A method based on samples to capture user needs for generalisation

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The automation of generalisation

- Most of today approaches relay on constraints

☞ Mimic cartographers
  - Apply a set of algorithms one after the other to gradually solve the conflicts
  - e.g. Agent Techniques

☞ Apply a global method that changes the co-ordinates up to a balance
  - the same algorithm is applied iteratively
  - e.g. Harrie, 02 ; Bader; 00

☞ Try different combinations of solutions and take the best
  - simulated annealing techniques
  - e.g. Ware and Jones 03
Constraints ...

- a convenient way to represent the final product specifications

- Constraints are **functions** on objects **properties** :
  - on each object :
    - **size** (building) > 200m²
    - **granularity** (geometry(building)) > 10m
    - \(|\text{elongation} (\text{obj-ini}) - \text{elongation} (\text{obj-fin})| < 0.2\)
  - two objects :
    - **minimum-distance** (obj1, obj2) > 5m
  - a set of objects :
    - **density** (objects) < 0.8
    - \(|\text{density} (\text{objs-ini}) - \text{density} (\text{objs-fin})| < 0.2\)
But ....

- to obtain different types of generalisation (fitness for use)
  it is necessary to be able to **specify (parametrise) the functions of constraints**

- e.g. Building constraints:
  - **size** (building) > 200m²
  - **granularity** (geometry(building)) > 10m
  - | elongation (obj-init) - elongation (obj-fin) | < 0.2
How to allow a user to introduce his requirements

without being an expert on generalisation?

AND EVEN WORSE

an expert on the system of generalisation?
CARTABLE

• a system to acquire (to understand) user need
• that presents only WHAT THE (GIS) SYSTEM CAN DO

• STEPS :
  – THE USER SEES SOME IMAGES OF DIFFERENT RESULTS
  – HE Chooses THE ONES THAT ARE CLOSE TO HIS NEEDS
  – THE SYSTEM ‘INTERPRETS’ THE USER CHOICES
  – AFTER THE DETECTION OF THE APPROPRIATE CHOICE THE PROCESS IS SPECIFIED
CARTABLE
for the parametrisation
of Buildings generalisation

• we name SAMPLES the pre-generalised objects
  – SAMPLES ARE ALREADY GENERALISED OBJECTS WITH A SPECIFIC PARAMETRISATION OF CONSTRAINTS

• the user chooses already generalised buildings
• the system *deduces* the appropriate parameter values of the constraints function by means of a *mechanism of convergence*
Map sample

1 map sample = 1 small extract of spatial data

Basic map samples

Treated map samples

1 sample is characterised

size = 2051.9
local width = 6.9
granularity = 3.38
concavity = 0.37
squareness = 0.68

Treatment with given parameterisation

size >= 256 m²
local width >= 9
granularity >= 9
...

1 parameterisation is characterised by thresholds for constraints

size = 1998
local width = 9
granularity = 9
concavity = 0.39
squareness = 0.68
BECAUSE OF GENERALISATION COMPLEXITY

IT IS NECESSARY TO PROPOSE MORE THAN ONE SAMPLE ...

Possible parameterisations

Size threshold

Granularity threshold

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The aim of the Dialogue is to gradually reduce a solution space.
The sample manager
1- propose parameterisations

propose a restricted set of samples

3 basic and 3 treated map samples

Possible parameterisations

Granularity threshold

Size threshold
2- interpret the user reactions

3- seek for a solution

→ Convergence Analysis
User Interface

FRED DEMO....
Conclusion

- The use of map samples is a new space of research to interact with users on the Web.

- Fred prototype runs and includes a Web interface, a dialogue module and a map samples manager. Convergence analysis is implemented.