Development of a new generalisation flowline for topographic maps

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IGN France
1st Vector Topographic Map Flowline

1993 - 2010

Cartographic preprocessing

Printing

- BDTopo® ("Standard"):
  - Stereophotogrammetric restitution + field collection
  - Planimetric and altimetric informations on 25% of France
  - All informations (for maps) with data consistency
  - Production of 450 sheets (1800 for France) at 1:25 000
  - …. But long time to collect all informations

- Decision in 2000:
  - To speed up data collection to finish the whole France in 2006
  - New version of BDTopo with less informations

- Problem:
  - How to continue to produce maps with the same content?
New Base Map Project

2004 - 2008

Cartographic preprocessing

Vector data

Data Matching

Generalisation

BDBaseMap

Printing

Top50

Top25

New BDTopo

+ different sources

Aims:
- To continue to produce a very similar topographic map (1:25k)
- To produce maps at 1:50k with generalisation
- To decrease maps updating cost
- To replace cartographic sheets management by DBMS seamless on France

Complete flowline:
- Presentation at ICC conference by Arnaud Braun

Focus in this workshop:
- Generalisation (buildings)
- Data Matching
Remarks

• Context of New Base Map Project:
  – Development / Research
  – Industrialization: robust and efficiency on large dataset

• Using of previous works
  – COGIT Research
  – Carto2001 Project
Different sources

- BDTOPO®: Main source of data
- Partners agreements
- Old scanned maps
- Other databases
- Field operation

**REFERENCE DB (DLM)***

Derivation (with Generalisation)

- 1:25.000 DB (DCM)
- 1:50.000 DB (DCM)

Data matching

1:25.000 Map
1:50.000 Map
Different sources and collects

- Partners agreements:
  - Foot tracks: FFRP digitalizes it from paper maps
  - Forest: IFN extracts automatically and interactively trees areas from orthophotos

- Old scanned maps: automatic extraction
  - Vineyard, (and forest)
  - Sand

- Other Databases: automatic extraction
  - Orthophotos: Rocks, Screes, Glaciers
  - DTM: contour lines
Data matching algorithms

- COGIT works implemented on different platform
  - Géoxygène: Automated matching of networks [Mustière 06]
  - LAMPS2: Automated matching of forests with networks + hedges extraction [Touya 07]
  - CLARITY: contour lines and rivers consistencies [Gaffuri 06]

- New Base Map Project: only one platform (Clarity)
Data matching for foot tracks

- Java code [Mustiere 06] introduced in Clarity
- Quickly useable on a large dataset
- 95% of foot tracks matched automatically with BDTopo tracks
Data matching for vineyard

- Code Adaptation for area – line
- Useable again on a large dataset
- Example
Data matching for forest

- [Touya 2006] adaptation
- Many operations in 5 steps:
  - Trees areas merging
  - Cutting up trees areas by networks
  - Discrimination between forests, hedges and small spot of trees
  - Hedges skeleton extraction
  - Forests (and hedges) matching with networks
Data matching for contour lines and hydrography

- Problem of consistency (not exactly matching)
- Solution with [Gaffuri 06] work
- ... But still in progress
Generalisation

- Many problems to generalise 1:10K to 1:50k
- Focus on buildings and roads
- Last workshop (2006): presentation on buildings generalisation process in Clarity
  - Urban structures determination [Boffet, 2001]
  - Urban structures characterization: unitary blocks, suburban blocks, urban blocks, centre blocks, etc [Boffet, 2001]
  - Specific generalisation with Agent technology on each block which is considered as a meso agent
Improvements for buildings displacement

- Loïc Gondol’s Internship at 1Spatial
- Algorithm proposed by Anne Ruas (1999)
- First improvement: better quality
- Example at 1:25 K:

a) Initial data without displacement
b) First version of buildings displacement algorithm
c) Improvement of buildings displacement
Using on a whole maps

- Second improvement: no more memory leak and more efficient
- Possibility to apply on a large dataset:
  - Orthez: 20 km x 30 km
  - 22,000 buildings: 2,000 blocks
  - 5 hours for automatic generalisation process
Results
example

1:25 K

1:50 K
Evaluation

- Comments of traditional cartographers
  - *The result describes well the landscape and a manual generalisation on a map extract provides a similar result.*
  - *But some buildings are a little bit too small after generalisation and more buildings must be deleted*.”
Roads problems

- Other important generalisation problems

- Beams [Bader, 01] and flexibility graph [Carto2001]

- … But still not robust enough and in progress
Conclusion

- New flowline for topographic maps with a lot of problems to solve
- Solutions for data matching and generalisation
- But still in progress at this moment