IMPLEMENTATION OF COMPREHENSIVE MODELING TECHNIQUES ON KARTOGEN GENERALIZATION SOFTWARE

Özlem SİMAY, Serdar ASLAN, Bülent ÇETİNKAYA, O.Nuri ÇOBANKAYA


13th Workshop of the ICA Commission on Generalisation and Multiple Representation
IMPLEMENTATION OF COMPREHENSIVE MODELING TECHNIQUES ON KARTOGEN GENERALIZATION SOFTWARE

INTRODUCTION

1:25K

1:50K

1:100K

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**INTRODUCTION**

Simple Batch Processing  

Sophisticated Methods

- Condition-Action (C-A),
- Human Interaction (HI),
- Constraint Based (CB) modeling

Harrie and Weibel (2007)
C-A Modeling Technique

(Object)

(Bend Simplify Algorithm) ➔ Line Simplify

(PAEK Algorithm) ➔ Line Smoothing

(Point Remove Algorithm) ➔ Point Remove

Object Algorithms Object

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HI Modeling Technique

Though HI model is well enough for single map objects, it is time consuming and highly confined to cartographer's ability.
CB Modeling Technique

- Defining the constraints (like geometric, topologic, semantic, legibility, etc.)

- Apply the related algorithms

- Defining the required values that satisfy the constraints.

- Evaluate the final state
This study focuses on the practical implementation of three well-known modeling techniques on the text generalization and text placement within the KartoGen (KG) software and search for an appropriate model in terms of the requirements of the General Command of Mapping for the production of 1: 50K and 1:100K scale maps.
**KG SOFTWARE**

- 1:25K, 1:250K, and 1:1000K scales are **BASE SCALES**.
- Non-base scale Standard Topographic Maps (STMs) like 1:50K and 1:100K

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KG SOFTWARE

KG project was initiated in 2002

0% Automation... Cartographic Satisfaction! 100%

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**KG SOFTWARE**

Select the extensions you want to use.

- 3D Analyst
- ArcPress
- ArcScan
- Geostatistical Analyst
- Kartogen Generalization
- Maplex
- Publisher
- Spatial Analyst
- StreetMap
- Survey Analyst
- Tracking Analyst

**Description:**

Kartogen 1.0
Telif Hakki ©2005 Kartografya Dairesi, HGK. Tüm haklar saklıdır

Kartogen Harita üretim sistemi ve Kartogen genelleştirme.

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**KG SOFTWARE**

- **25K**
  - K816

- **50K**
  - K716

- **100K**
  - K613

Within the same year

Karto50

KVK25

Within the same year

Within the same year

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**KG SOFTWARE**

1:50K and 1:100K Maps covering the Turkish Territory;

<table>
<thead>
<tr>
<th>Scale</th>
<th>Turkey</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:50K</td>
<td>1453</td>
</tr>
<tr>
<td>1:100K</td>
<td>391</td>
</tr>
</tbody>
</table>

From the year 2005, the outputs of **KG** serves the requirements of GCM.

<table>
<thead>
<tr>
<th>Year</th>
<th>1:50K</th>
<th>1:100K</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>2006</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>2007</td>
<td>101</td>
<td>11</td>
</tr>
<tr>
<td>2008</td>
<td>228</td>
<td>35</td>
</tr>
<tr>
<td>2009</td>
<td>142</td>
<td>38</td>
</tr>
<tr>
<td>2010</td>
<td>145</td>
<td>39</td>
</tr>
</tbody>
</table>
Generalization workflow of KG software

The system is mainly managed by means of C-A and HI modeling techniques.

We are now updating our software by taking the advantage of CB modeling.

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Modeling techniques used in KG software

<table>
<thead>
<tr>
<th>Generalization</th>
<th>C-A Model</th>
<th>HI Model</th>
<th>CB Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation Generalization</td>
<td>A</td>
<td>A</td>
<td>-</td>
</tr>
<tr>
<td>Hydrographic Network Generalization</td>
<td>A</td>
<td>A</td>
<td>-</td>
</tr>
<tr>
<td>Transportation Network Generalization</td>
<td>A</td>
<td>A</td>
<td>R</td>
</tr>
<tr>
<td>Building Generalization</td>
<td>A</td>
<td>A</td>
<td>R</td>
</tr>
<tr>
<td>Industry Generalization</td>
<td>A</td>
<td>A</td>
<td>-</td>
</tr>
<tr>
<td>Utility Generalization</td>
<td>A</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Physiography Generalization</td>
<td>A</td>
<td>A</td>
<td>-</td>
</tr>
<tr>
<td>Boundary Generalization</td>
<td>A</td>
<td>A</td>
<td>-</td>
</tr>
<tr>
<td>Vegetation Generalization</td>
<td>A</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Text Generalization and Text Placement</td>
<td>-</td>
<td>-</td>
<td>A</td>
</tr>
</tbody>
</table>

(A depicts the applied model and R depicts the model in research level)
Implementation of C-A Model on KG Vegetation Generalisation

(a)  

(b)
Implementation of C-A & HI Model on KG Building Generalisation

(a) Before

(b) After

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Parameters that are used in Hydrography generalization

<table>
<thead>
<tr>
<th>Hydrography Generalization Parameters</th>
<th>Tanımlanan Değer</th>
<th>Uygulanan Değer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrography Point Detail Generalization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrography line point detail rotation - accuracy criteria</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>Nearby spatial relationship detail point accuracy - distance criteria</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>All point details spatial relationship grouping distance - distance criteria</td>
<td>100</td>
<td>100</td>
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<tr>
<td>Point detail point detail accuracy - distance criteria</td>
<td>500</td>
<td>500</td>
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<tr>
<td>Hydrography line detail point detail accuracy - distance criteria</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Other point detail details spatial - distance - minimum distance criteria</td>
<td>75</td>
<td>75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hydrography Baseline and Yumusatma Işleri</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrography line detail baseline accuracy</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Hydrography line detail yumusatma accuracy</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Hydrography line detail point detail accuracy</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Hydrography line detail baseline accuracy</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Hydrography line detail point detail accuracy</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Hydrography line detail yumusatma - key points - tolerance criteria</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hydrography line detail point detail accuracy</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

ÇIKIŞ  | Parametreleri Kaydet
COMPARISION OF THREE MODELING TECHNIQUES ON THE TEXT GENERALIZATION

The adapted comparison criteria are:

- the processing time,
- the accuracies of the text positions and
- the number of the missing text data according to the GCM production requirements.
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Reference 1: 1:100K Map

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The same area with only C-A
The same area with CB

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CONCLUSION

- *KG* software,
- The three modeling techniques,
- A case study about text generalization and placement.
CB model highly prevents the human interactivity and lead the automation of the generalization processes to a promising level.

Implement CB modeling techniques into the displacement of buildings and transportation generalization including elimination, simplification and displacement operations and researches for its application have been recently initiated.
Each model be used in different parts of the system to obtain desirable and encouraging solutions.

Feature classes that have not dense data such as industry, utility and boundary yield satisfactory results based on C-A model and need little interaction, whereas the densely distributed data such as text, building and transportation can be benefit from the advantage of CB model.
THANK YOU...

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