

A toolbox of algorithms for polygonal subdivision generalization

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A toolbox of algorithms for polygonal subdivision generalization

- concept of the toolbox
- algorithms in the toolbox
- selected experiments
- conclusions

The toolbox

... terms a collection of **algorithms and tools** that are especially designed for the **interactive generalization** of **polygonal subdivisions**.

All the key decisions (e.g. holistic reasoning, parameter setting etc.) are left up to the user.

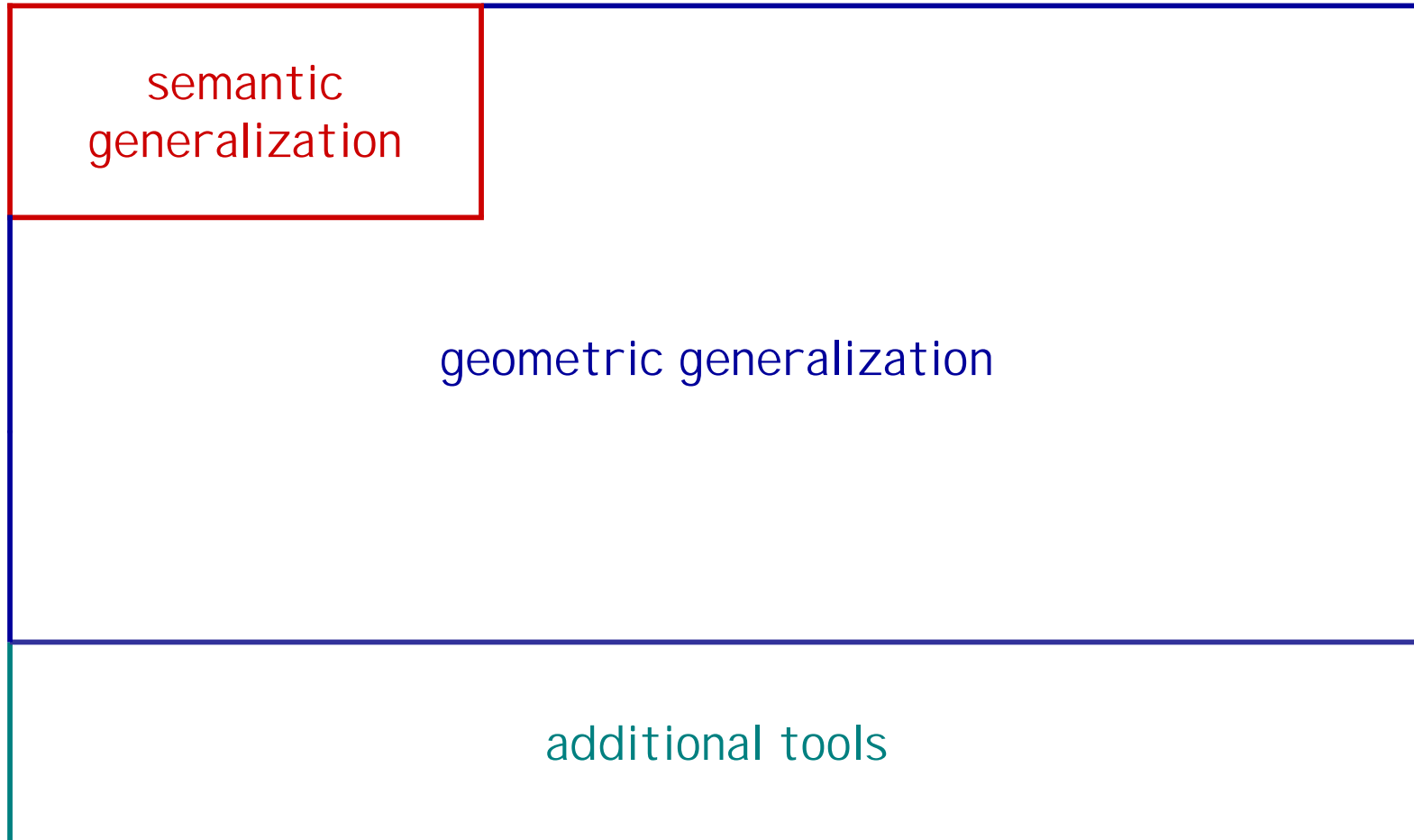
Test bed LAMPS2 (Laser-Scan Ltd.).

