

## **Greedy-Add heuristic for addressing a maximal coverage problem: a macro for Arc/INFO**

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### **Step 1: Create input datasets**

6 input datasets are required and need to be in the inputs directory

<b>Dataset name</b>	<b>Type</b>	<b>Description</b>
Friction	grid	Values of time in seconds to cross a cell
Boundary	grid	Defining the extent of the analysis with single value of 1
Sumzonegrid	grid	Defining the extent of the population to be analysed with single value of 1
Pop	grid	The uncovered population that are considered at the start of the analysis
Totpop	grid	The total population in the area of analysis
Test_points	shapefile	Locations that can be considered as facilities/outlets

### **Step 2: Adjust the aml settings**

Change the directory settings in the aml

Change the number of points to be considered in the aml

Change the number of iterations considered in the aml

### **Step 3: Run the aml**

In Arc/INFO

w [homedir]

&r access\_optimisation\_general.aml

### **Step 4: Wait while the heuristic runs**

The time will depend on the number of potential points per iteration and the number of iterations needed to reach population threshold for the time threshold.

### **Step 5: Analyse results**

Look at the [resultdir]\popsummary table, this (Table 1) shows the point that captures the most population for each iteration. The summary doesn't show the cumulative

population nor the cumulative percentage of the population covered but these are easy to calculate (Table 2).

**Table 1. Popsummary table**

Iteration	Point Number	Population
1	19	112,801
2	4	93,507
3	9	80,410
4	10	55,034
5	17	28,543
6	8	22,164
7	6	20,958
8	16	14,748
9	7	14,219
10	11	12,110
11	18	9,600
12	15	8,257
13	12	7,194
14	3	1,718
15	14	1,132
16	13	182
17	5	80
18	1	3

**Table 2. Calculated cumulative population**

Iteration	Cumulative Population	% covered
1	112,801	18.66
2	206,308	34.12
3	286,717	47.42
4	341,751	56.52
5	370,294	61.24
6	392,458	64.91
7	413,416	68.37
8	428,164	70.81
9	442,383	73.17
10	454,493	75.17
11	464,093	76.76
12	472,350	78.12
13	479,544	79.31
14	481,262	79.60
15	482,394	79.78
16	482,576	79.81
17	482,656	79.83
18	482,659	79.83

The results show that the 80% population threshold was not reached with the points available. The table also starkly demonstrates the diminishing population covered with each iteration.

This information can also be seen visually and when the aml has completed there are maps that allow for the investigation of the results of each iteration. Specifically grids that show the cells within time threshold for each iteration, and a grid showing the population left uncovered after each iteration.

The grid for the initial population is loaded by the user (Figure 1), the population left uncovered after the first iteration is called [inputdir]\popmax\* where the \* is the number of the first point in popsummary table. In our example that is point# 19, so the grid is popmax19 (Figure 2).

In addition to the [inputdir]\popmax\* grids there are grids calculated for the area within the time threshold of the selected point for each iteration called [resultdir]\n\*\_hourgrid where \* is the number of each iteration.

