

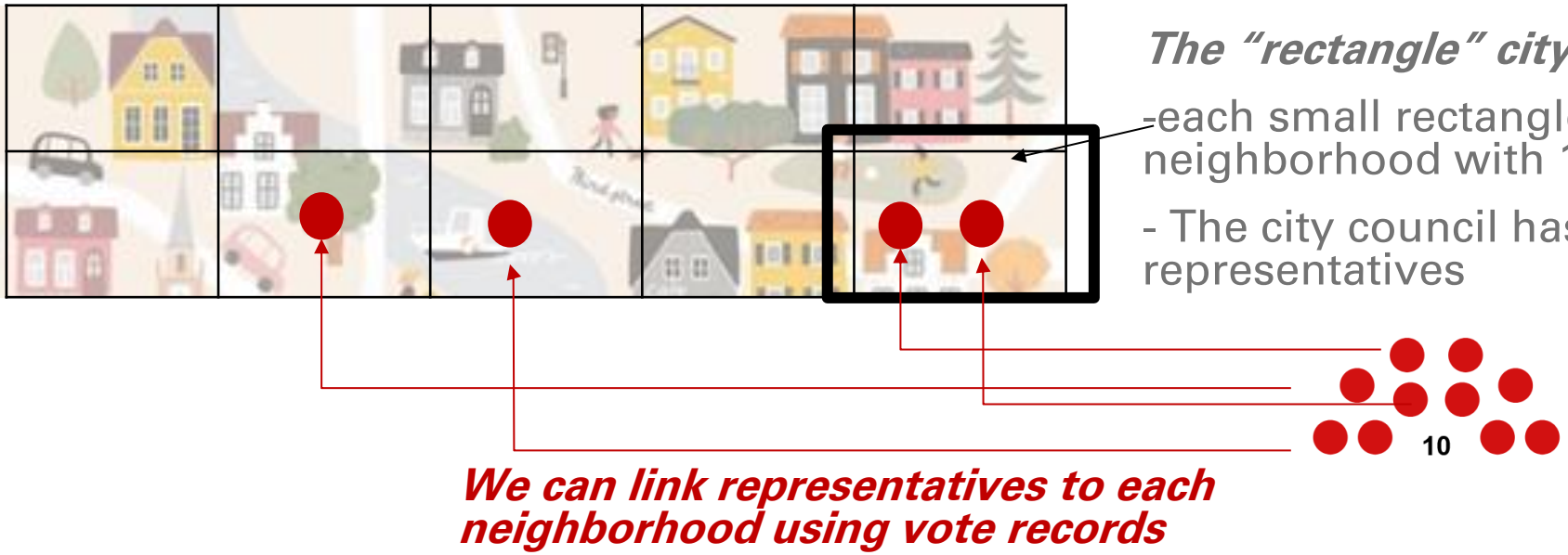
Augusto Cerqua, Gabriele Pinto & Alessandra Scerbo (DISSE – SAPIENZA)

In a nutshell

We conceptualize and develop an index to measure POLITICAL TERRITORIAL REPRESENTATION

- We apply it to four large italian metropolitan cities (Rome, Turin, Milan and Palermo).
- We study what are the main socio-demographic correlates of areas consistently over/under-represented

What is political territorial representation?



The "rectangle" city (note the

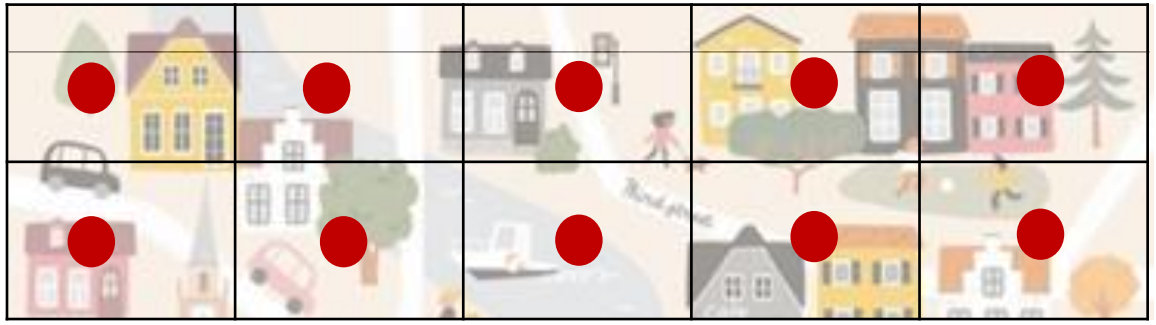
-each small rectangle is a neighborhood with 100 citizens

