Introduction to AZTool software

Professor David Martin
AZTool: What is it for?

• Aggregation of building block polygons into a tract polygons to best meet design criteria
• Iterative recombination of building blocks from many random starting points to produce a “best” solution, given a specified number of iterations
• One of a range of software implementations for automated zone design that have included Sage, ZDES, ZD2k, AZM
AZTool history

• Developed by David Martin, Samantha Cockings and Andrew Harfoot at the University of Southampton

• Originally based on Openshaw’s (1977) Automated Zoning Procedure (AZP)

• Some of the functionality previously available as a Visual Basic 6 program called AZM

• Programmed in .NET environment – should run on any modern Windows PC, freely downloadable
Input files (1)

• A set of building blocks and associated data. These are specified as .aat and .pat files
  • The arc attributes describe which building blocks are contiguous
  • No coordinates are needed, but the contiguity information and attributes of each polygon relevant to the design criteria are required
Input files (2)

• Attributes for each building block might include:
  • Population (to be used as a target and/or min/max thresholds)
  • Region (e.g. a larger area within which zones are to be constrained)
  • Homogeneity variables (e.g. tenure or accommodation type, for designing zones which are as internally homogenous as possible)
AZTImporter

• If needed, the AZTImporter program will generate .aat and .pat files from the widely-used ESRI Shapefile GIS format
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<th>Shape*</th>
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Parameter file

- An XML file containing the program run parameters. This can be edited, saved and re-used.
- Contains all necessary program control parameters for setup, specification and output
- For use in batch mode using a Windows Batch File
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A program run

XML Configuration file:
C:\AZTool\AZTool_M_Parameters.xml

Zone Output file:
C:\AZT_Demo\TractOutput.csv

Swap iteration 5
Run 18
Merging IRA tracts to reach the optimal count for target mean
Reduced from 7 to 3 tracts, ideal is 2
Swap iteration 1
Swap iteration 2
Swap iteration 3
Swap iteration 4
Swap iteration 5

Swap iteration 5
Run 19
Resolving sub-threshold tracts produced by IRA
Merging IRA tracts to reach the optimal count for target mean
Reduced from 6 to 3 tracts, ideal is 2
Swap iteration 1
Swap iteration 2
Swap iteration 3
Swap iteration 4
Swap iteration 5

Swap iteration 5
Run 20
Merging IRA tracts to reach the optimal count for target mean
Reduced from 7 to 3 tracts, ideal is 2
Swap iteration 1
Swap iteration 2
Swap iteration 3
Swap iteration 4
Swap iteration 5

Best iteration: 10 Tracts produced: 2
Tract composition saved to C:\AZT_Demo\TractOutput.csv
Duration: 1.96s
Output files

• A .txt format log file, reporting progress of the program run and identifying any problems, e.g. with the input data
• A .csv format results file, showing the output tract to which each building blocks has been assigned
• Zoning results can be re-imported to GIS and used to dissolve boundaries between building blocks
Output files

Swap iteration 5
Run 18
Merging IRA tracts to reach the optimal count for target mean
Reduced from 7 to 3 tracts, ideal is 2
  Swap iteration 1
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  Swap iteration 5

Best iteration: 10 Tracts produced: 2
Tract composition saved to C:\AZT_Demo\TractOutput.csv
Duration: 1.36s
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AZTool design constraints

- Constraint within higher level regions
- Population targets and thresholds
- Shape compactness
- Intra-area correlation measures
- New accessibility/network connectivity measures (April 2016)
Summary

• AZTool free Windows software application which aggregates a set of building block polygons into output tracts to best meet a set of zone design criteria

• Input arc and polygon attributes

• Run controlled by an XML parameter file

• Output log files and tract composition files

• Data usually sourced from and imported back into GIS
For more information please visit
www.ncrm.ac.uk