Starting point for automated polygon generalization.

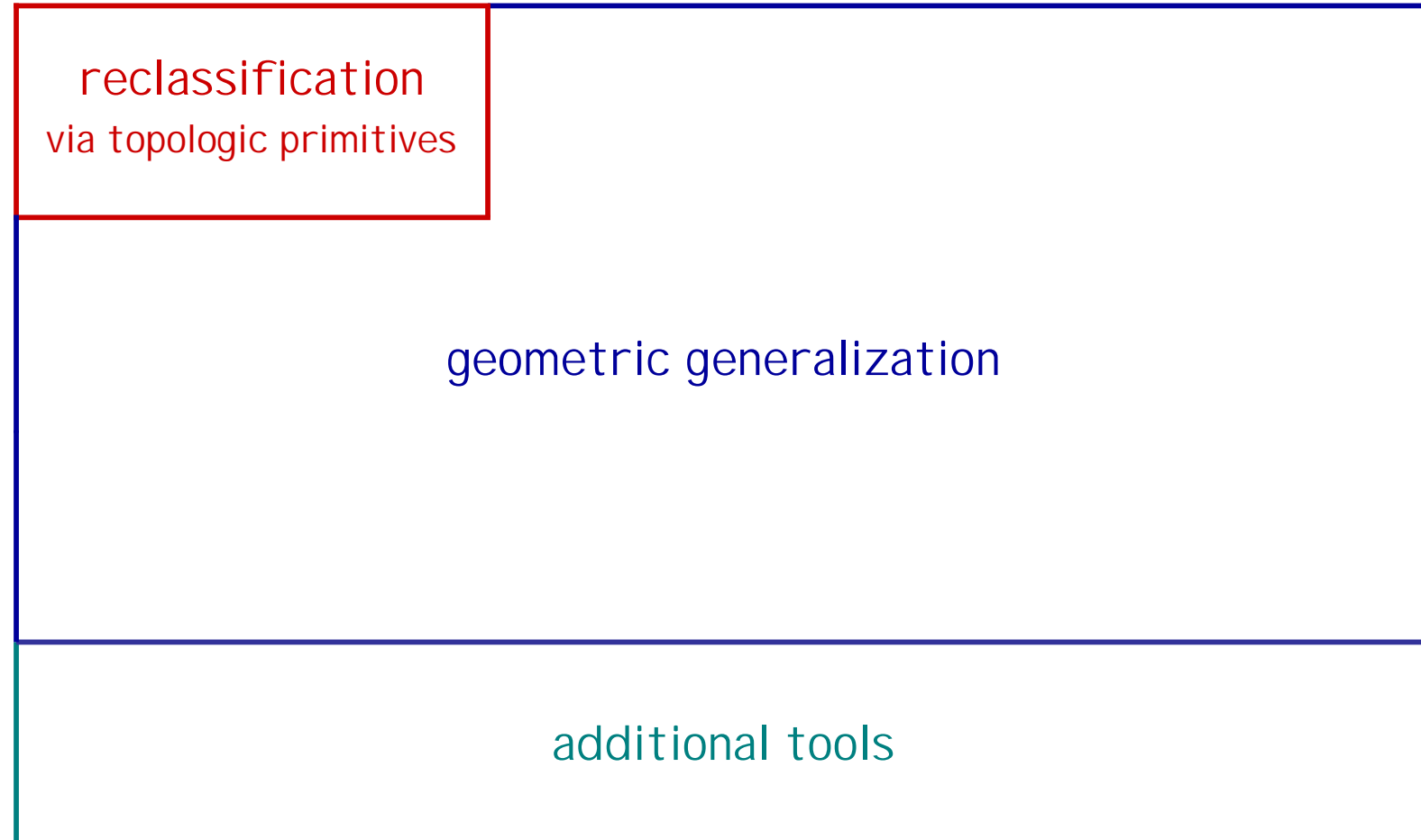
An algorithm should

- ... ensure consistency of the subdivision (semantic, topological).
- ... trigger the propagation of every object's change to the subdivision.
- ... require a minimum of interactive input.
- ... balance computational costs and possible benefit.
- ... produce predictable results.
- ... be robust.

