

## AccGIS Tool: Land Use Data Disaggregation

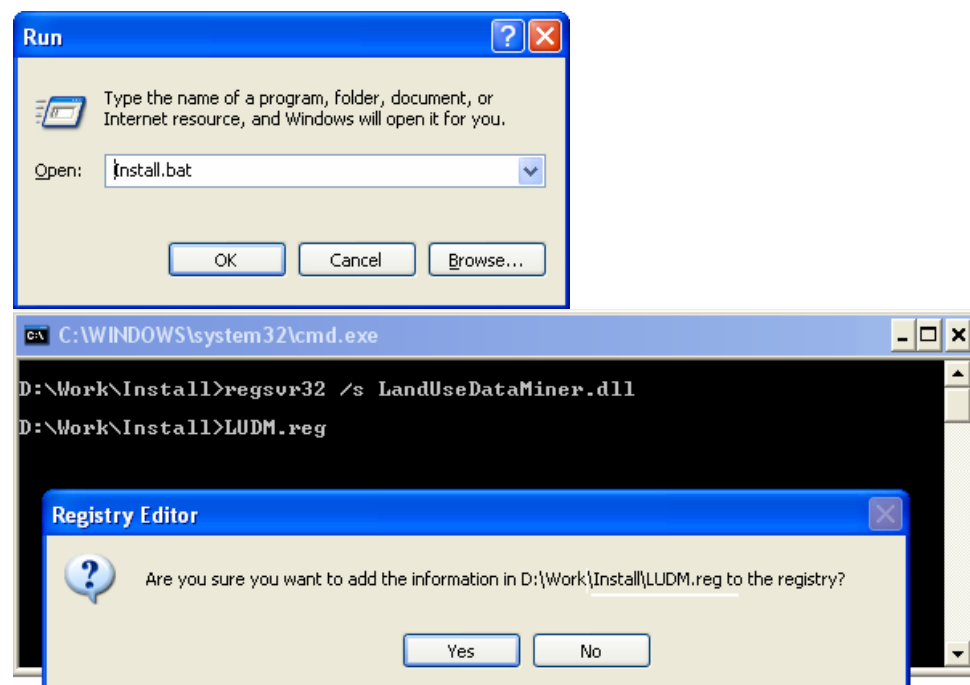
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The tool is used to disaggregate spatial data from a source layer to a target layer with incompatible zones. The layers have to be first integrated (spatial union) and the tool disaggregates data from a set of source zones to a set of integrated target zones.

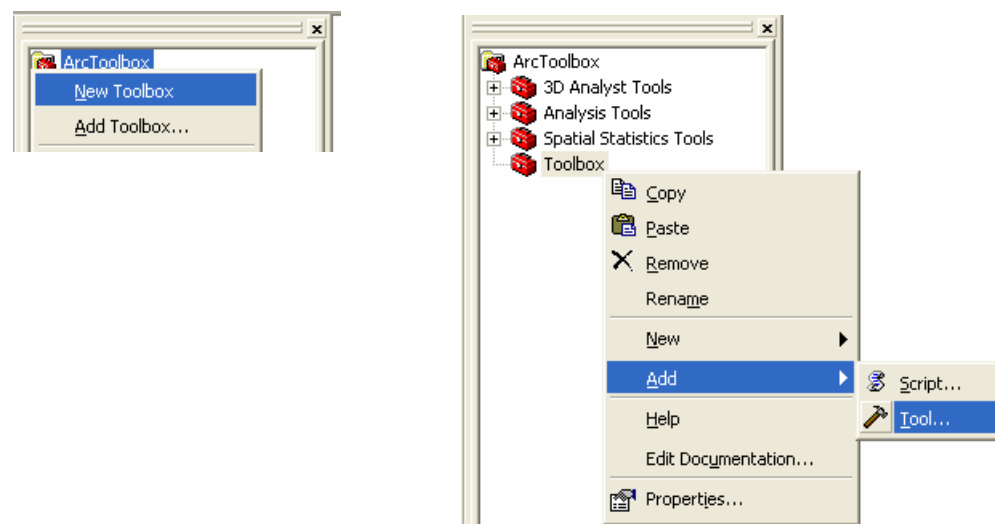
Flowerdew, R., M. Green, et al. (1991). 'Using areal interpolation methods in geographic information systems.' *Papers in Regional Science* 70(3): 303-315.

