Improvement of generalization quality for vario-scale map

Groups method

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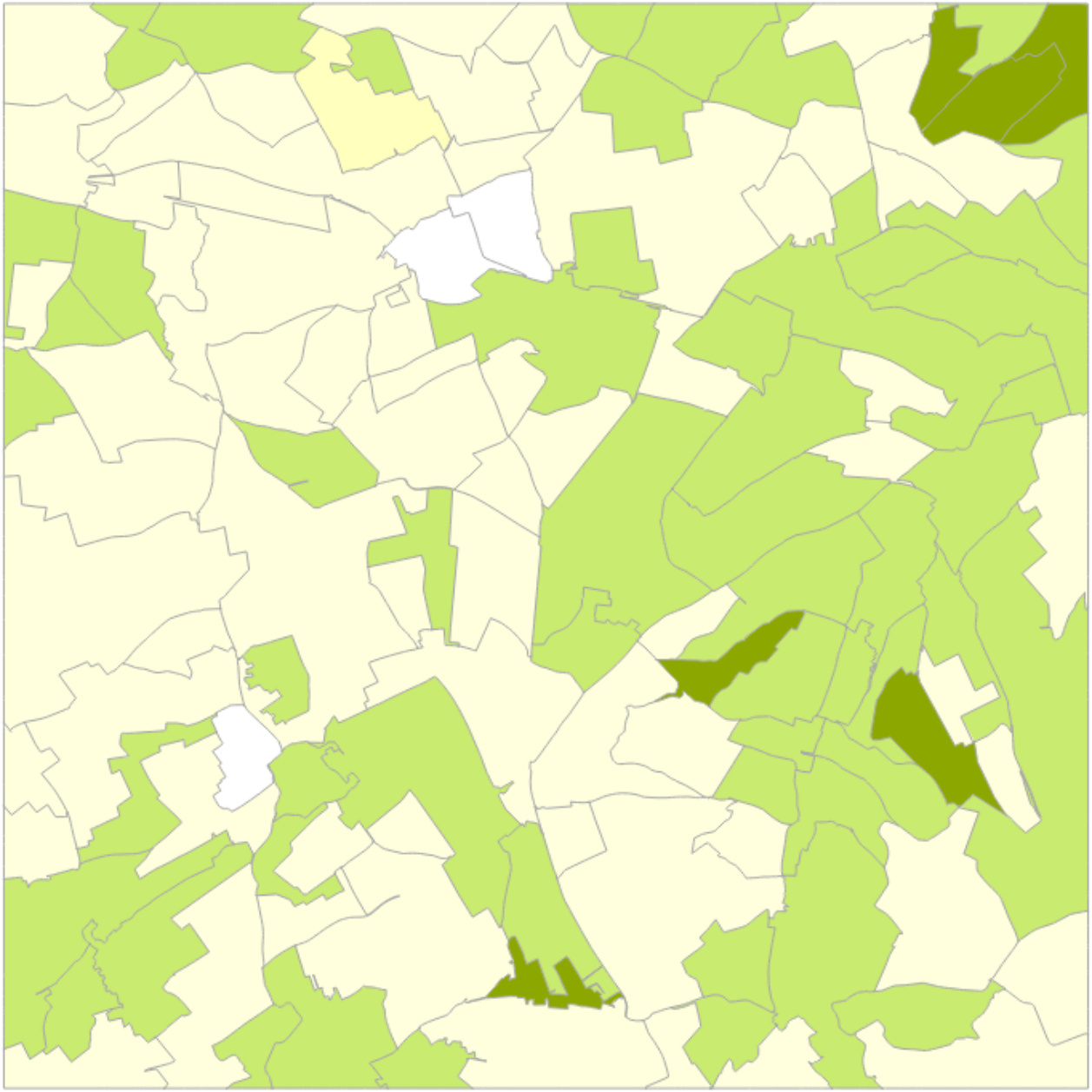
Motivation

We have following tools for generating meaningful map content:

- remove/merge operation
- collapse split
- line simplification
- large dataset in parallel
- road network in middle-small scale

Nevertheless generating good quality output is challenging.

Example of bad result



Principle

The generalization process is driven by

- Global queue based on size (every step one object is selected)
- Most compatible neighbour for selected object $\leftarrow$ our focus

Our target is design generic global overall recipe to get

- good cartographic quality for entire process
- preserved main map features (urban regions, main roads)