The toolbox



The toolbox



The toolbox

reclassification via topologic primitives	aggregation enhanced convex hull	displacement vector-, snakes-based
exaggeration snakes-based	elimination reclassif., by skeleton	enlargement snakes-based, scaling
simplification enh. Douglas-Poiker	smoothing gaussian smoothing	typification ???
additional tools		

The toolbox

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propagation snakes-based, overlays	auxiliary data cDT, graphs	measures

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elimination

freed space must be assigned to other categories.

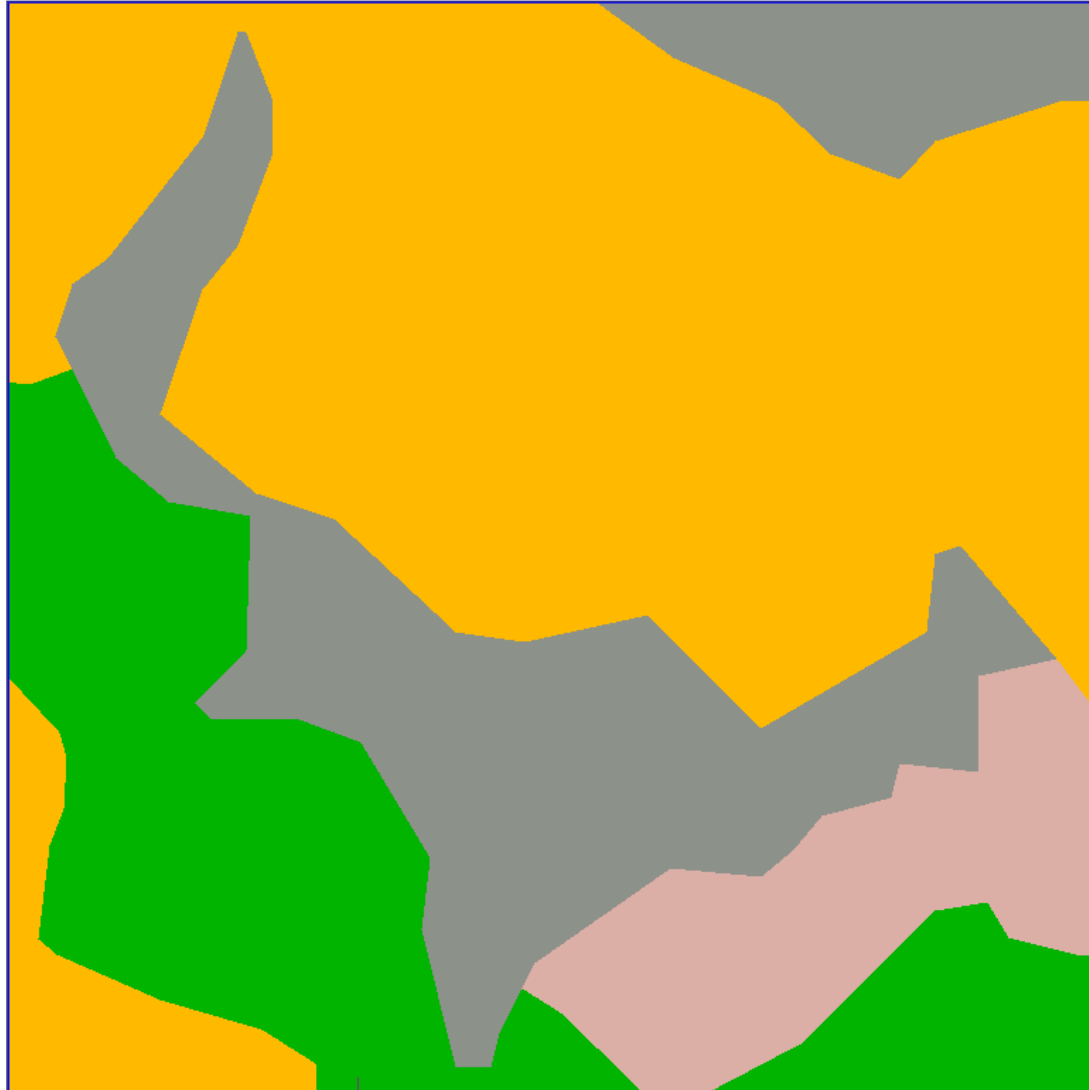
A. semantic solution: reclassification

- metadata required (semantic similarity)
- assignment of the polygon to ONE of the neighbors

