

Active Agent Based Approaches to Automated Generalisation

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KMS Denmark

- Requirement is 1:50K mapping from 1:10K database.
- Using a mixture of 'procedural' process methods and Agent based process methods.
- Using Agents to generalise buildings.
- Production in 2001.



KMS - Urban Areas





Urban Areas

- Pre-processing removes unwanted buildings.
- A process method run on each urban area will:
 - Construct a meso-agent to control the urban area.
 - Initialise each building as a micro-agent.
 - Trigger the meso-agent.
 - Destroy the meso-agent.
- The constraints determine that:
 - Buildings are deleted, symbolised, scaled or simplified.
 - Buildings must not overlap one another or nearby roads, and must remain inside their meso-controlled area.
 - Buildings can be displaced, deleted or aggregated.



KMS - Rural Areas





Rural areas

- Pre-processing partitions the rural areas and identifies farms.
- A process method run on each partition area will:
 - Identify clusters of rural buildings and buildings belonging to farms.
 - Construct a meso-agent to control each farm or rural cluster.
 - Initialise each of the individual buildings as micro-agents
 - Construct a high-level meso-agent to control the entire rural area.
 - Trigger the high-level meso-agent.
 - Destroy the meso-agents.
- The constraints determine that:
 - Individual buildings are deleted, symbolised, scaled or simplified.
 - Building do not overlap each other or nearby roads.
 - Buildings within a farm retain their relative positions.
 - Individual farms or rural clusters do not overlap.
 - Buildings can be displaced, deleted or aggregated.



Different Possible Approaches

| Polygon scaling | Change elongation | Enlarge to rectangle | Simplify | Simplify to rectangle | Enlarge width | Rotate | Squaring |
|--------------------|-------------------|----------------------|----------|-----------------------|------------------|--------|----------|
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Meso-agents (Districts) and Micro-agents (Buildings)





Agents for Generalisation

- Behaviour is implemented as methods:
 - Measures characterise the situation
 - width, area, distance, shape, orientation
 - Constraints act as goals
 - Within object (self-intersection, minimum size).
 - Between objects (overlap conflicts, continuity).
 - Algorithms are tools to improve happiness
 - squaring, enlarging, filtering, typifying, displacing
- Loop through sequence:
 - Characterise, Propose, Act, Assess, (Keep?)



Process Methods

- Special methods used for 'batch' type processing of objects satisfying certain criteria.
- Use baseclasses inherited by the objects.
- Useful for generalisation.
- Several can be placed together in a sequence.

















CamMap

www.cammap.com

- Building generalisation as zoom
 - Switch to pre-prepared alternative
 - Simplified outlines of buildings









Zoomed in -Based on OS Landline

Zoomed out -Based on OS 10K Raster



Conclusions

- Active Agents allow complex contextual generalisation operations to be automated.
- Agents can be incorporated into a system along with other procedural operations.
- Process methods allow large data sets to be generalised using a mixture of procedural and Agent based approaches.
- Display methods allow generalisation results to be displayed according to scale.









