Geographic Data Science

Types of *W*

Dani Arribas-Bel

What is a neighbor?

A neighbor is "somebody" who is:

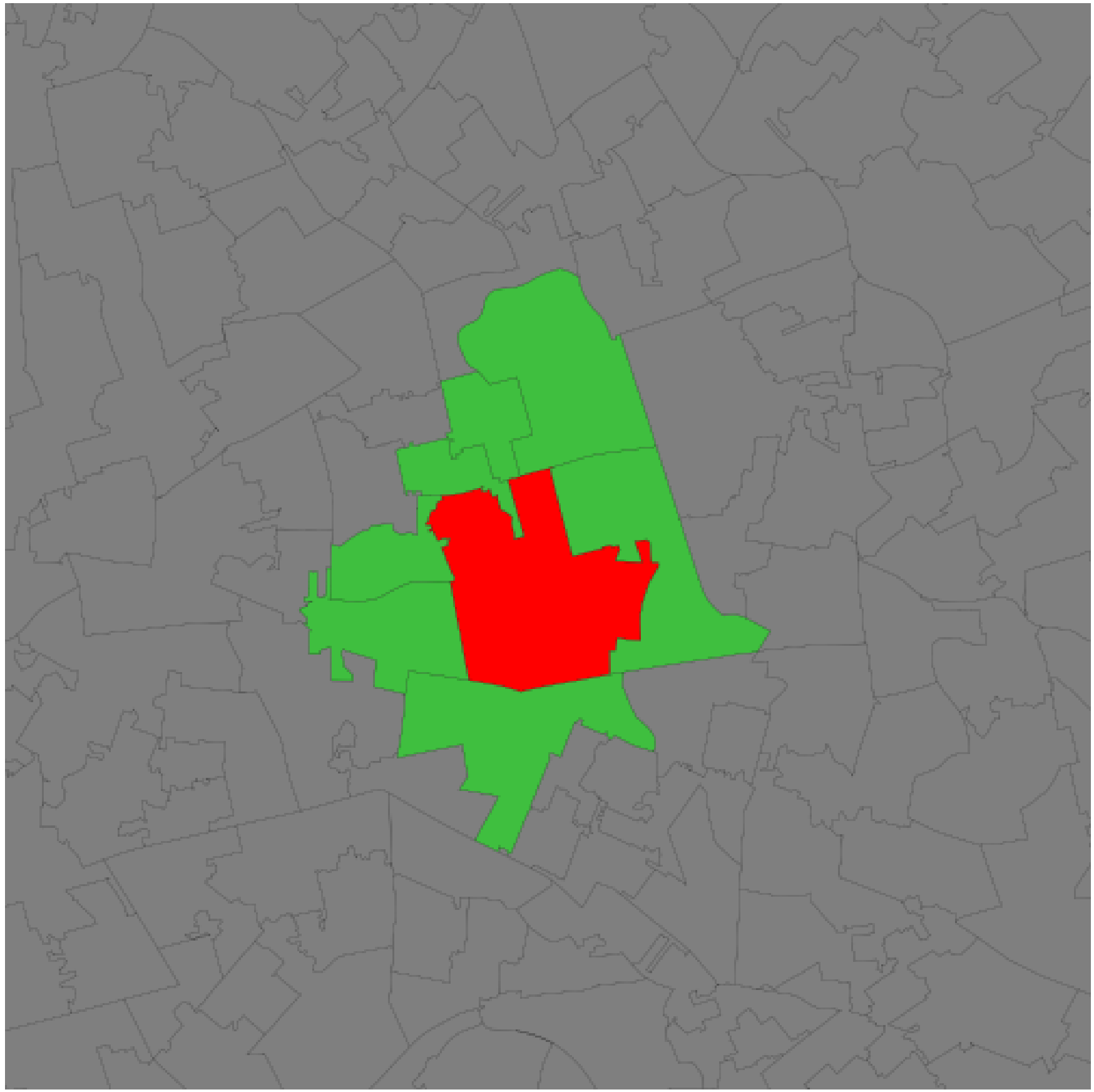
- Next door → **Contiguity**-based *W*s
- Close → **Distance**-based *W*s
- In the same "place" as us → **Block** weights
- …

See Anselin & Rey (2014) for an in-detail discussion and more types of *W*.

