Object-field relationships modelling in an agent based generalisation model

Julien Gaffuri, Cécile Duchêne, Anne Ruas
11th ICA workshop on generalisation and multiple representation
Montpellier - 20-21 June 2008
**Introduction**

- **Context:**
  - Many generalisation models designed for **objects** (buildings, networks, etc.)
  - In these models, no **taking into account** of **fields** (relief, land use cover, etc.)

- **Consequence:** relationships between objects and fields can be broken
The GAEL model [Gaffuri 2008]

Principle:

Introduction

1-Object-field relationship modelling
2-Dynamics
Conclusion
Introduction

1- Object-field relationships modelling

2- Dynamics (taken into account of these relationships in the generalisation process)
1- Object-field relationship modelling

- Relationships are explicit,
- Two associated constraints.

![Diagram of geographic agent, field agent, object-field relationship, object-field relational constraint, field-object relational constraint]
1- Object-field relationship modelling

The data model:

- Geographic agent
  - triggerFieldDeformation()
  - deform()
  - 1

- Object-field relationship
  - currentValue
  - InitialValue
  - satisfaction
  - importance
  - computeCurrentValue()
  - computeSatisfaction()
  - 1

- Field agent
  - deform()
  - 0..*

- Object-field relational constraint
  - priority
  - 1
  - getSatisfaction()
  - proposeAlgorithm()

- Field-object relational constraint
  - priority
  - 1
  - getSatisfaction()
  - proposeAlgorithm()
1- Object-field relationship modelling

This modelling allows:

- a relationship violation evaluation,
- and a relationship constraints representation

How to take into account theses relationships and their associated constraints in the generalisation process?
2- Dynamics

How to take into account the object-field relationships in the objects generalisation process?

Principles of the agent-based generalisation model of [Ruas and Duchêne 2007]:

- Explicit constraints,
- Geographic objects are agents (autonomy),
- Goal of each agent: satisfy its cartographic constraints,
- Try treatments step by step,
- Hierarchical levels: micro and meso.
2- Dynamics

- How to take into account the object-field relationships in the objects generalisation process?

- Data models compatibility

**Proposition:**
- Overall satisfaction of a geographic agent take into account the satisfaction values of its object-field relationships,
- A geographic agent can trigger a deformation of a field,
- A geographic agent tries to improve its object-field relational constraints by the use of specific algorithms such as:
  1- field deformations,
  2- own transformations (displacement, deformation, etc.).
Example:

- Dynamics

Introduction 1-Object-field relationship modelling  2-Dynamics  Conclusion
Possible results:

- Works with several objects and fields
- Complex interactions between fields and objects
Results:

Before generalisation

After generalisation without GAEL

After generalisation with GAEL

Relief deformation
2- Dynamics

Results:

Before generalisation

After generalisation without GAEL

After generalisation with GAEL

Relief deformation
Conclusion

A model able to manage field-object relationships
- Modelling
- Dynamic

Progress towards a more complete generalisation model, able to manage more types of themes.

Illustration of the adaptability of the agent modelling in generalisation.