Geometrical decisions only

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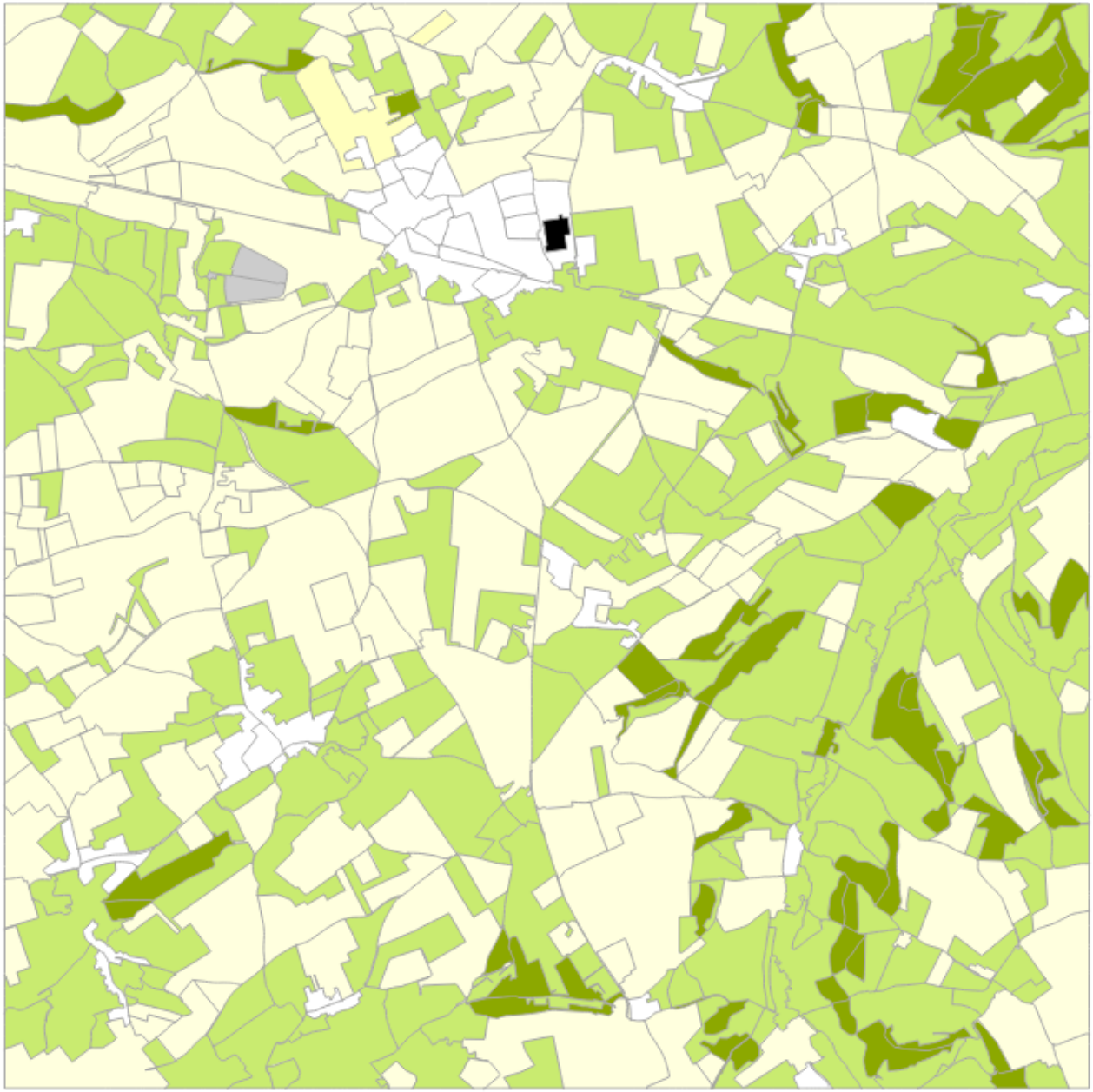
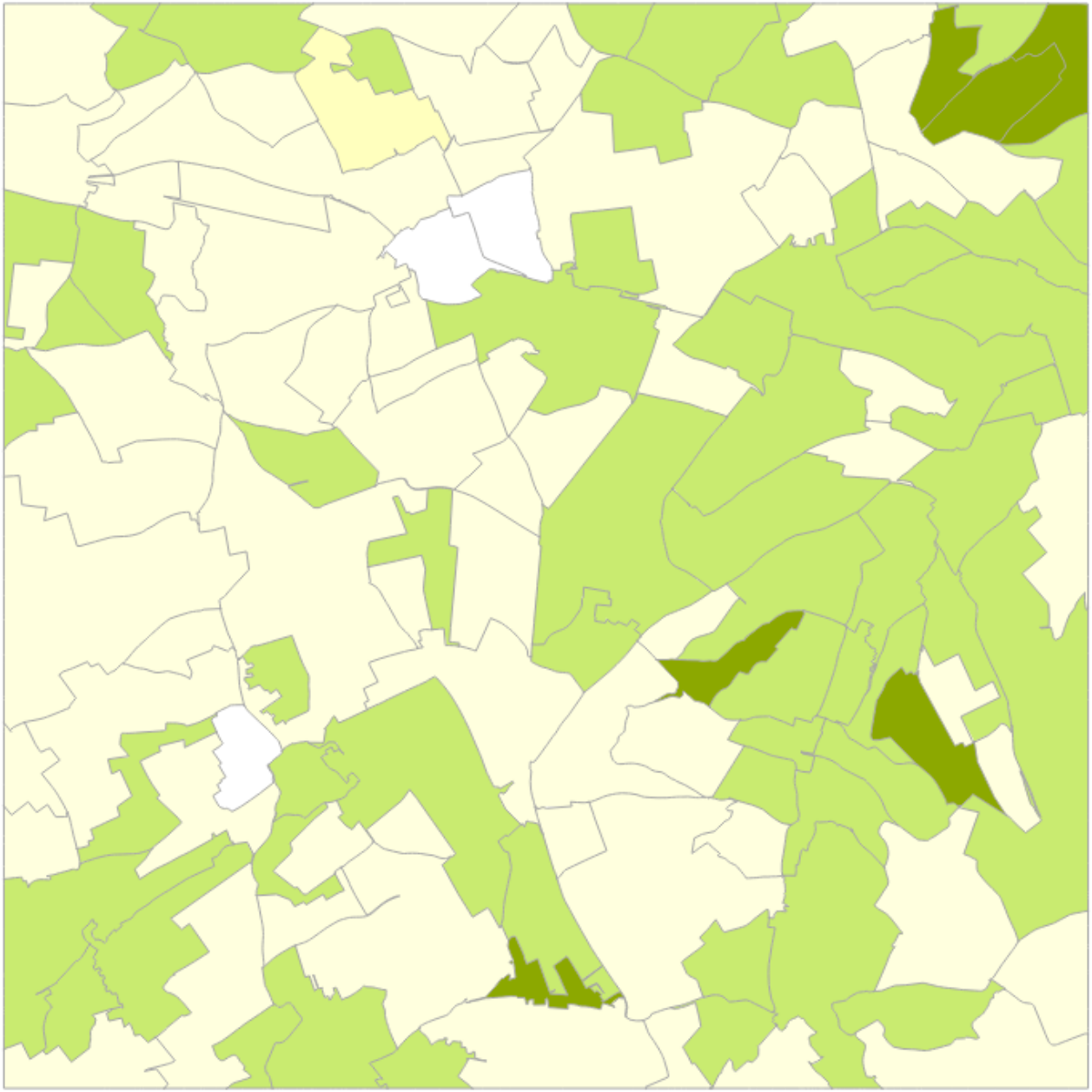


Geometrical decisions only



Real impression

Decisions in generalization process

- Geometrical decisions only
- Compatibility matrix
- Groups
- Compatibility matrix + Groups

