The complexity of relief data generalization: an example in automating the generalization of spot heights and contour lines

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Abstract

Since 1999 the Institut Cartogràfic de Catalunya (ICC) uses generalization for producing maps at scale 1:10 000 from the Topographic Database at scale 1:5 000, and since 2003, to obtain a database at scale 1:25 000.

Manual generalization of spot heights is one of the most time consuming task, that increases significatnly in the mountainous areas. The criteria applied by the cartographers to generalize the data were documented at the beginning of the production of the Topographic Map at 1:10000 and reported in year 2000 at the CMC Workshop Rudolfshütte, but to date, none of them has been automated yet.

The Department of Cartography, Geodesy and Photogrammetry of the Universitat Politècnica de València (UPV), has developed an application to generalize spot heights, taking into account some of the ICC criteria (CMC Workshop Núria 2004). The ICC has initiated contacts with UPV to implement this application in the production workflows. The results of the first test will be described in detail in the first part of the paper.

A new ICC project is to analyze the feasibility to derive from the Topographic Database at scale 1:25 000 the main topographic products at smaller scales, from scale 1:50 000 to scale 1:100 000.
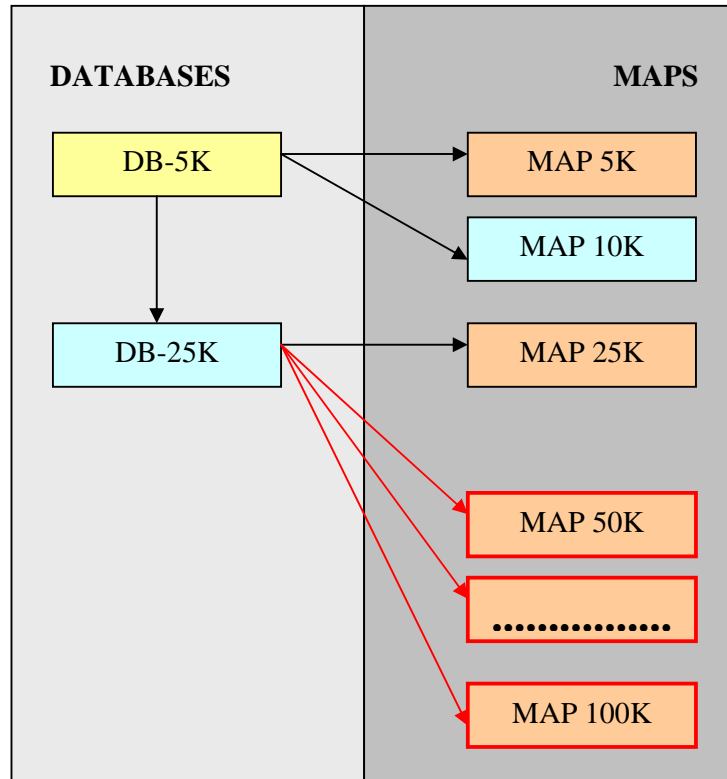
The figure shows in yellow the basic database compiled directly using photogrammetric systems (DB-5K). In blue, the current derived products applying generalization and manual editing (DB-25K, MAP 10K). In orange with black boundaries, the products derived automatically with no manual editing (MAP 5K, MAP 25K). The black arrows show the relationships between the existing products. The orange blocks with red boundaries and the red arrows show future products and the relationships among them. By using generalization instead the traditional compilation, we hope to enforce the consistency between scales and products, thus reducing substantially the cost of updating.

Nevertheless, a new problem appears in the proposed workflows, namely, the generalization of the contour lines. Two methods will be analyzed to derive the contours: the generalization of the original contour lines and the generalization of the original DTM for the interpolation of the contours. The second part of the paper will describe the results of this analysis, focused specially in the mountainous areas.