A Stroke-based Approach to Detect Patterns of Discrete Buildings for Generalization Purposes

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Outline

- Introduction
- Methodology
- Experiment and discussion
- Outlook
Motivation

OpenStreetMap

Level 17

Level 16

Level 15

Level 14

Without generalization

Legible problem
Research status

• Many researchers have paid attention to building generalization

• Main idea of building generalization [Li et al., 2004]
  Two steps: 1. Building Grouping (pattern detection)
  2. Generalization execution
Methodology

Step 1: Pattern detection by stroke
(1) Stroke construction
(2) Stroke pruning
(3) Stroke classification

Step 2: Generalization execution
Different patterns, different generalization strategies
Methodology

Step 1: Pattern detection by stroke
(1) Stroke construction

Original data

CDTN

Proximity Graph

Distance

Refined Proximity Graph

Good continuation

Stroke construction
Methodology

Step 1: Pattern detection by stroke
(2) Stroke pruning

Rule 1: Deleting the short strokes which are connected only by normal strokes.

Rule 2: Deleting the strokes related three-building which connect with strokes that relate more than four buildings.
Methodology

Step 1: Pattern detection by stroke
(2) Stroke pruning

Original stroke

Pruned stroke
Step 1: Pattern detection by stroke
(3) Stroke classification

- Short strokes group
- Non-Stroke
- Isolated stroke
- Isolated short stroke
- Strokes group
### Methodology

#### Step 1: Pattern detection by stroke

#### Building pattern detection

<table>
<thead>
<tr>
<th>Type</th>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
<th>Type 4</th>
<th>Type 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picture</td>
<td><img src="image1.png" alt="Pattern 1" /></td>
<td><img src="image2.png" alt="Pattern 2" /></td>
<td><img src="image3.png" alt="Pattern 3" /></td>
<td><img src="image4.png" alt="Pattern 4" /></td>
<td><img src="image5.png" alt="Pattern 5" /></td>
</tr>
<tr>
<td>Stroke class</td>
<td>Isolated stroke</td>
<td>Strokes group</td>
<td>Short strokes group</td>
<td>Isolated short stroke</td>
<td>Non-stroke</td>
</tr>
<tr>
<td>Building pattern</td>
<td><strong>Linear like alignment</strong></td>
<td><strong>Linear like cluster</strong></td>
<td><strong>Irregular cluster</strong></td>
<td><strong>Irregular cluster</strong></td>
<td><strong>Isolated building</strong></td>
</tr>
</tbody>
</table>
Methodology

Step 2: Generalization execution

➢ Type 1: Linear like alignment

Typification
Methodology

Step 2: Generalization execution

- Type 2: Linear like cluster

Intersected Building

Intermediate Building

Hanging Building
Methodology

Step 2: Generalization execution

➢ Type 3: Irregular cluster

Situation 1

Aggregation

Situation 2

Typification

Situation 3

Elimination
Methodology

Step 2: Generalization execution

- Type 4: Irregular cluster

**Situation 1**

- Aggregation

**Situation 2**

- Partial Aggregation
Methodology

Step 2: Generalization execution

- Type 5: Isolated building

Selection based on distribution density

A

B

C

D

A

B

C

D

X
Experiment and discussion

Generalized results

- Original building
- Generalized building
Experiment and discussion

Discussion

- Advantage

Original distribution can be preserved
Experimental Results

Discussion

- Weakness

- High density region

- The affect of large and long edge buildings
Outlook

- Evaluation of the generalized results
- The effects caused by road generalization
Thank you!

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Questions?

Original building
Generalized building