Compatibility matrix overview

$$Compatibility(f, n) = Matrix(class(f), class(n)) * L_{common}(f, n)$$

Compatibility matrix overview

From-class code →		1001	2001	3001	4001	4002	4003	4004	4005	5001
Weight		**13.0**	**1.20**	**1.30**	**9.00**	**1.00**	**0.93**	**0.90**	**0.88**	**1.00**
Class name	To-c↓									
Building	1001	1.00	0.50	0.00	0.90	0.90	0.50	0.50	0.00	0.99
Road	2001	0.00	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water	3001	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Lot	4001	0.50	0.90	0.00	1.00	0.95	0.95	0.95	0.80	0.95
Fallow land	4002	0.90	0.90	0.00	0.50	1.00	0.90	0.90	0.50	0.95
Plants	4003	0.50	0.50	0.00	0.50	0.50	0.99	0.95	0.90	0.50
Terrain unk.	4004	0.90	0.50	0.00	0.50	0.90	0.00	1.00	0.99	0.95
Grass	4005	0.50	0.90	0.00	0.80	0.50	0.95	0.95	0.99	0.50
Other Building	5001	0.99	0.50	0.00	0.50	0.90	0.50	0.50	0.00	1.00

Compatibility matrix overview

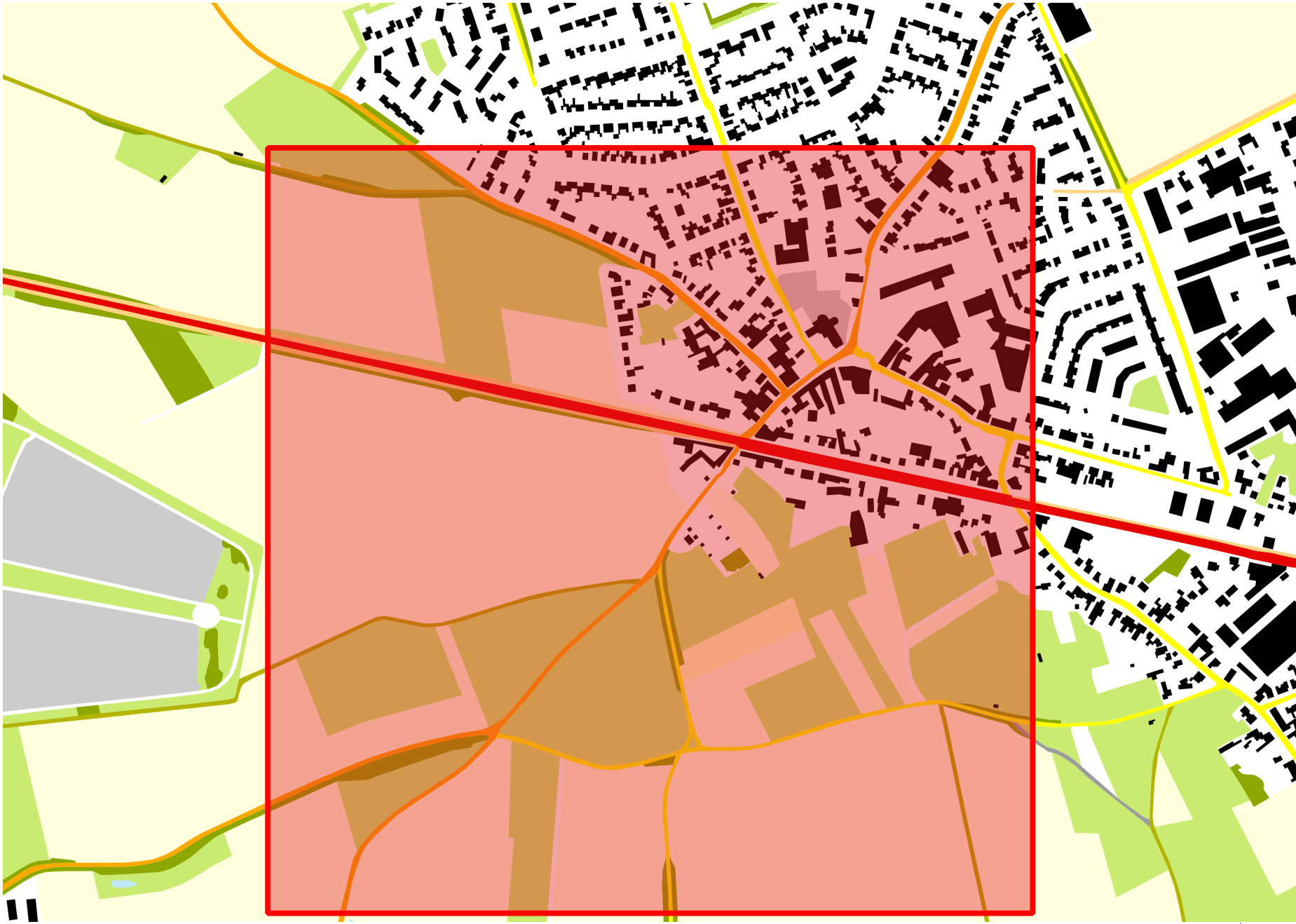
Pros

- easy to use
- obvious principle

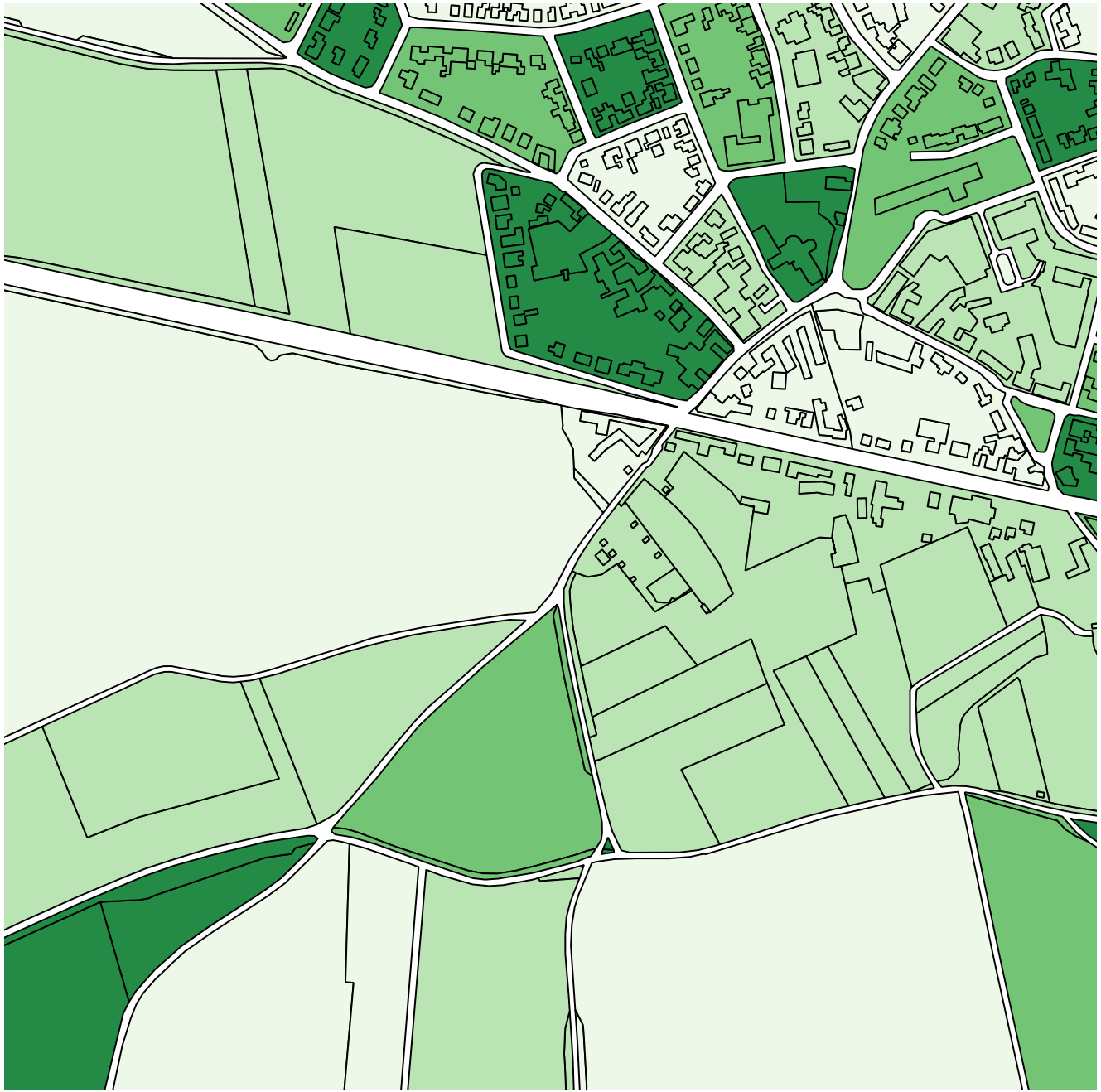
Cons

- valid for certain scale only, then “fall apart”
- defining the matrix
- long objects (roads)

