KTI-Project

DRIVE – Derivation of Vector Models

Dirk Burghardt / Ajay Mathur
Matthias Bobzien / Ingo Petzold
Outline

1. What are the motivations for the DRIVE project?
2. What are the aims of the project?
3. What we are working on now?
What are the motivations for the DRIVE project?

• Commission for technology and innovation
  – Funds applied research
  – Credo: “science to market”
• Industry partner: Axes Systems
  – Extension of the *axpand* system
  – Improve generalisation functionality
• University of Zurich
  – Test approaches in application relevant environment
  – Identify relevant research questions
axpand – map examples
DRIVE – Derivation of vector models

University of Zurich

Die semantische- und geometrische Generalisierung bei Maßstabsableitung
smoothing and typification
smoothing and typification
Starting from system point view -

• Basic generalisation functionality is available
• Intention of process automation is visible, but rather limited
• No intelligence for the orchestration of generalisation operators (batch mode, job lists)
• Object context is considered inside the generalisation, but no generalisation for groups of objects
Starting from scientific point of view -

1. Experiences from other projects

2. Limits of other approaches, open research questions
   - Generalisation of object groups
     - Automated grouping
     - Definition and evaluation of group constraints
     - Generalisation algorithms for group of objects
   - Complexity of orchestration parameter
     - Prioritisation and weighting between constraints
     - Selection of sequence for generalisation operators (plans)
     - Adjustment of parameter
What are the aims of the project?

- update of generalised data sets in MRDB
- orchestration of generalisation operators
- generalisation algorithms
- topology and neighbourhood relationships
What we are working on now?

1. Standard based extension of the architecture

- GUI
- BusinessLogic
- DB
- JUMP
- Generalisation
- Topology
- JTS
- User
- Developer
- Axpand (C)
- JAxpand (Java)
What we are working on now?

2. Creation of data model
What we are working on now?

3. Generalisation of object groups
   • Automated creation of groups (identify horizontal relations - DEGEN)
   • Constraints for groups
     – Concept of “constraint space”
     – Evaluation (placement of groups inside the constraint space)
State evaluation

“Constraint Space”
Concepts

- Simplification of constraint space, dependencies
  
e.g. with
  factor analysis, principal components analysis (PCA)

\[ \text{PC}_i = e_{i1} \cdot x_1 + \ldots + e_{ij} \cdot x_j \]

- \( X \) – original constraints
- \( \text{PC}_i \) – principal components
- \( e_i \) – eigenvector
Concepts

- Simplification of constraint space, dependencies
- Clustering of objects/groups
Concepts

- Simplification of constraint space, dependencies
- Clustering of objects/groups
- Apply workflows (workflow patterns)
- Self learning – evaluation of results for weighting of workflows

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Summary

• Cooperation between University of Zurich and Axes Systems in a practically oriented generalisation project

• Starting point
  – Modern cartographic production system
  – Know-how in the field of automated generalisation

• Aims
  – Extension of the *axpand* system, improve generalisation functionality
  – *Research focus*: orchestration, generalisation operators, MRDB and update

• Current work
  – Open the system, XML-RPC interface
  – Extension of data model, JTS, JUMP
  – Generalisation of object groups