

Evaluating QUality of multi-scale geographical objects

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The problem of evaluating the accuracy of multi-scale geographical objects has been related to the testing of different geographical databases at various levels of scale and detail. The problem of scale and the fact that geographical objects have different properties under different scales have been emphasized. The objective has been to test and describe the accuracy of geographical objects and classes in order to help the users to evaluate how the databases meet their requirements for spatial analysis.

The study includes a discussion about actual accuracy testing procedures for evaluating the accuracy of a real geographical database and a review on how to take samples from multi-scale geographical objects. The importance of sampling method, random versus stratified random sampling, together with sample size, sampling unit and taken unit size to the resulting accuracy values have been emphasized. Further, the study handles the question of what is an error and how can we realize an error for multi-scale objects? The question has been divided according to the types of categorical objects we can find, namely whether the objects boundaries are exact or not, does the objects include remains of smaller features from other classes or not, or does the object features include typological variation between the class objects or not. The question of minimum mapping unit and its relation to the uncertainties found in different scales has been treated. The problems of taking sample points and verifying the correct class label for different types of categorical objects are discussed. The found error types are separated to positional and attribute errors, and a short review how these errors are deduced to the derived statistical summary measures has been done.

The methods for evaluating multi-scale geographical objects have been presented using the testing of three different geographical databases as examples. The medium scale SLICES -land use database is described more thoroughly, but also some references to the large scale National Topographic database, and to the small scale CORINE land cover database have been given. Selected results from the error assessment methods have been presented and their validity has been discussed. Conclusions from the results for how to test multi-scale databases, e.g. how to separate the cross errors from the generalization errors, have been drawn, and what should we take account in taking samples and calculating summaries from testing results? Finally, some of the possible solutions for handling the uncertainty and fuzziness of multi-scale geographical objects and statistics derived from them have been given.