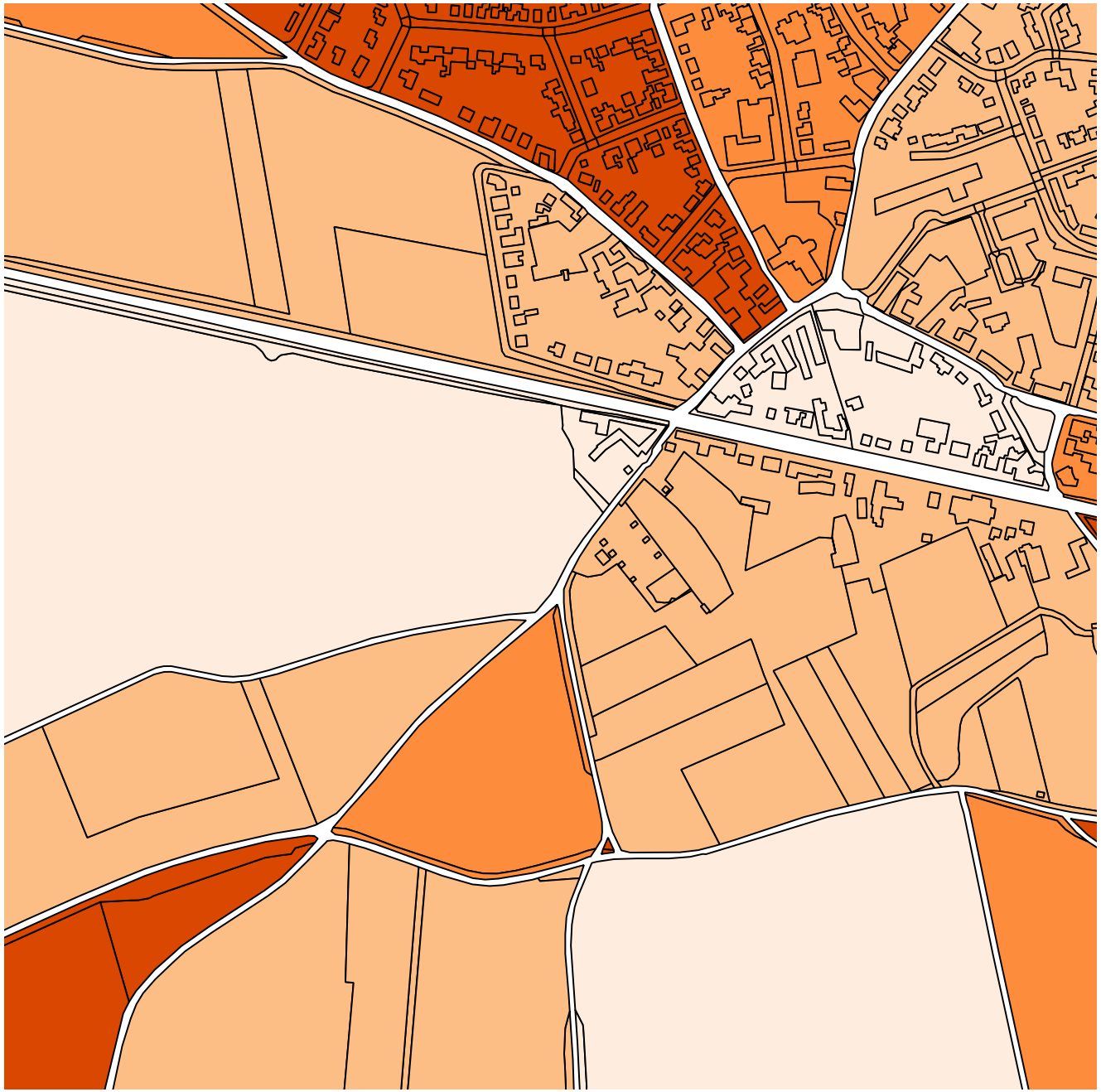
Groups definition, overview



Groups definition by all roads; level 1

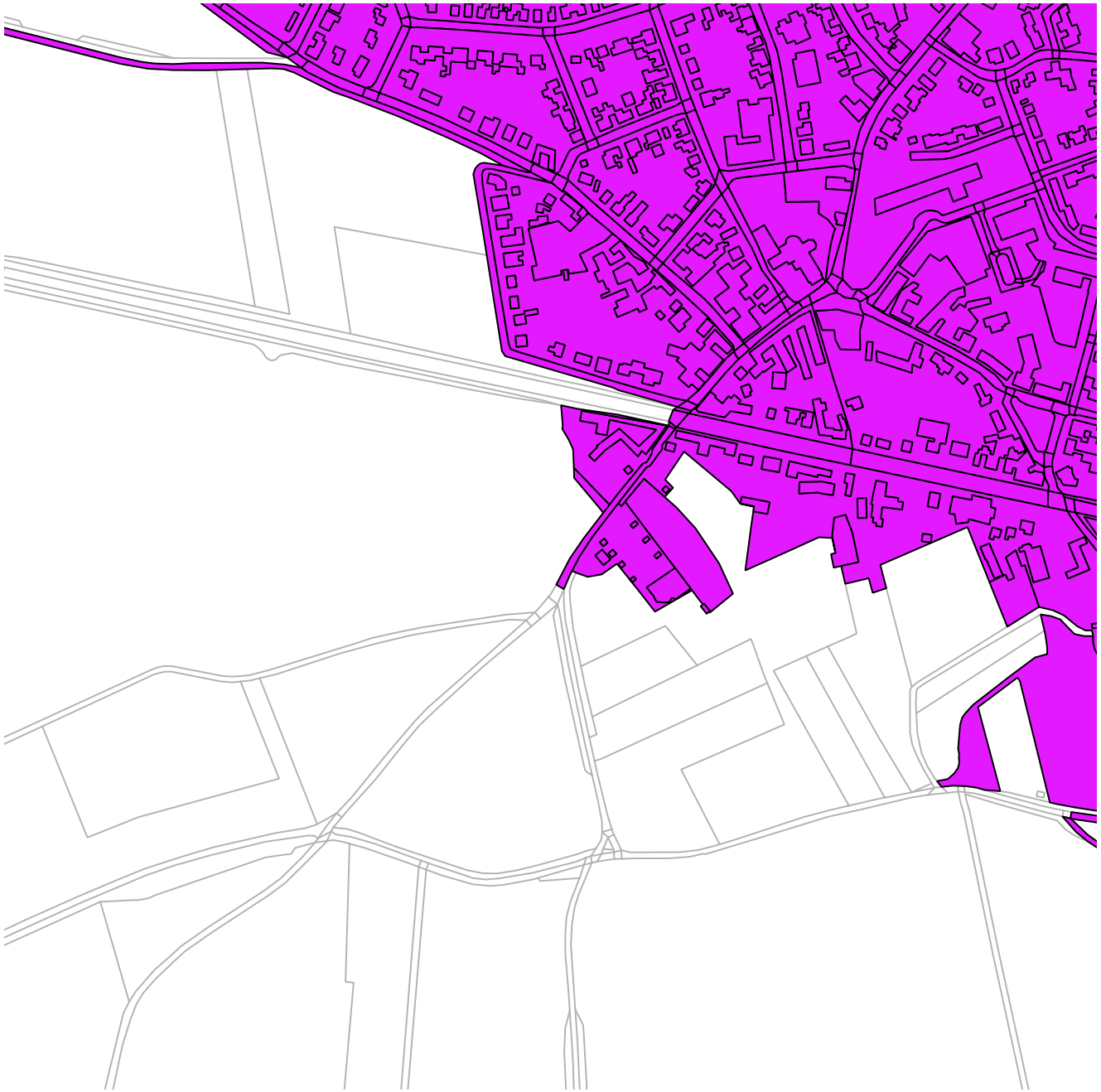


Groups definition by local roads; level 2



Groups definition by main roads; level 3

Groups definition by urban regions; level 4



$$Compatibility(f, n) = \frac{G_{common}(f, n)}{G_{total}(f, n)} + L_{common}(f, n)$$

