Assessment of the quality of Generalisation

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1. Objectives of automatic assessment

1- Error detection
2- Qualitative characterisation
2. Methodology of assessment

Generalisation

Initial data - 1/25k

Final data - 1/50k

Characterisation

Several levels of analysis

Assessment

Assessment functions

Aggregation

Aggregation functions
Enrichment of data schema

Objectives

Methodology

Assessment functions

Results
3. Assessment function

- Generalisation
  - Initial data - 1/25k
  - Final data - 1/50k
- Characterisation
- Assessment
- Aggregation
- Assessment functions

**Methodology**

- Objectives
- Methodology
- Assessment functions
- Results
3.1- What a reference could be

Example. size property

Parameter $\lambda \leftrightarrow \text{min. size}$

$\leftrightarrow$ Reference function

Function shape
Parameters $\lambda$

Different shapes
3.2- Define a reference, but...

**Imprecision in the knowledge on generalisation**

- **Generalisation constraint**
  
  ⇔ “Roads must not moved too much”
  
  Maximum of displacement = 1mm

- **Legibility constraint**
  
  ⇔ “Buildings minimum size is about 0.16 mm²”
  
  0.15 mm² / 0.17mm² ≈ ‘same size’
3.3- Tolerance

Size property

Parameter $\lambda \leftrightarrow$ scale

$\Rightarrow$ Reference function

Function shape
Parameters $\lambda$

$\Rightarrow$ Imprecision ?

Tolerance $\varepsilon$

Representation of the tolerance interval $\Rightarrow$ tolerance area
3.4- So, what is an assessment function?

Function shape, Parameters + Tolerance

Reference function

“Assessment of buildings size”
\[ \lambda = 0.16 \text{mm}^2 \text{ and } \varepsilon = \pm 0.1 \text{mm}^2 \]
4. Results (1)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Automatic</th>
<th>Tolerance</th>
<th>Personal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min Size</td>
<td>400.0</td>
<td>40.0</td>
<td></td>
</tr>
<tr>
<td>Max Position Change</td>
<td>10.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Max Orientation Change</td>
<td>10.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Min Distance</td>
<td>250.0</td>
<td>20.0</td>
<td></td>
</tr>
<tr>
<td>Min Granularity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differentiation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min width line</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feature Class selection</td>
<td>Batis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criteria selection</td>
<td>Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tolerance</td>
<td>25.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seuil</td>
<td>400.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Methodology

Assessment functions

Results

- 1:50k, 0.4*0.4mm=0.16mm²
- 0.1*0.1mm tolerance
4. Results (2)

- **Good quality**
- **Rather good**
- **Rather bad**
- **Bad quality**

Methodology

Assessment functions

Results
Conclusion

Assessment of generalisation

3 steps: characterisation, evaluation, aggregation
Assessment function = (reference, parameter) + tolerance
Tools developed: interfaces

on-going work

Assessment of meso and macro level
<table>
<thead>
<tr>
<th>Meso</th>
<th>Characterisation</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Density</strong></td>
<td>Buildings</td>
<td><img src="image" alt="Graph showing density" /></td>
</tr>
<tr>
<td></td>
<td>Free space</td>
<td><img src="image" alt="Graph showing density" /></td>
</tr>
<tr>
<td><strong>Street density</strong></td>
<td>% road covering</td>
<td><img src="image" alt="Graph showing density" /></td>
</tr>
<tr>
<td></td>
<td>Number, surface</td>
<td><img src="image" alt="Graph showing density" /></td>
</tr>
<tr>
<td><strong>Proximity</strong></td>
<td>Buildings</td>
<td><img src="image" alt="Graph showing density" /></td>
</tr>
<tr>
<td></td>
<td>Buildings / roads</td>
<td><img src="image" alt="Graph showing density" /></td>
</tr>
<tr>
<td></td>
<td>λ = 0.15mm</td>
<td><img src="image" alt="Graph showing density" /></td>
</tr>
<tr>
<td></td>
<td>ε = ±0.05mm</td>
<td><img src="image" alt="Graph showing density" /></td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td>Alignment</td>
<td><img src="image" alt="Graph showing density" /></td>
</tr>
<tr>
<td></td>
<td>Cluster of buildings</td>
<td><img src="image" alt="Graph showing density" /></td>
</tr>
<tr>
<td><strong>Semantic</strong></td>
<td>Number and surface</td>
<td><img src="image" alt="Graph showing density" /></td>
</tr>
</tbody>
</table>

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Macro

Size

Characterisation

Proximity
Conclusion

on-going work

Assessment of meso and macro level

Fuzzy set theory aggregation

Assessment of tolerance:
- Good quality
- Rather good
- Rather bad
- Bad qualify

Tolerance $\varepsilon$:
- Initial
- 2x tolerance

Overlap intervals:
-的好
good quality
- 良好
rather good
- 较好
rather bad
- 不好
bad quality

Distance:
- 1.5 tolerance
- 0.2 overlap
- 0.75
- 0.25
- 0

Graphical representation of tolerance intervals.