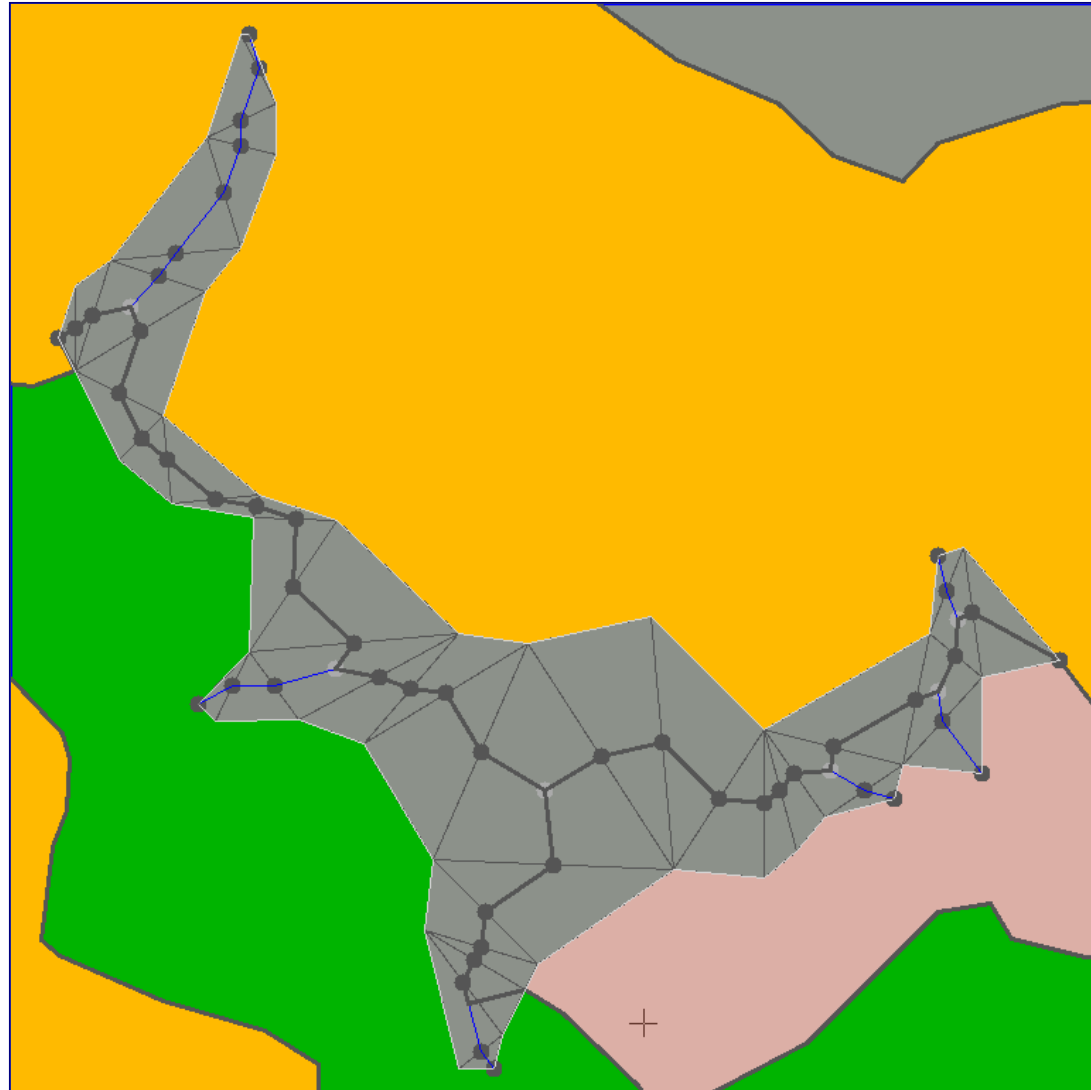
B. geometric solution: by skeleton

- concept by Bader (1997)
- distribution of the polygon among ALL the neighbors

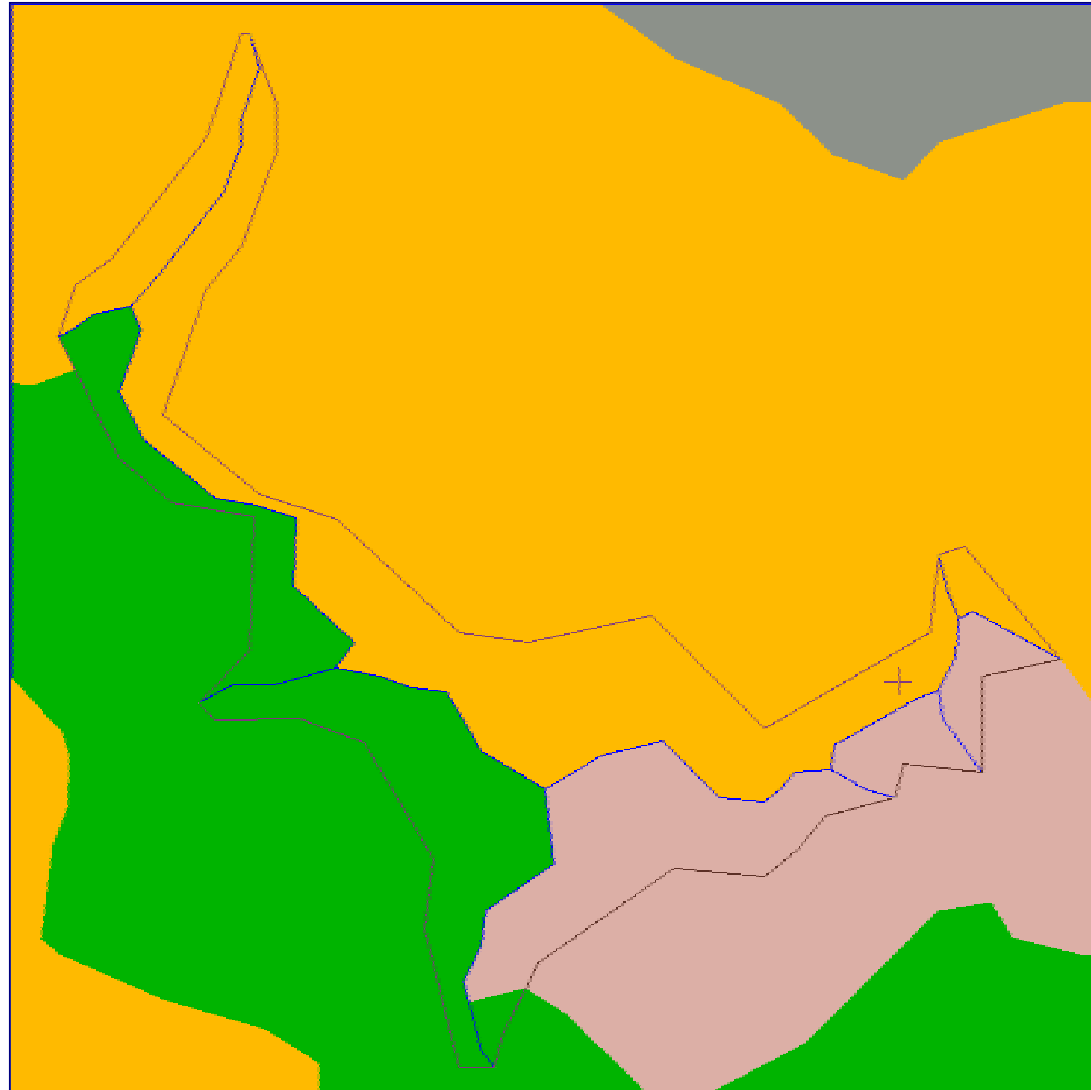
elimination: by skeleton



elimination: by skeleton



elimination: by skeleton