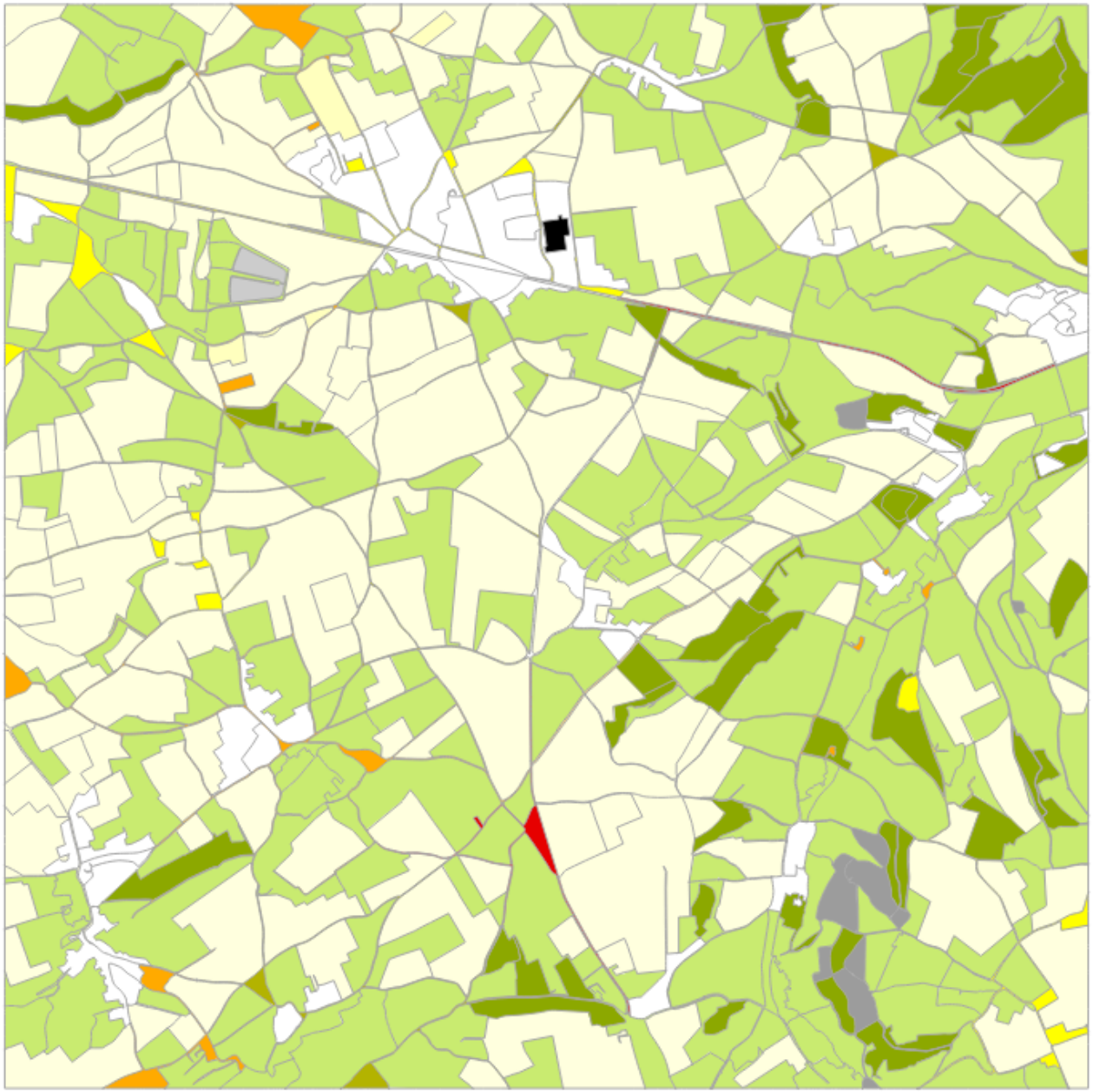
Visual result

Visual result

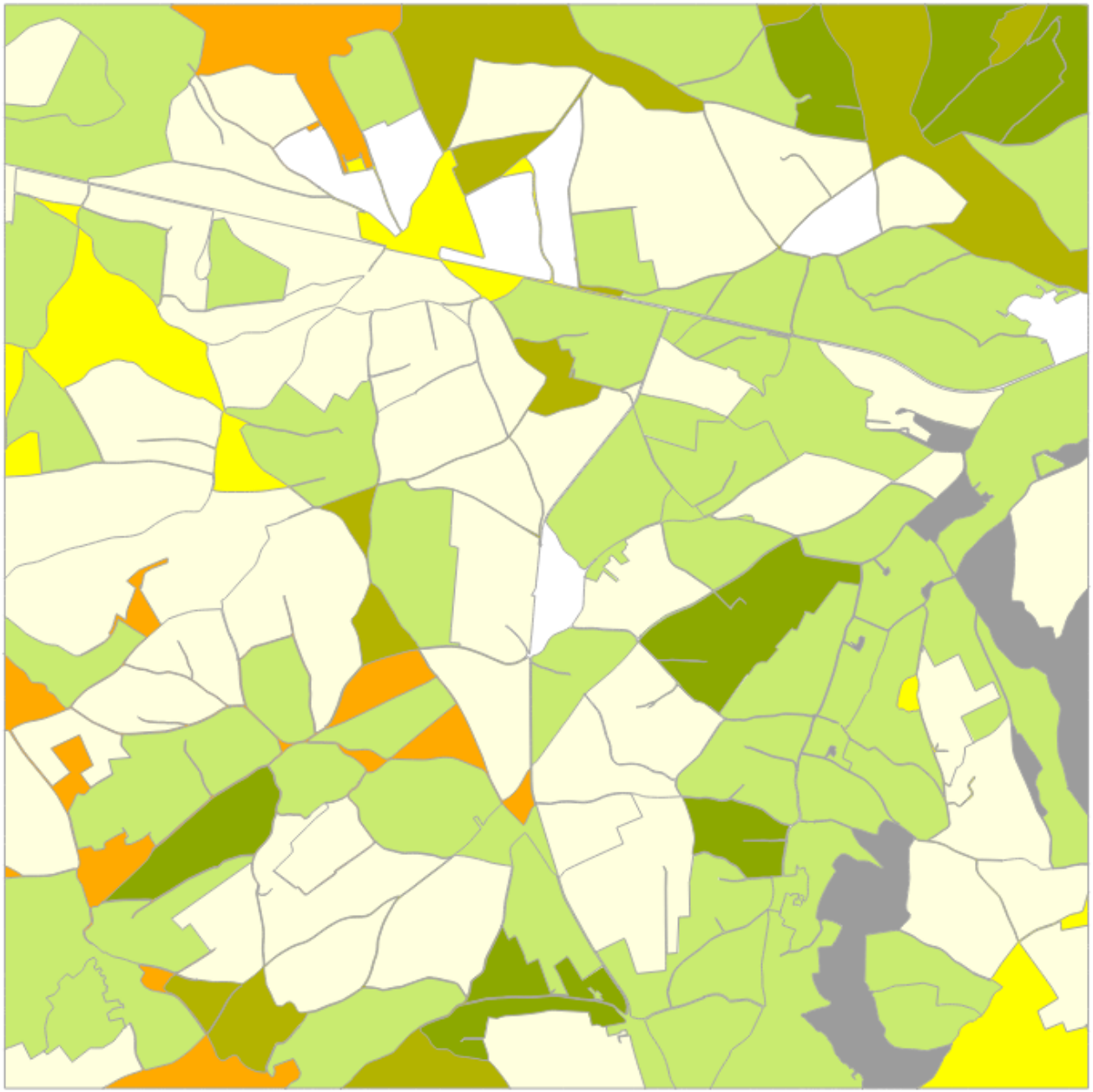
Visual result

Visual result

Visual result

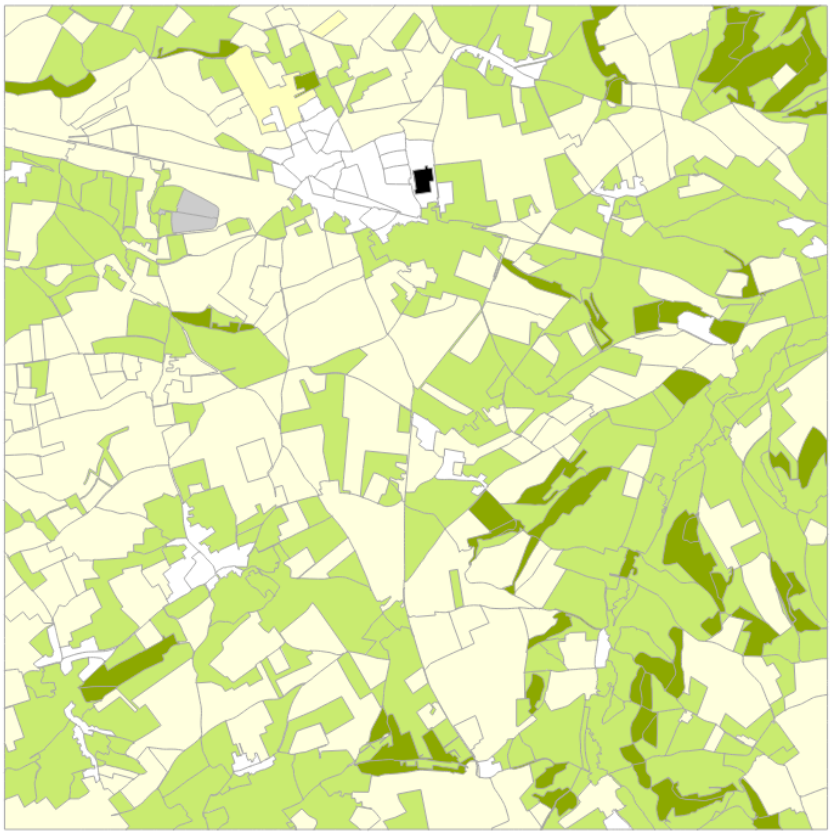


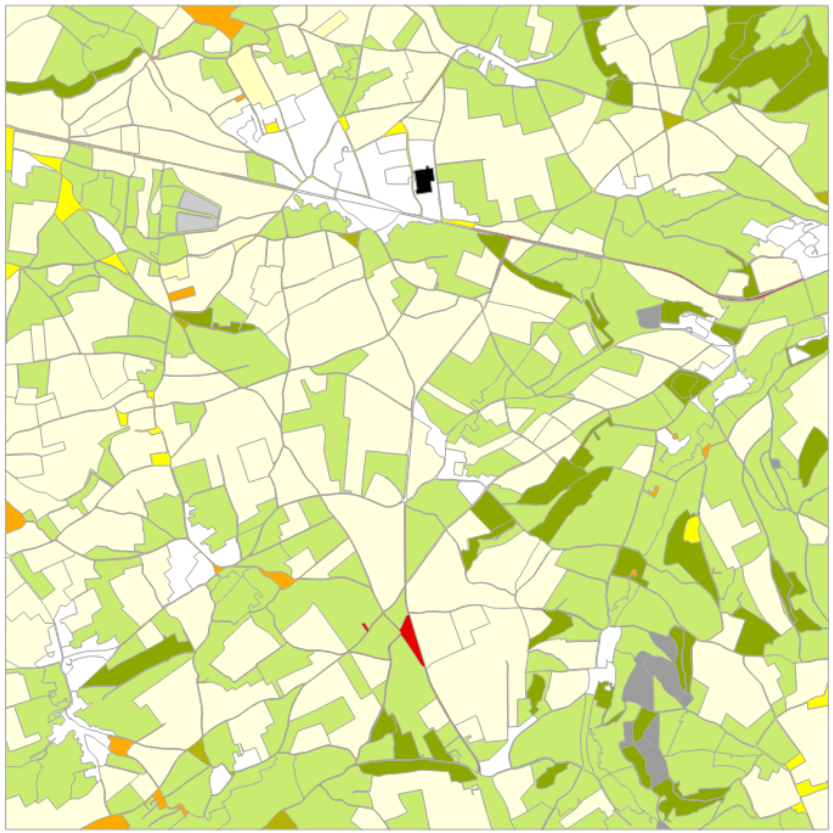
Visual result

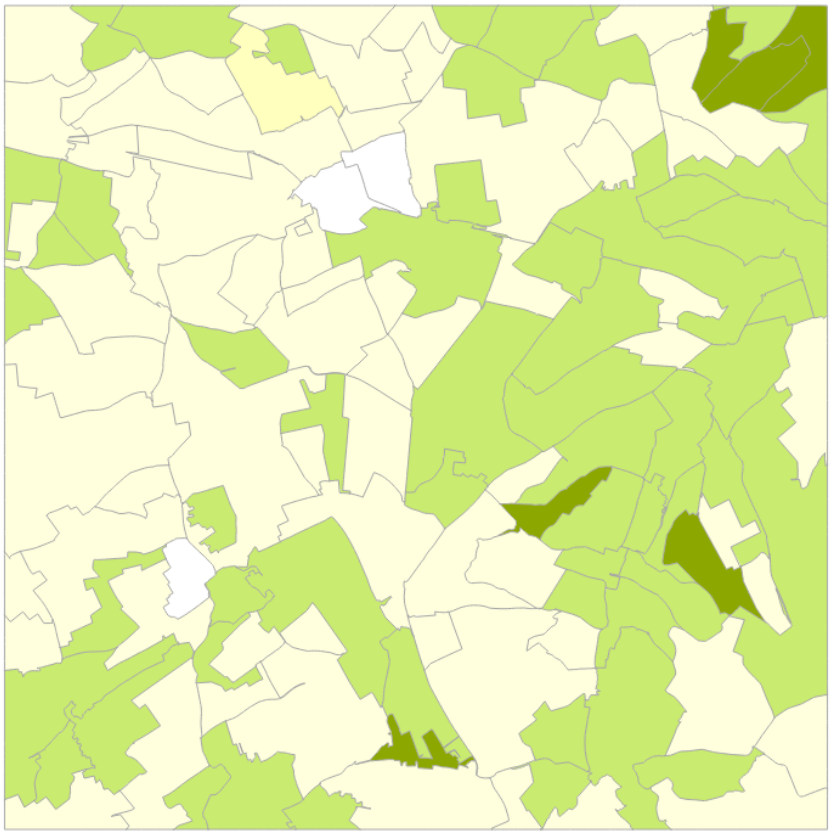