### Installation

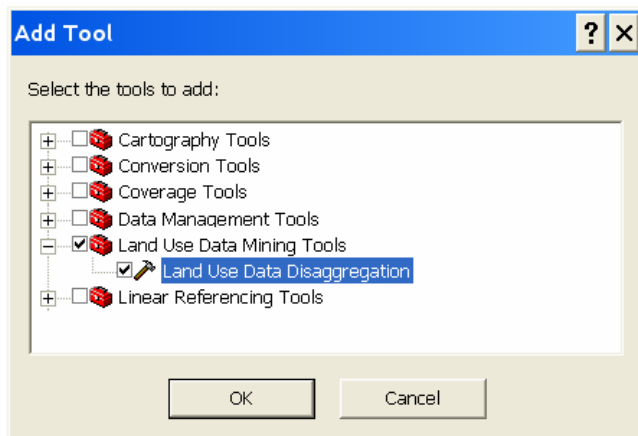
Copy the files LandUseDatMiner.dll , Install.bat, LUDM.reg to a folder and execute the Install.bat file. This will update Windows Registry entries to allow the tool to run within ArcGIS.



In ArcGIS, create a toolbox and add the tool.

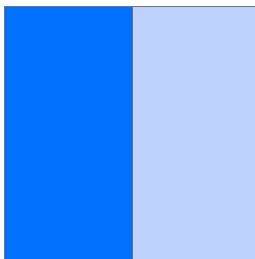


The 'Land Use Data Mining Tools' should be visible, Add the tool 'Land Use Data Disaggregation' to your toolbox.

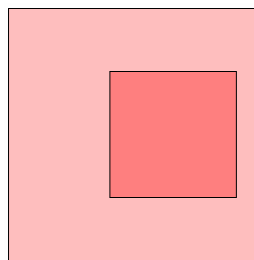


### Example: of Land Use Data Disaggregation Tool

Given a source layer with data for population, the problem is to transfer the population to a target layer with incompatible polygons.



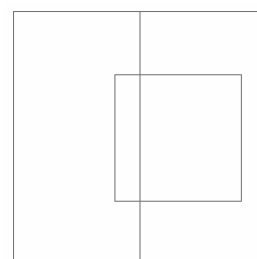
a) Input zones .



b) Target zones

Step 1. Overlay the two layers to create an integrated layer with the identifiers for the input (source, target) zone indices.

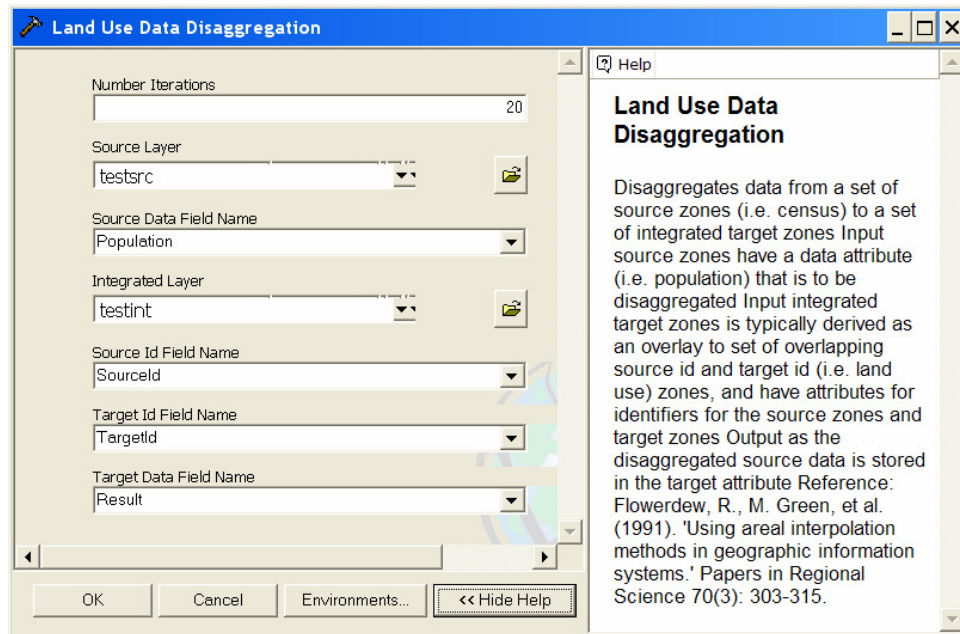
	OBJECTID	SHAPE*	SHAPE_Length	SHAPE_Area	SourceId	TargetId	Result
1	3	Polygon	32	45	1	1	<Null>
2	4	Polygon	12	5	1	2	<Null>
3	5	Polygon	18	20	2	2	<Null>
4	6	Polygon	38	30	2	1	<Null>