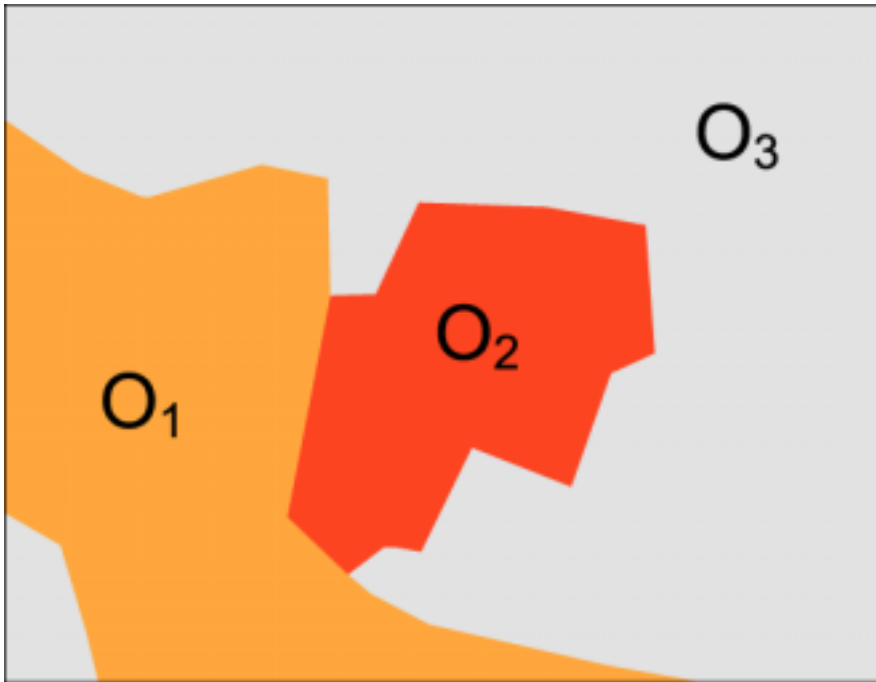
elimination

- + robust according to polygon's shape
- + efficient use of computer resources
- none of the approaches optimal (combination?!)
- by skeleton
 - simplification (smoothing) of new links recommended
 - check for neighbors of same category