Contiguity-based weights

Sharing boundaries to any extent

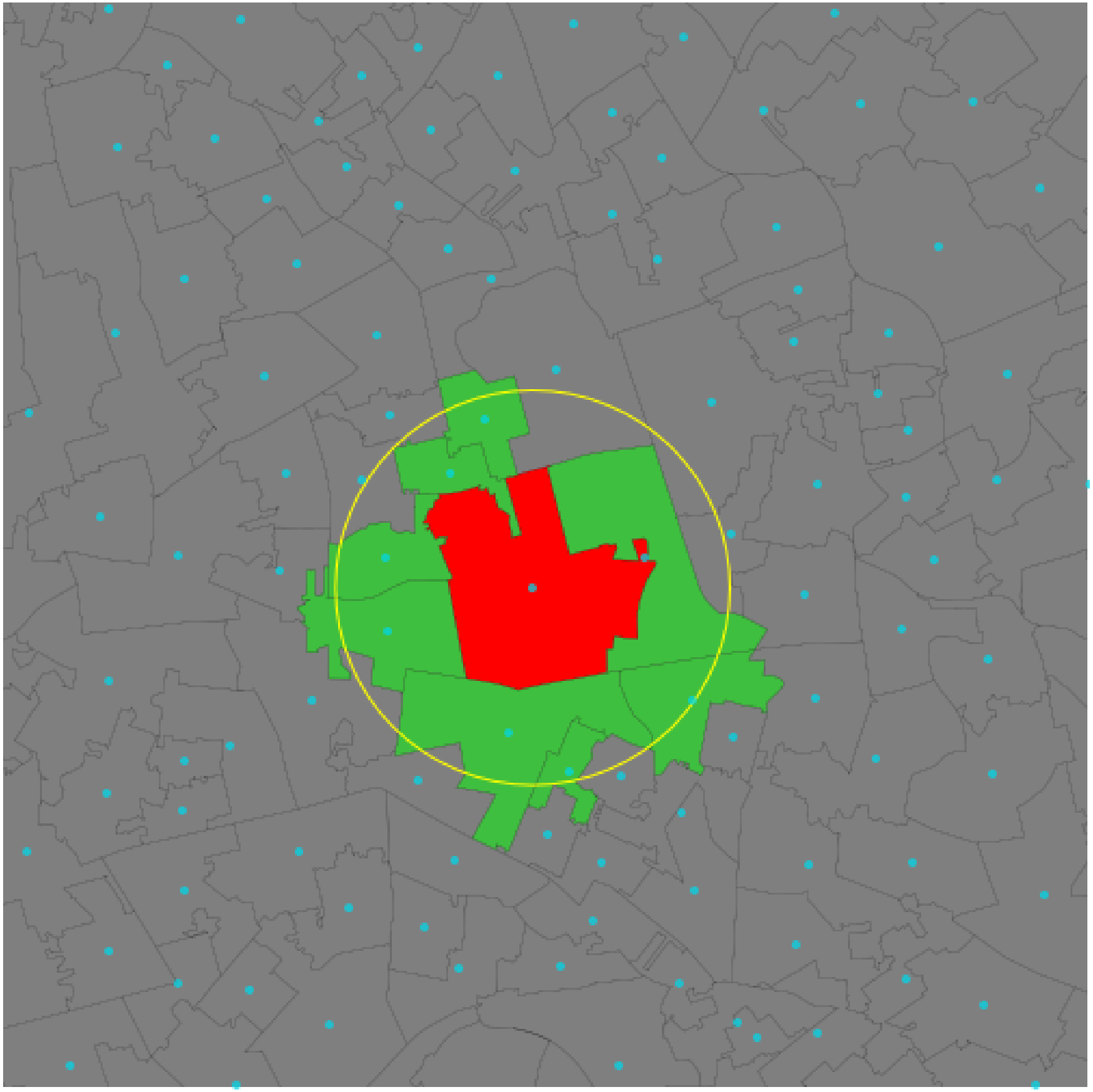
- Rook
- Queen
- …



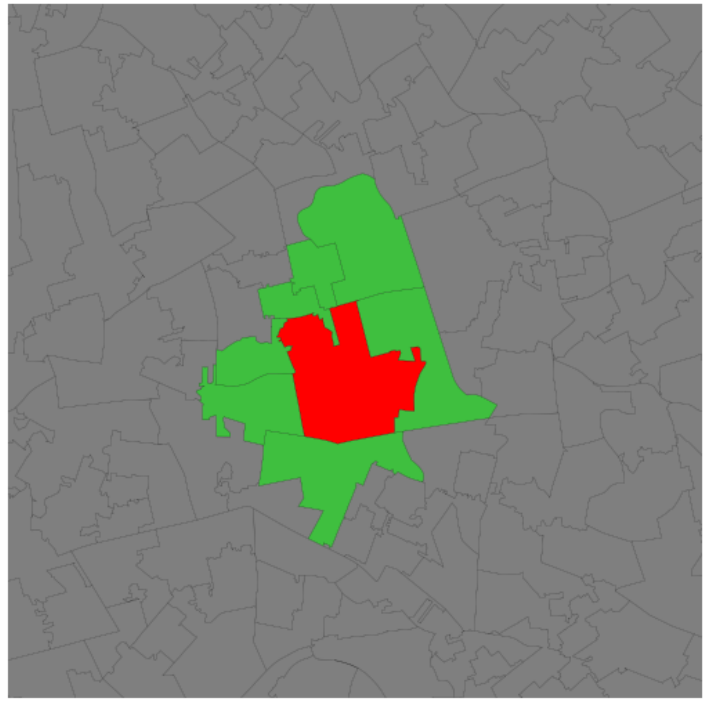
Distance-based weights

