A study on the state-of-the-art in automated map generalisation implemented in commercial out-of-the-box software

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21st June 2008, 11th ICA Workshop on Generalisation and Multiple Representation,
EuroSDR generalisation project

- Overview of presentation today:
  - Introduction
  - Methodology of the project
  - Initial results
  - Initial conclusions
Aim of the project

- How much automatic generalisation capabilities are available in commercial software

Audience

- NMAs: inform about the level of automation currently achievable
- Software companies: learn about NMAs requirements
- Research: what is still missing
Project team

- **NMAs:**
  - IGN, France
  - ICC, Catalonia
  - KMS, Denmark
  - Ordnance Survey, Great Britain
  - TD Kadaster, the Netherlands
  - IGN, Spain

- **Research institutes:**
  - University of Zurich, Switzerland
  - University of Hanover, Germany
  - ITC, Enschede

- We meet three times a year (start in October 2006)
Scope of the project

- Automated generalisation from large to mid-scale topographical data
- Focus is on:
  - generalisation of complete maps
  - fully automated generalisation
  - out-of-the-box versions, adjusting the software to a particular need will not be studied
Main contribution of the project

- **Methodology**
  - Formalism for expressing requirements
  - Evaluation method
  - General plan for this test

- **Results**
  - Can we express requirements in the systems
  - How well do the systems handle them
Methodology of the project

- Selection of test cases
- Software tested
- Defining map requirements
- Test process
- Evaluation methodology
Selection of test cases

- Selection of test cases, from four NMAs
- All interesting generalisation situations are covered

<table>
<thead>
<tr>
<th>Area type</th>
<th>Source dataset</th>
<th>Target dataset</th>
<th>Provided by</th>
<th>Nr of input layers</th>
<th>Main layers</th>
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<tr>
<td>Urban area</td>
<td>1:1250</td>
<td>1:25k</td>
<td>OS Great Britain</td>
<td>37</td>
<td>buildings, roads, river, relief</td>
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<tr>
<td>Mountainous area</td>
<td>1:10k</td>
<td>1:50k</td>
<td>IGN France</td>
<td>23</td>
<td>village, river, land use</td>
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<tr>
<td>Rural area</td>
<td>1:10k</td>
<td>1:50k</td>
<td>Kadaster</td>
<td>29</td>
<td>small town, land use, planar partition</td>
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<tr>
<td>Costal area</td>
<td>1:25k</td>
<td>1:50k</td>
<td>ICC Catalonia</td>
<td>74</td>
<td>village, land use (not mosaic), hydrography</td>
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</tbody>
</table>
Software tested

- Systems:
  - Clarity (1Spatial)
  - ArcGIS (ESRI)
  - Typify/Change/Push (University of Hannover)
  - Axes systems

- System versions available in June 2007

- Initial preparation from the software providers
Defining map requirements

- Requirements expressed as constraints
  - Step 1: each NMA expresses its constraints
  - Step 2: harmonisation
Test process

- From June 2007 to 2008
- Testers:
  - Experts
  - Novices
  - Software companies

=> Resulted in appr. 10 outputs per test case
1:50K, derived from 1:25K, ICC

1:25K, derived from 1:1250, OSGB

1:50K, derived from 1:10K, Kadaster

1:50K, derived from 1:10K, IGN, France
Evaluation procedure

- Design the evaluation methodology (Dec 2007 - April 2008)
- Analysis of tester’s feedback
- Analysis of derived datasets (ongoing)
  - Automated evaluation (University of Zurich)
  - Expert evaluation (ITC)
  - Comparison of output data for one test case (IGN)
- End of evaluation: end of 2008

More details tomorrow
Initial results on testers feedback

- About 50% of constraints expressed

- Number of constraints expressed is dependent on:
  - Number of features (1, 2, group)
  - Focus of software system
  - Scale variation (low for OSGB)
  - Level of experience of tester
Initial conclusions (1/2)

- Project focuses on out-of-the-box versions
- Results show
  - Improvement since OOEPE test
  - Still significantly short of meeting requirements
  - Out-of-the-box results far below customised versions.

⇒ Currently, significant automation possible through customisation.
⇒ Automatic out-of-the-box solutions in their infancy.
Initial conclusions (2/2)

- Most valuable contributions:
  - Formalisation of map requirements
  - Evaluation methodology
  - Set up can be used for future test

- Less valuable contribution
  - Raw graphical outputs: high risk of mis-interpretation
Thank you for your attention...

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# Analysis of defined constraints

<table>
<thead>
<tr>
<th>Test case</th>
<th>Total number of constraints</th>
<th>Number of constraints</th>
<th>Number of constraints on different constraint types</th>
<th>Number of constraints on different feature classes</th>
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<tbody>
<tr>
<td></td>
<td>on one object</td>
<td>on two objects</td>
<td>on group of objects</td>
<td>Model generalisation</td>
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<tr>
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<td>OSGB</td>
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<td>Total</td>
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