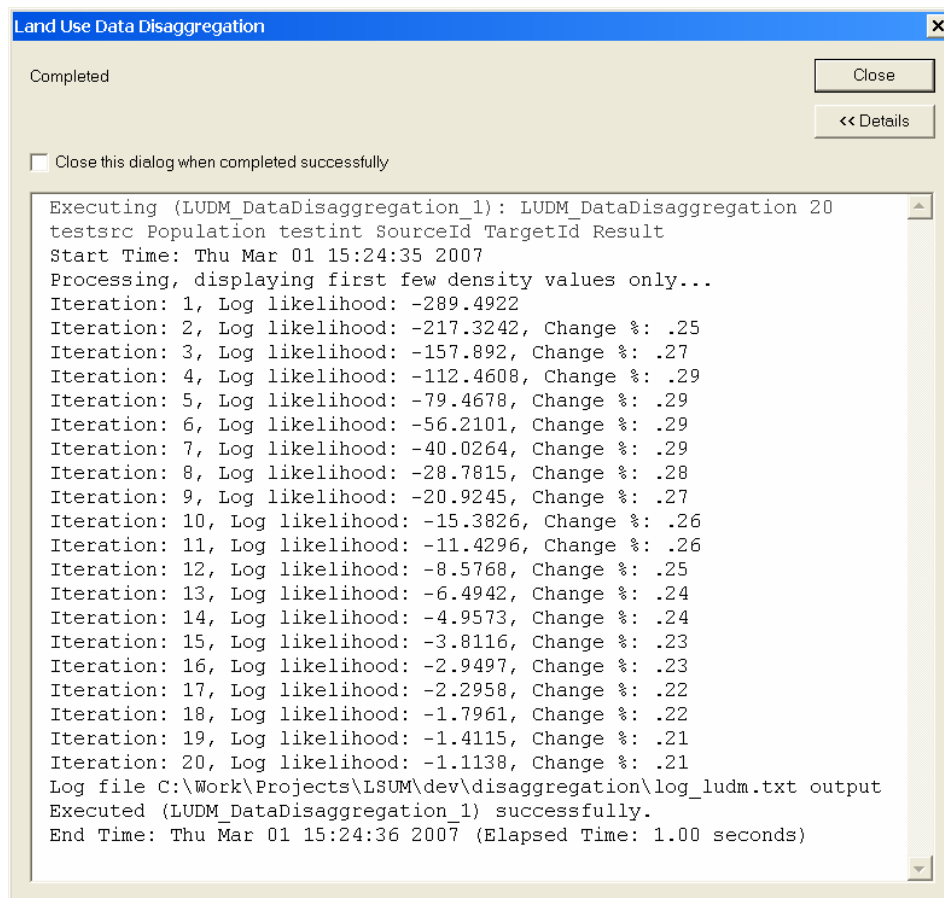
Note that zones are identified by an index in sequence, i.e. 1,2,3..

Step 2. Run the 'Land Use Data Disaggregation' tool

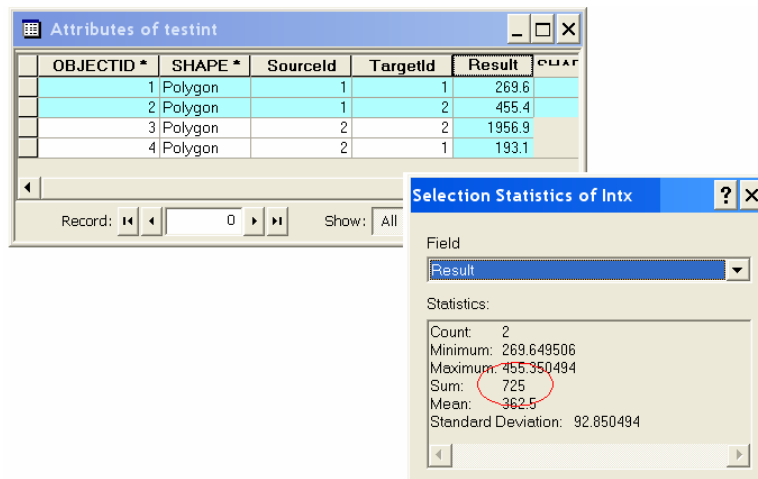
Specify the number of iterations to be performed. Specify the input source layer and the data attribute (i.e. population) that is to be disaggregated. Specify the integrated (spatial union) layer and the source ids, target id (i.e. land use) zones, and result field.



