# Building Network

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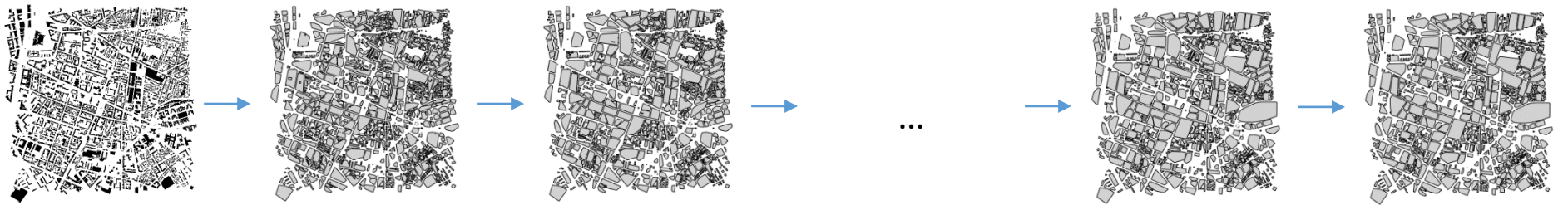
The **Building Network** models a city – or a part of the city – as a **weighted spatial network** of buildings in proximity.

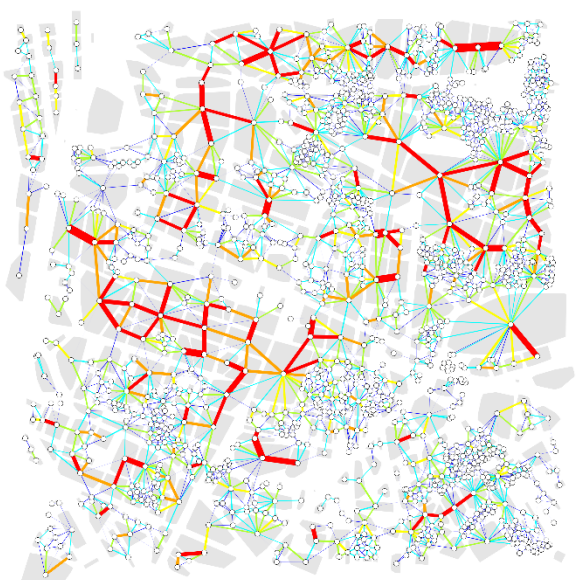
**Step 1**: Download the buildings footprint from OpenStreetMaps.

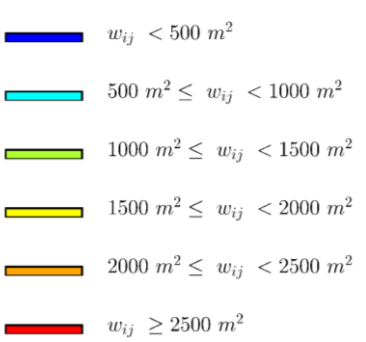
**Step 2**: Merge together adjacent buildings and replace them by their convex hull. Iteratively merge overlapping complex hulls and take the convex hull of the result until no further merging is possible.



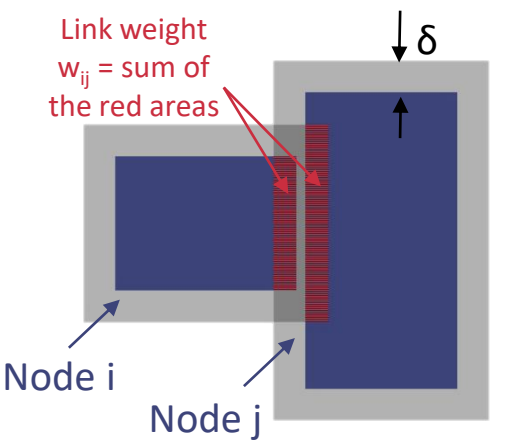

**Step 3**: Create the Buildings Network.

- **Nodes**: merged buildings.
- **Links**: between merged buildings at distance ≤ δ (default**: δ = 30m**) and that have no other merged buildings in-between them.
- **Link weights** : space occupied.

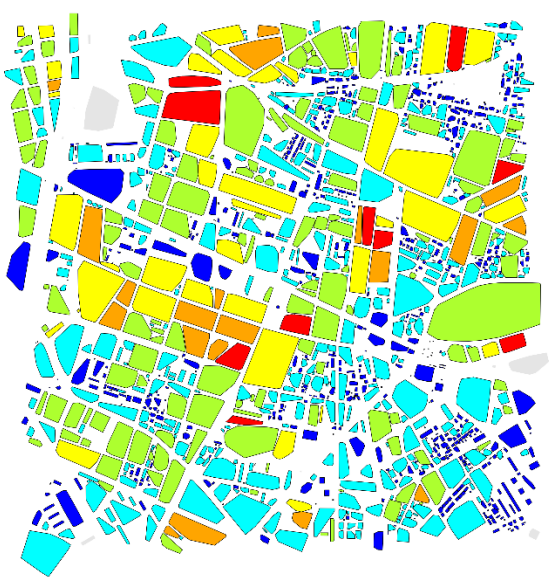


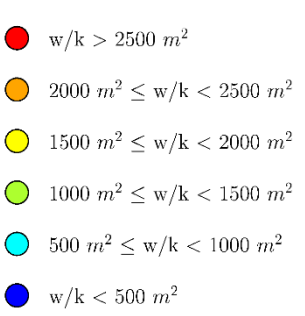



**Link weight definition:**




*It quantifies space occupied by the two merged buildings in the area of width δ around each merged building.*






**Neighborhood analysis**:

- Degree $k_i$ = n. neighbors of node i
- Total weight $w_i$ = Sum of the weights of the links made by node i
- Mean weight = $w_i$ / $k_i$

*The mean weight w/k quantifies the space occupied around each merged building.*

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github.com/lorpac/building-network

- **R Shiny App** –2km x 2km area
- **Jupyter notebook** – area of your choice or entire city.