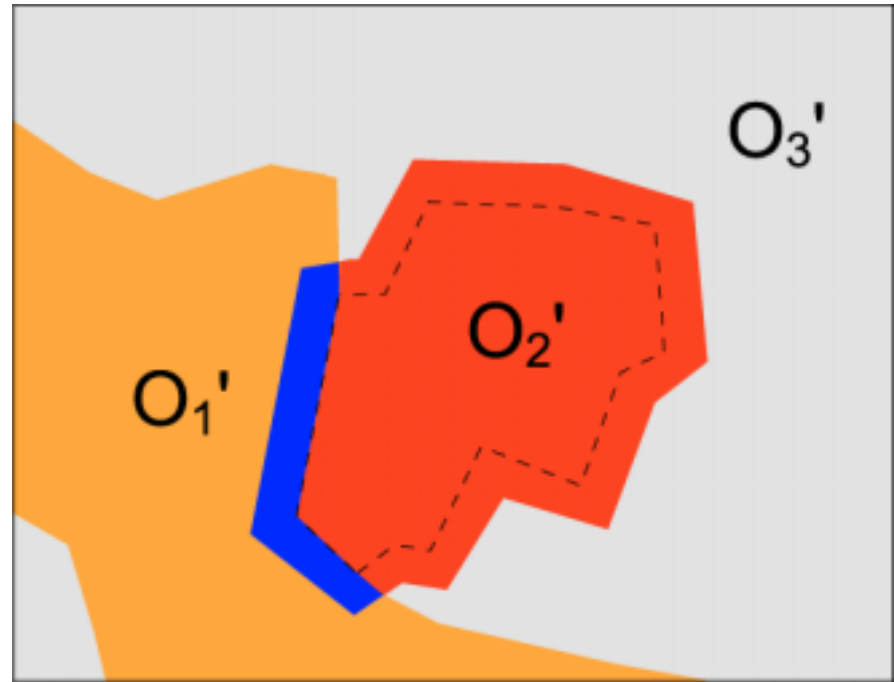
snakes-based algorithms

- snakes
 - optimization technique
 - energy minimizing spline guided by internal constraint forces and external forces
- for details see Galanda (2001)
- operators enabled
 - displacement
 - enlargement
 - exaggeration