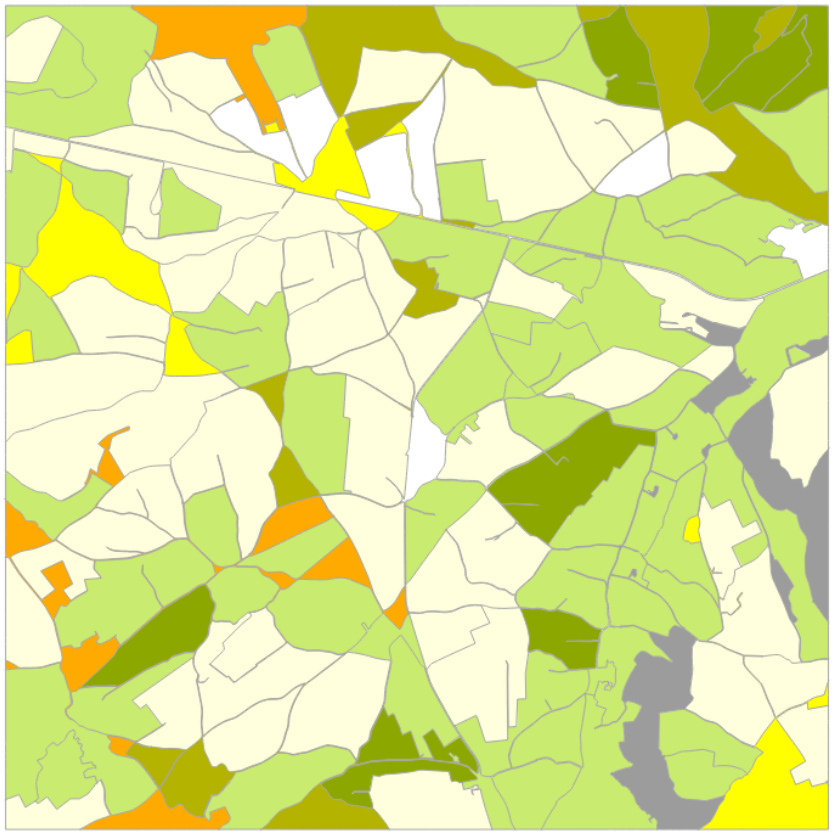
Real impression

comparison

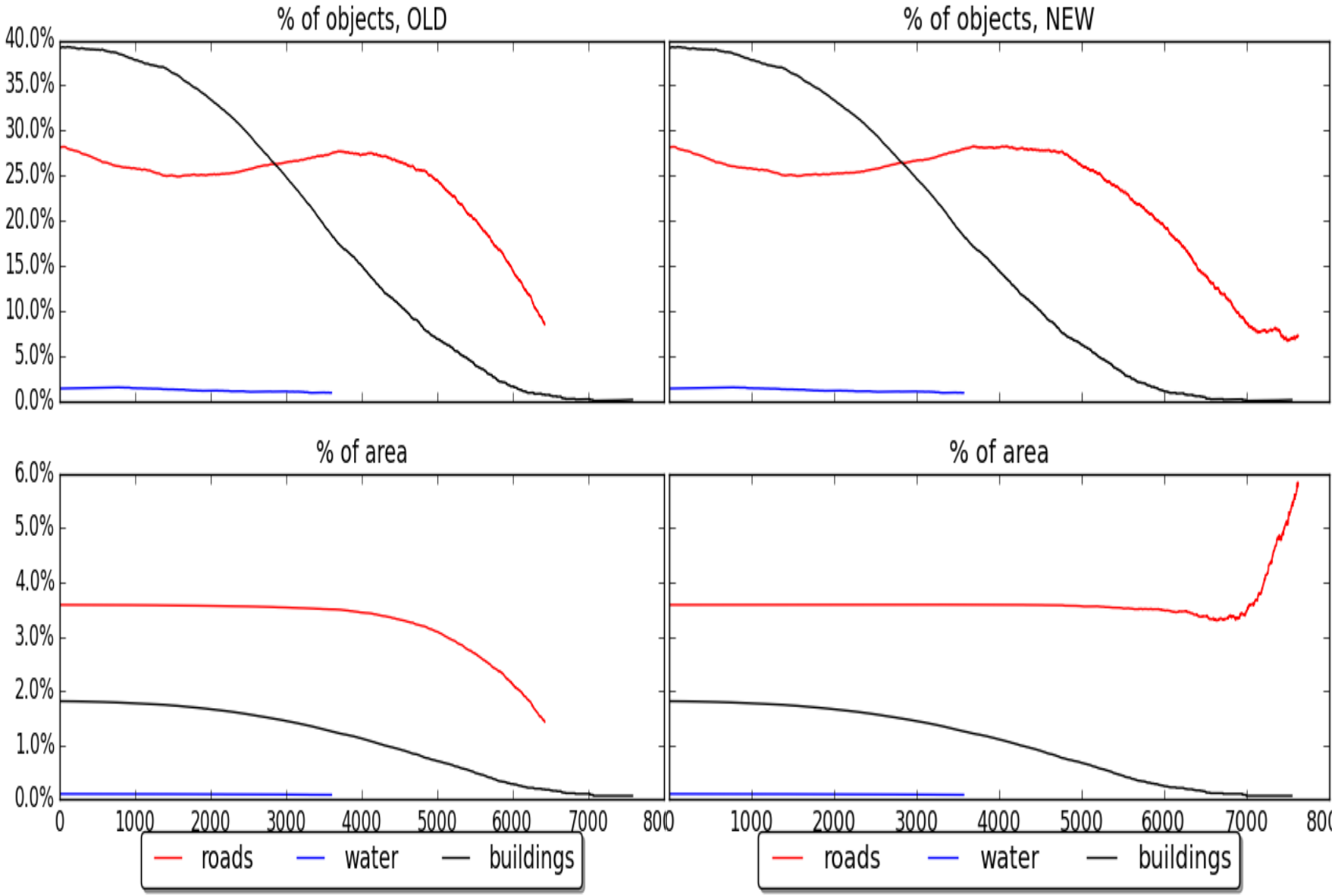








Statistics


% of objects, OLD
% of objects, NEW
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
% of area
% of area
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
0
1000
2000
3000
4000
5000
6000
7000
roads
water
buildings
roads
water
buildings

Some open questions

- How many groups? (hydrology, infrastructure, ...)
- Combination of compatibility matrix and groups
- Same groups for same number of steps?

Thanks for your attention

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