The tool runs and gives output messages on the algorithms progress; it reports the log-likelihood for each step to indicate how well the estimated density fits the source data and the % change in this value from the previous iteration.



Step 3. The 'Target Data Field' should have the estimated disaggregate values. Use the 'Summarize' tool to get totals by the 'TargetId' field and compare the totals to the source data values; they should be very close.



The image shows two overlapping windows from a GIS software. The top window, 'Attributes of testint', displays a table with the following data:

OBJECTID *	SHAPE *	SourceId	TargetId	Result
1	Polygon	1	1	269.6
2	Polygon	1	2	455.4
3	Polygon	2	2	1956.9
4	Polygon	2	1	193.1

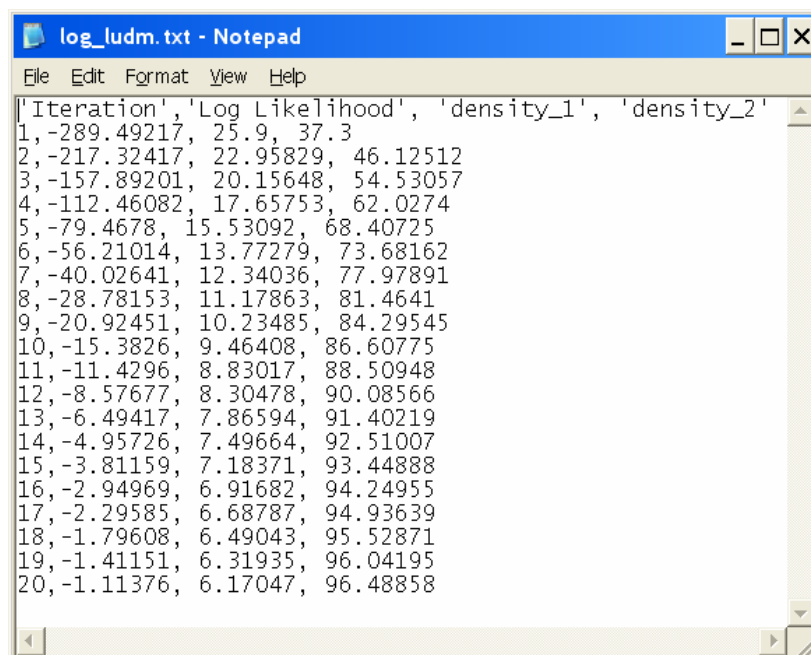
The bottom window, 'Selection Statistics of Intx', shows statistics for the 'Result' field:

Field
Result

Statistics:

Count:	2
Minimum:	269.649506
Maximum:	455.350494
Sum:	725
Mean:	362.5
Standard Deviation:	92.850494

A log file is created 'log\_ludm.txt' in the same folder as the datasets with output for the log-likelihood value and the density estimate for target zones for each iteration. The last line contains the best estimates used to compute the disaggregate values.



The image shows a Notepad window titled 'log\_ludm.txt - Notepad' containing the following text:

```

Iteration', 'Log Likelihood', 'density_1', 'density_2'
1, -289.49217, 25.9, 37.3
2, -217.32417, 22.95829, 46.12512
3, -157.89201, 20.15648, 54.53057
4, -112.46082, 17.65753, 62.0274
5, -79.4678, 15.53092, 68.40725
6, -56.21014, 13.77279, 73.68162
7, -40.02641, 12.34036, 77.97891
8, -28.78153, 11.17863, 81.4641
9, -20.92451, 10.23485, 84.29545
10, -15.3826, 9.46408, 86.60775
11, -11.4296, 8.83017, 88.50948
12, -8.57677, 8.30478, 90.08566
13, -6.49417, 7.86594, 91.40219
14, -4.95726, 7.49664, 92.51007
15, -3.81159, 7.18371, 93.44888
16, -2.94969, 6.91682, 94.24955
17, -2.29585, 6.68787, 94.93639
18, -1.79608, 6.49043, 95.52871
19, -1.41151, 6.31935, 96.04195
20, -1.11376, 6.17047, 96.48858

```