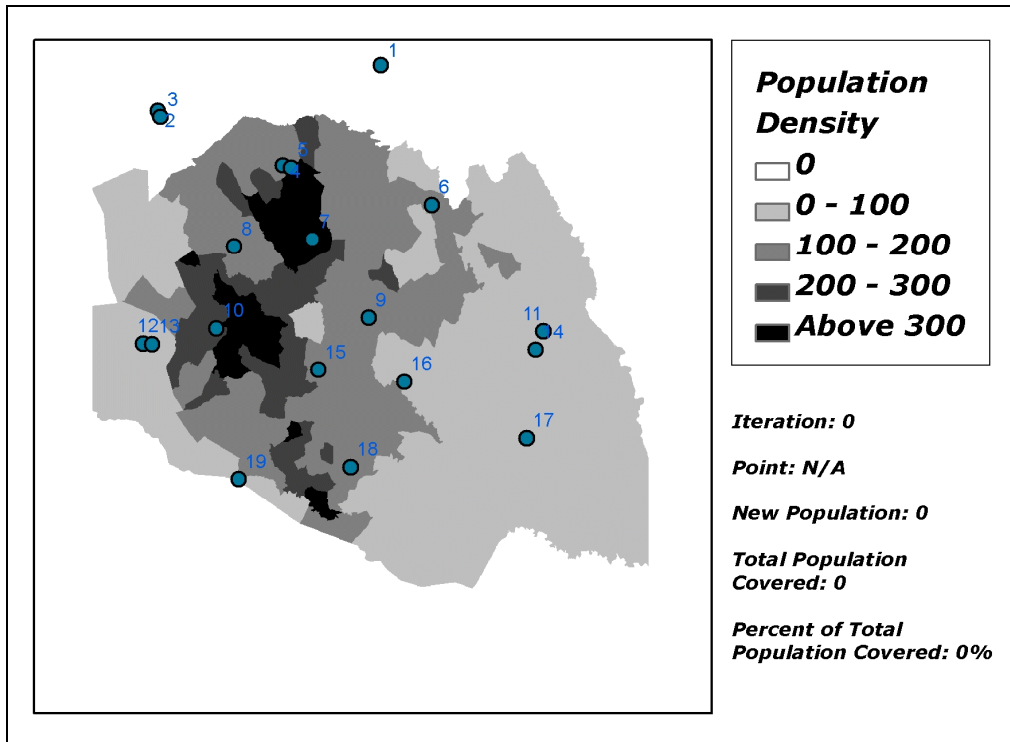


Figure 1. Initial population not covered showing potential outlets

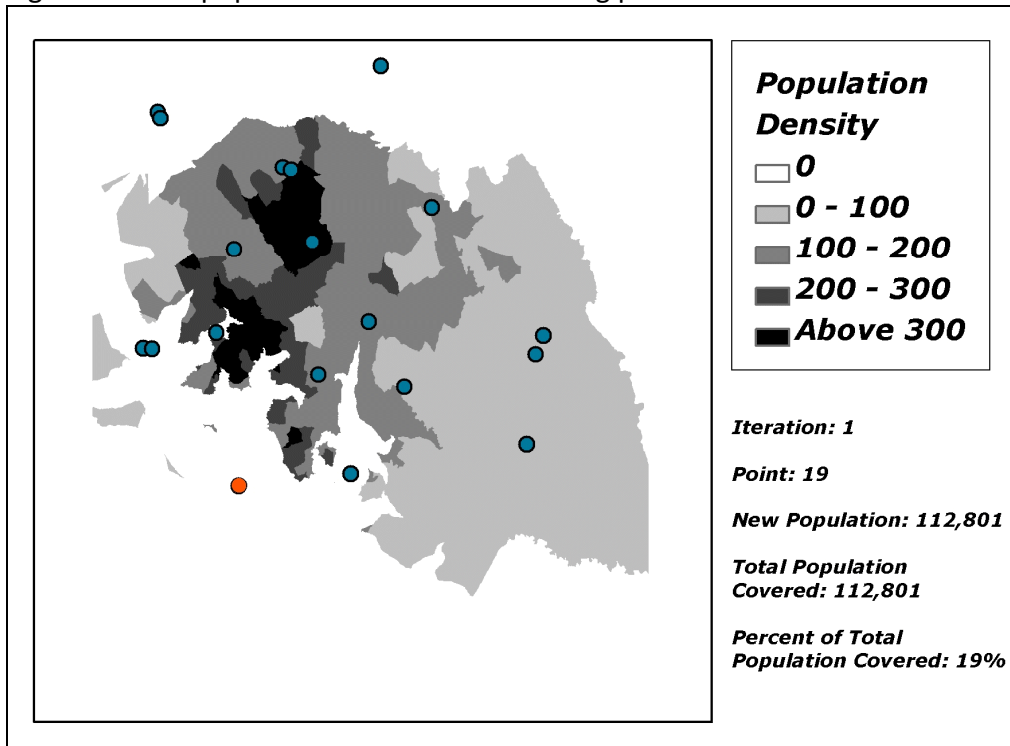


Figure 2. Population uncovered after 1 iteration, the selected point is shown in orange