Weight is (inversely) proportional to distance between observations

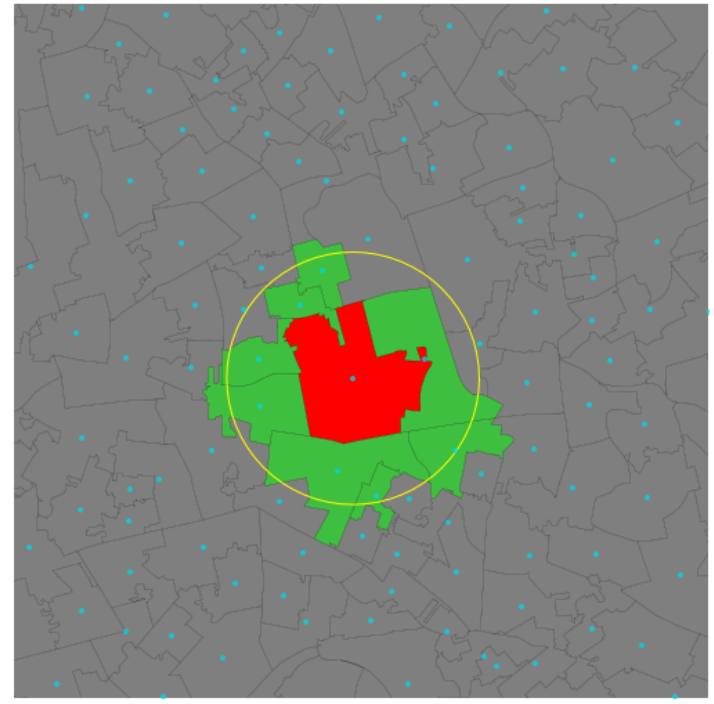
- Inverse distance (threshold)
- KNN (fixed number of neighbors)
- …



