Agency). We have downloaded them from both organizations' websites after their permission. LCM2000 is a grid data set with a 1km resolution. CLC2000 has two data types, 100 m grid and 250 m grid.

3. Ontology

Ontology is originally a term of philosophy. However, it is recently used as a plan of general ideas among researchers of engineering. Existence of things affects a way of conceptualization. Different observers may take the same object for different things. Also even if viewpoints are different, different objects may be expressed using the same general idea. In other words, Ontology is the method to explain how concepts are created from various kinds of information. We offer an effective analytical method to integrate different classification systems by combining Ontology and GIS.

4. Methods

The study area is Great Britain where Land Cover data of LCM overlap with those of CLC. Their classification systems are compared and examined in the following procedures.

(1) Visualization

Ontology: Recent engineering studies indicate that OWL (Web Ontology Language) is a superior technology for the Semantic Web. OWL's browsing functions permit an advanced expression of classification systems. A usual expression of a legend is that various colors correspond to various kinds of land cover. An OWL browser keeps this property, and makes it possible to draw hierarchical structure and to understand the nature of classification systems.

ArcGIS: In addition, the data were visualized using ArcGIS. It also makes possible to overlay and compare the classified results.

(2) Comparison

Because each cell on the map holds an attribute corresponding to the legend, a quantitative comparison between various classification systems is possible. With the function of ArcGIS, two different land cover maps by LCM and CLC are compared. We have superimposed raster data of the maps and integrated attribute data based on their spatial relationships. Then we have quantitatively clarified how many combinations of land use types exist and how much proportion of overlapping area is, i.e., how much each land use type of the LCM system corresponds to that of CLC.

5. Conclusion

The results obtained from this study indicate that the proportion of overlapping area would be crucial for refining classification. Also legends newly visualized by OWL give suggestions to aggregate land cover data. Through these examinations, a new integrated classification system could be created from original legends.