Moving towards New Technology for Generalization

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- R & D and practice with Workstation ArcInfo
- ArcGIS technology
- Integration plans
R & D and practice with Worksation ArcInfo

- Supporting requests and benchmarks
- Making new tools and enhancements

You can find the following white papers:

Automation of Map Generalization: The Cutting-Edge Technology
Map Generalization in GIS: - practical solutions with Workstation ArcInfo
Identify BUP, TSP, OSP??

BDLG (network)

MAPJOIN (net)

BDLG_NEW

GENSIMPLIFY
orthogonal; 3m

CLEAN

BUILD

AREAEXT
orth. 3m; constraint (road)

Eliminate
area<40 sqm

ADDITEM

TABLES

Identify BUP, TSP, OSP??

BDLG (network)

BDLG-PD
Generalization procedures
-- example: area extend

- **BUFFER** the pond polygons with a positive buffer distance to get an aggregated polygon.
- **BUFFER** that polygon with the same distance inwards to get the group polygons
- Use **LINEDIST** to convert the polygons to grid and expand the grid polygons to find the middle lines between polygons.
- Use **GRIDPOLY** to convert the expanded polygons, including the middle lines back to vector.
- **CLIP** the expanded polygons by the aggregated polygons.
- **APPEND** the middle lines with the aggregated polygon.
Making new tools and enhancements

For line/polygon simplification:
- BENDSIMPLIFY operator – ArcInfo 7.1.2

For building simplification:
- ORTHOGONAL operator – ArcInfo 7.2.1
- BUILDINGSIMPLIFY command – Workstation ArcInfo 8.0.1
- FINDCONFLICTS command – Workstation ArcInfo 8.0.1

For road centerline creation:
- CENTERLINE command – Workstation ArcInfo 8.0.1

For polygon aggregation:
- AREAAGGREGATE command – Workstation ArcInfo 8.0.2

Enhancements to the GENERALIZE command
- a minor enhancement – Workstation ArcInfo 8.0.1;
- a major enhancement – Workstation ArcInfo 8.1
Line simplification

In Arc: \[ \text{GENERALIZE} \ <\text{in\_cover}> \ <\text{out\_cover}> \ <\text{weed\_tolerance}> \]
\{\text{POINTREMOVE} \mid \text{BENDSIMPLIFY}\}

In ArcEdit: \[ \text{GENERALIZE} \ {\text{default}} \mid * \mid \text{distance} \} \ \{\text{POINTREMOVE} \mid \text{BENDSIMPLIFY}\}\]

In Arcplot: \[ \text{WEEDOPERATOR} \ <\text{POINTREMOVE} \mid \text{BENDSIMPLIFY}> \]
Major enhancement to GENERALIZE

In Arc:  GENERALIZE <in_cover> <out_cover> <weed_tolerance>
        {POINTREMOVE | BENDSIMPLIFY} {NOERRORCHECK | ERRORCHECK}

- Corrected most topological errors
- Tolflag in out_cover.aat
- You can use BUILD to obtain polygon topology

- Polygons collapsed to lines, causing label errors.
- Small polygon becomes 0-length line (point)
- All polygons are retained with their labels inside!!
Building simplification

In Arc:

BUILDINGSIMPLIFY <in_cover> <out_cover> <simplification_distance> {minimum_area} {selection_file} {NOCHECK | CHECKCONFLICT}
The out_cover contains two new items, BDS-STATUS and BDS-GROUP

In Arcplot:

WEEDOPERATOR <POINTREMOVE | BENDSIMPLIFY | ORTHOGONAL> {minimum_area} {NOCHECK | CHECKCONFLICT}

Different styles

With different parameters
Finding building conflicts
- overlapping or too close to each other

In Arc: FINDCONFLICTS <in_cover> <out_cover> <distance>
Creating road centerlines

In Arc:  
```
CENTERLINE <in_cover> <out_cover>
<maximum_width> {minimum_width}
```

In ArcEdit:  
```
CENTERLINE <maximum_width> {minimum_width}
```
Simple intersections (2-, 3-, and 4-way)

Complicated intersections (LTYPE = 2)

Quasi-quad-tree partitions (LTYPE = 3)
Aggregating polygons

In Arc: AREAAGGREGATE <in_cover> <out_cover> <cell_size> <aggregation_distance> {NON_ORTHOGONAL | ORTHOGONAL}
ArcGIS, the new generation of ESRI software

a single, unified, scalable, object-oriented GIS software with COM-based components, and geodatabase data model.

Recent articles:
“An Overview of ArcGIS”, ArcNews Spring 2001 issue, ESRI
ArcGIS Seat Types: (ArcView, ArcEditor, and ArcInfo)

Each Seat includes ArcMap (map making), ArcCatalog (data management) and ArcToolbox (analysis and geoprocessing)

Unifies the traditional ArcView and ArcInfo environments

- common architecture
- same underlying executables and user interface
- common extension models

Additional functionality and increased usability and interoperability
ArcMap

- Start to finish professional cartographer’s map production software seat
  - Data compilation and editing tools
  - Advanced symbology methods and 1,000s of predefined symbols for 30+ industries
  - Automated text placement
  - Robust graphical tools for map layout and composition
  - Many export and printing options and formats

- Map centric user interface
  - Designed to allow map makers to work on their products from the context of the finished product

- Tools and user interface are designed to make map making very efficient
ArcObjects
-The collection of COM-based ArcGIS components

- The development platform for ArcGIS Desktop applications
- The open programming environment makes the full capability of ArcGIS accessible to all
Geodatabase
- an object-oriented data model created with ArcGIS

- a storage mechanism for all types of geo-data
  - single user personal geodatabases are stored in Microsoft Access
  - Multi-user databases, accessed by ArcSDE, are stored in IBM DB2, Informix, Oracle, or Microsoft SQL Server

- a series of data access components
  - allows multi-user access to continuous databases through versioning and long transactions

- a framework for modeling and capturing the behavior of real-world objects
  - intelligent features, rules, and relationships

- allows the creation of common data models for specific industries and applications
Integration of generalization into ArcGIS

Our ultimate goal:
Support data transformation and the creation of cartographic products with maximum automation, flexibility, and productivity.
Short-term plans and focus for ArcGIS

- Developing Gen-tools along with other cartographic projects (workflow management, NP, map sheet production automation, prepress automation, more carto. Symbology and color management, …)
  - Porting and adding gen functionality
  - Supporting batch and interactive processes, and post-editing
  - Assessment and measurement of data before and after generalization

- Focusing on NMAs’ requests
  - Production flow, specifications, scale range, priorities, performance, …

- Processing multi-layers with goal of generalizing the total map.
  - Taking into account of feature importance ordering and maintaining positional accuracy of important features

- Maintaining source-output relationship
Support operator-driven approach

follows the logic of map compilation with computer-assisted tools

Interactive process
- Selecting features
- Selecting gen. operators
- setting/testing/saving
- Parameters ...

Global input:
- Carto and feature Spec.

Batch process

Queued editing

General editing

Visual tools

Master Database

Sub-DB

Maps

Project control
Long-term plans and focus for ArcGIS

- Continue to add new generalization functions to what we accomplish in the short-term
  - Support more types of operators
  - Add/improve existing operators with more robust methods
- Support other areas for Generalization in GIS
  - Supporting surface or terrain data generalization
  - Generalizing/sampling remotely sensed data
  - Portraying linear networks and route data (Typification of Networks)
  - Portraying clusters of points (showing stacks of geocoded points clearly)
  - Automating unrelated functionality through generalization processes, e.g., automated creation of map insets or automatically arranging marginalia on a mapsheet