Queen neighbors of `E01006690`



Neighbors within 1km of `E01006690`

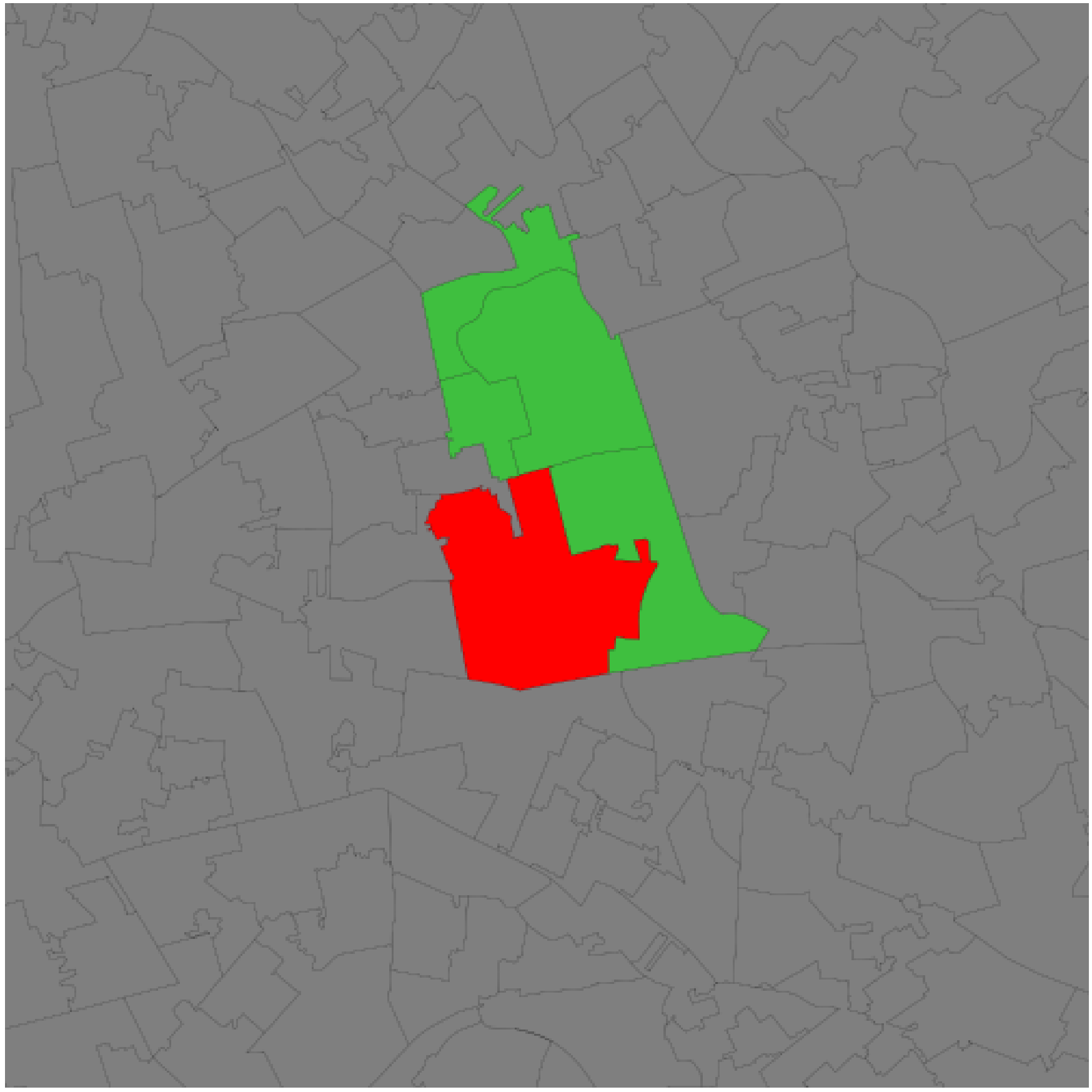


Block weights

Weights are assigned based on discretionary rules loosely related to geography

For example:

- LSOAs into MSOAs
- Post-codes within city boundaries
- Counties within states
- …



How much of a neighbor?

No neighbors receive zero weight: $w_{ij} = 0$

Neighbors, it depends, w_{ij} can be:

Choice of W

Should be based on and reflect the **underlying channels of interaction** for the question at hand.

Examples:

- Processes propagated by inmediate contact (e.g. disease contagion) → Contiguity weights
- Accessibility → Distance weights
- Effects of county differences in laws → Block weights

Do your own (contiguity) weights time!

1	2	3
4	5	6
7	8	9

	1	2	3	4	5	6	7	8	9
1	0	1	0	1	0	0	0	0	0
2	1	0	1	0	1	0	0	0	0
3	0	1	0	0	0	1	0	0	0
4	1	0	0	0	1	0	1	0	0
5	0	1	0	1	0	1	0	1	0
6	0	0	1	0	1	0	0	0	1
7	0	0	0	1	0	0	0	1	0
8	0	0	0	0	1	0	1	0	1
9	0	0	0	0	0	1	0	1	0

Standardization

In some applications (e.g. spatial autocorrelation) it is common to *standardize W*

The most widely used standardization is **row-based**: divide every element by the sum of the row:

where $w_{i.}$ is the sum of a row.

```
<a rel="license" href="http://creativecommons.org/licenses
```