

Recognition of Large Island Structures

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1. Motivation

Map generalization:

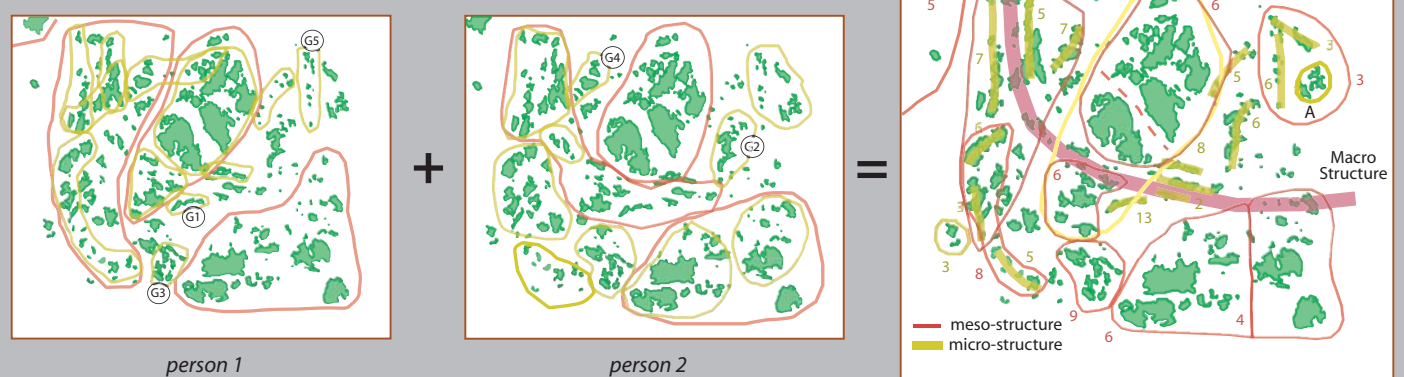
- 1) real-time generalization for internet map services
- 2) automatization of manual generalization processes for paper map production



real-time generalization of Map24.com - internet map service: missing preservation of island structures

2. Identification of Island Structures

- pencil and paper experiment
- 13 persons from GIS Division
- given information:
 - . islands between Finland and Sweden
 - . formed by glacial processes
 - . groups of different size



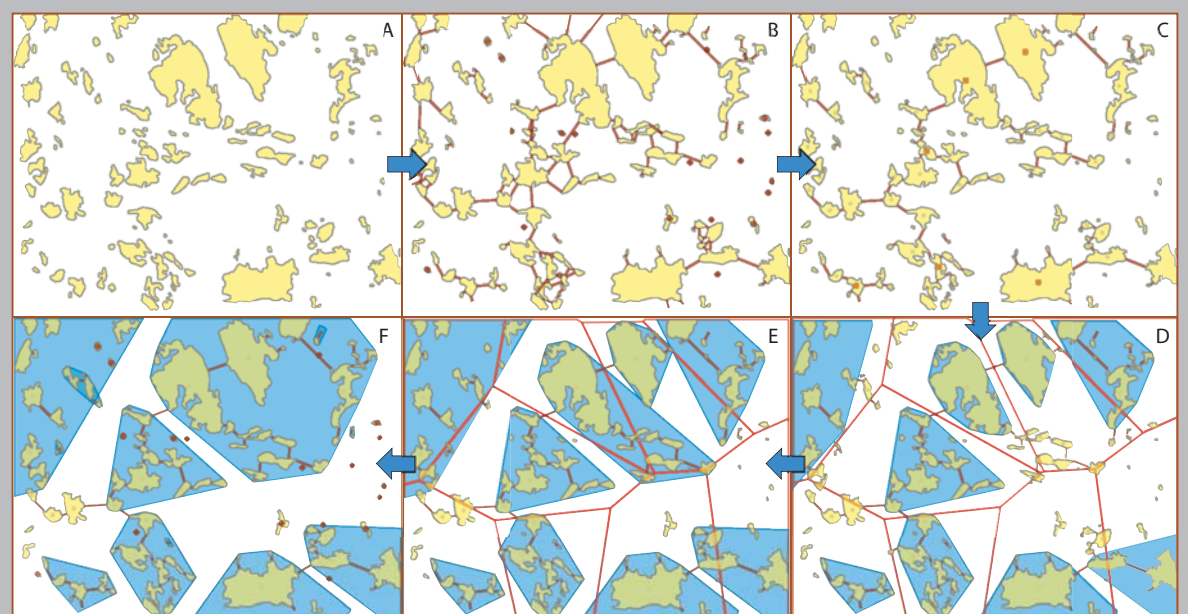
3. Formalization of Island Structures

Size	Shape	Grouping Principles (Gestalt theory)
small groups → micro structure	clustered groups → cluster	spatial proximity → micro and meso (G3)
large groups → meso structure	elongated groups → alignment	shape and orientation similarity → micro (G1)
very large structures → macro structure		symmetry within group → micro (G4)
		dominance of large island → micro (G2)
		cardinal direction of group → micro (G5)

4. Detection of Large Groups

Human experiment: meso groups formed basically on spatial proximity principle → algorithm approach

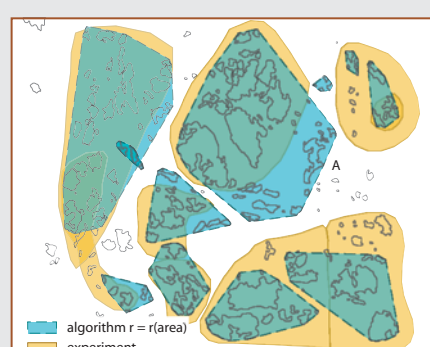
- original situation
- proximity graph and remaining single islands
- minimal spanning tree derived from proximity graph and seeds selected by high connectivity
- initial groups traced from seeds until a Voronoi edge is reached
- adding of unassigned islands to groups
- merging of groups with adjacent seeds



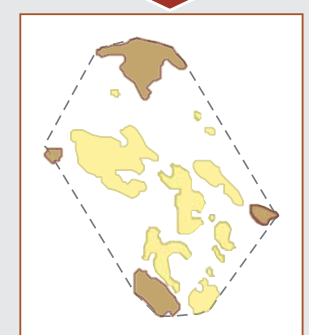
5. Evaluation

A) Comparison of human results with algorithm result

- meso group cores are similar
- group extents are different
- some islands should be split from the group (see A)



B) Spatial outlier test using Hotellings T² statistics



outliers are colored brown

Reference

Steiniger, Burghardt & Weibel (2006), Recognition of Island Structures for Map Generalization. Proc. of ACM-GIS 2006, Arlington

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