snakes-based algorithms

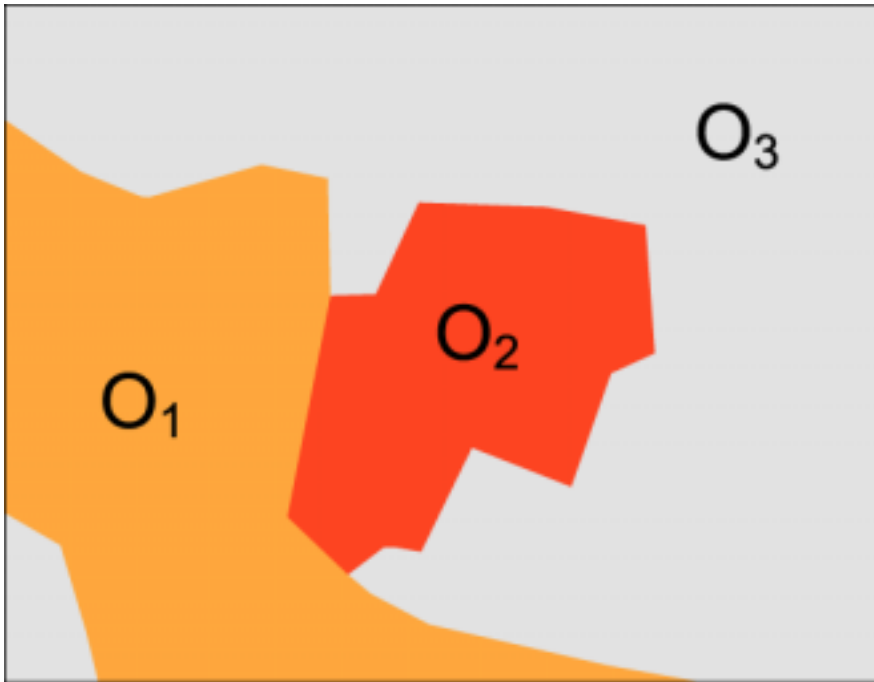


original situation

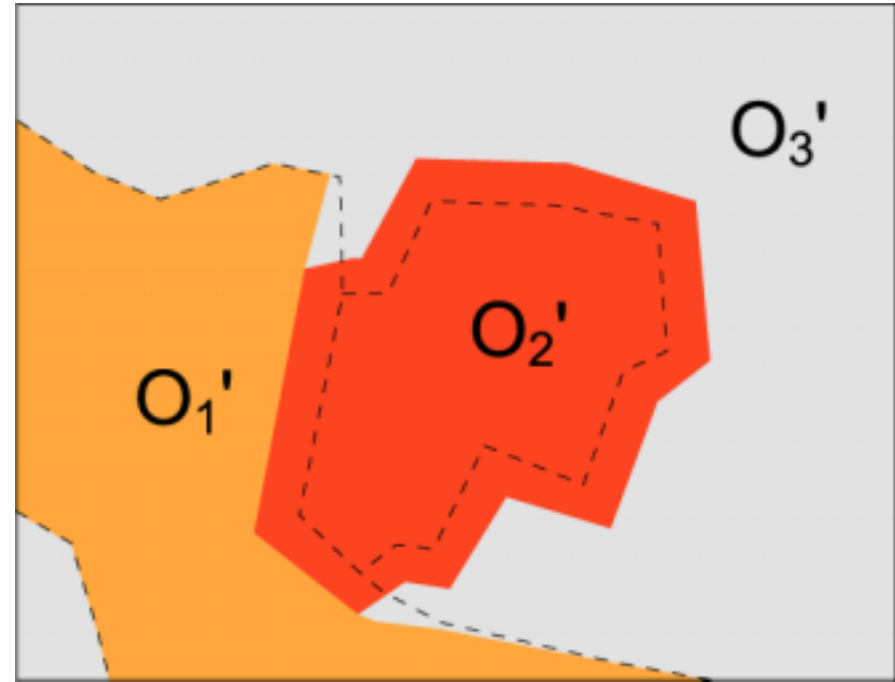


1. snakes-based enlargement
no propagation

snakes-based algorithms

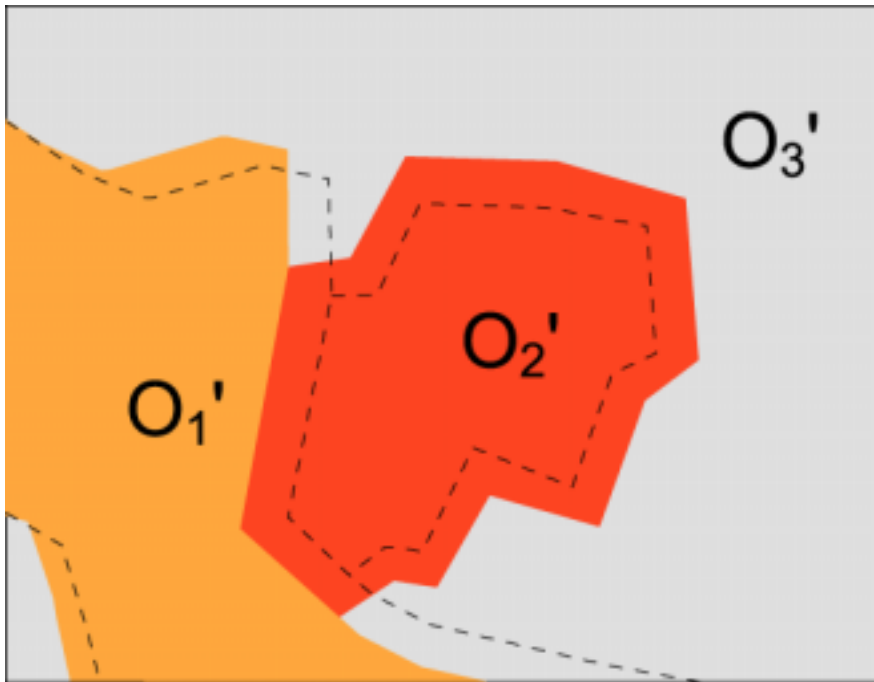


original situation

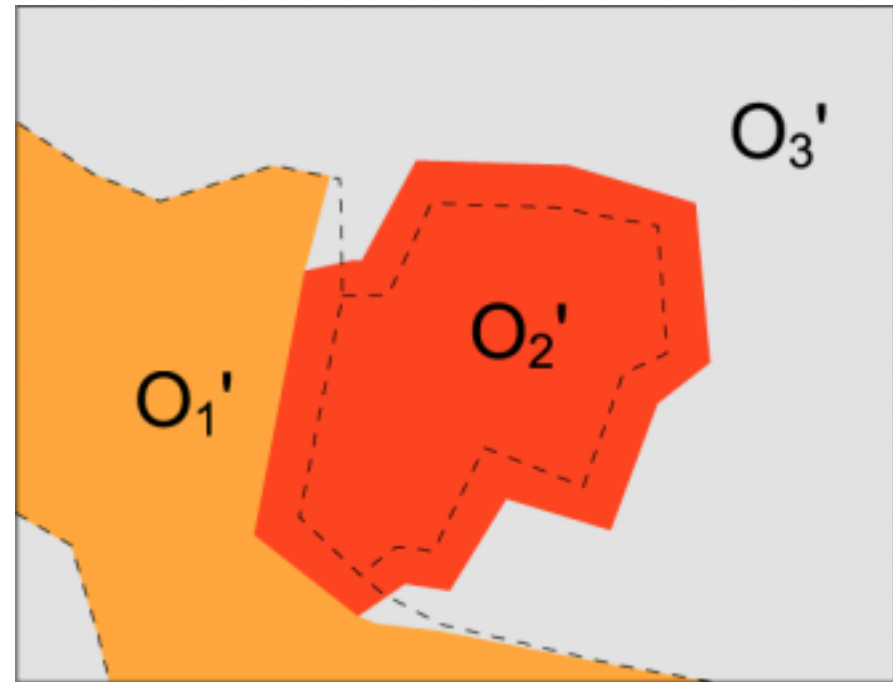


1. snakes-based enlargement
propagation part of 1.

snakes-based algorithms



1. snakes-based enlargement
2. propagation by 1-step snakes



1. snakes-based enlargement
propagation part of 1.

- computational costs
- several small vs. one displacement(s)

snakes-based algorithms

- + global approach
- + one concept, several algorithms
- + cartographically pleasing results
- + line and polygon objects together
- computational costs
- parameter setting
- several extensions thinkable

conclusions

- algorithms tested and documented (never ending)
- default parameters for selected scale ranges and data types available
- test bed for orchestration (automation)
- orchestration
 - SDH 2002
 - enhancement of toolbox with e.g. measures, automated parameter setting etc.

Questions ?

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