Road Network Selection Using an Extended Stroke-Mesh Combination Algorithm

Stefan Benz & Robert Weibel

ICA Workshop on Generalisation and Map Production
Dresden, Germany, 2013
Research project in collaboration with swisstopo

**REQUIREMENTS** (Selection of 70% of the street segments, preservation of structure, selection of important roads, omission of short dead-end roads, etc.)
First choice of algorithms

Stroke algorithm (Thomson and Richardson 1999)
First choice of algorithms

Mesh algorithm (Chen et al. 2009)
First choice of algorithms

Stroke-Mesh combination algorithm (Li and Zhou 2012)

Benz, S.A., Weibel, R. 2013. Road Network Selection Using an Extended Stroke-Mesh Combination Algorithm
Problems of the integrated approach and proposed solutions

1: Bottom-Up approach

Top-Down (Li and Zhou 2012)

Bottom-Up (our solution)
Problems of the integrated approach and proposed solutions

1: Bottom-Up approach

Segments omitted using the top-down approach, but selected using the bottom approach
Problems of the integrated approach and proposed solutions

2: Unconnected linear patterns

Shortest path

Ommited segments

Benz, S.A., Weibel, R. 2013. Road Network Selection Using an Extended Stroke-Mesh Combination Algorithm
3: Roundabout correction

Swisstopo map (1:50’000)

1. Build Strokes
2. Extract circular strokes using a length threshold (e.g. 90 m)
3. Select the whole roundabout
4: POI accessibility
Problems of the integrated approach and proposed solutions

5: Structure preservation

INSUFFICIENT road network density distribution

SUFFICIENT road network density distribution

Benz, S.A., Weibel, R. 2013. Road Network Selection Using an Extended Stroke-Mesh Combination Algorithm
Problems of the integrated approach and proposed solutions

5: Optimal mesh density factor

![Graph showing the ratio of the number of segments in urban and rural areas against mesh density factor. The graph illustrates an upward trend with a marked point indicating an optimal mesh density factor.](image-url)
5: Settlement area extraction

1. Calculate centroid for each segment.
Conclusion

• **Several extensions and improvements optimize the result:**
  1. Bottom-Up traversal of the linear tree hierarchy
  2. Connection of linear patterns at a dissolved mesh
  3. Correction of roundabouts using a stroke algorithm
  4. Ensuring the accessibility of *points of interests*
  5. Model for retaining the network density distribution (using external layers or a density algorithm)

• **Quantitative and qualitative measures (inspection by swisstopo experts) revealed that the final results are of good quality**
Thank you for your attention!