- The city council has 10 representatives

We can link representatives to each neighborhood using vote records

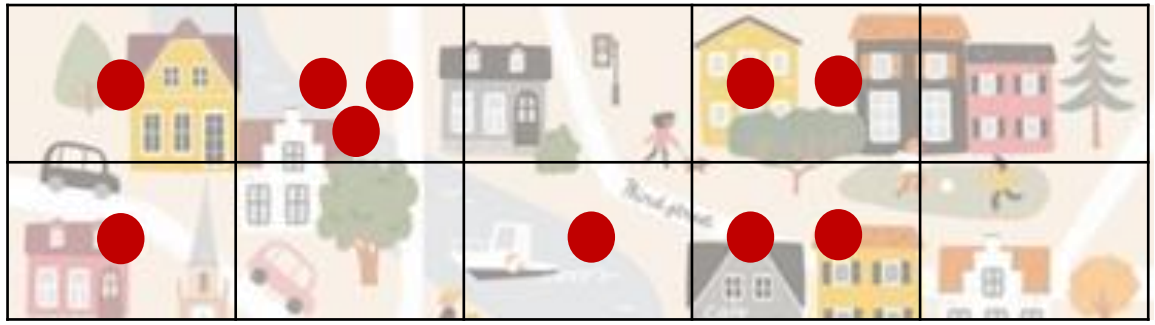
We show the example with a city but the same reasoning can be applied to a region or a country

What is political territorial representation?



If each neighborhood has 1 representative = ***equal territorial representation***

(all neighborhoods have same representation)



Some neighborhoods have more representatives, someshave not = ***unequal representation***



Only one neighborhood has representatives ***= maximum unequal representation***

What is political territorial representation?

DEFINITION:
The degree to which a territory is politically represented

Why it is relevant? (especially for local policies)

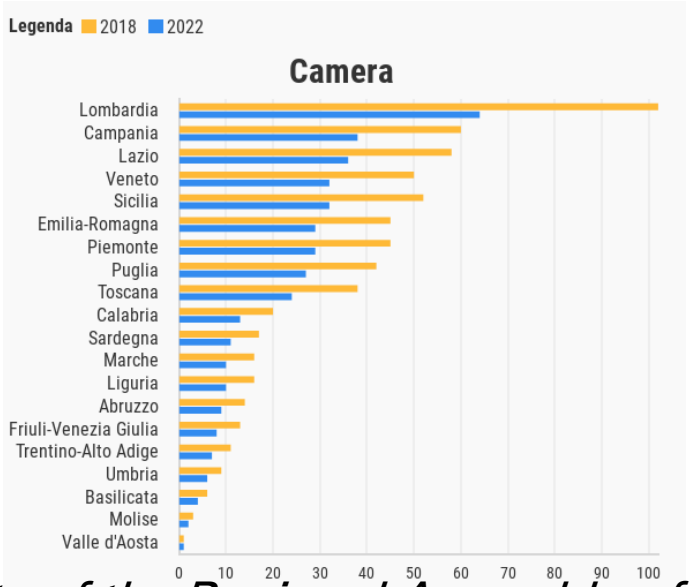
… Likely exacerbation of existing socio-economic inequalities, under the assumption of pork-barreling, i.e., that politicians are more likely to prioritize the needs of the areas that elected them…. *(see Cerqua et al. 2025, Signature Spending Politics)*

Low representation -> low political power -> less resources -> and so on..

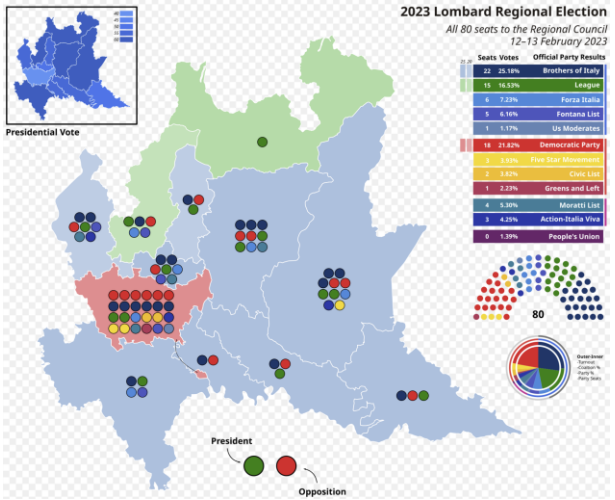
Political territorial representation in electoral laws

This is why many electoral laws include provisions **guaranteeing each territory (e.g., regions, provinces) a minimum level of representation, typically in proportion to its population.**

Parliament Seats by region in italy



Seats of the Regional Assembly of Lombardia



Motivation

What happens when an electoral law does not include any formal provisions to ensure geographical representation?

(i.e. no electoral "district" or similar)

Example of contexts:

→ Metropolitan cities (in Italy, our case study)

→ Countries (Netherlands, Israel and other)

→ Other cities around the world

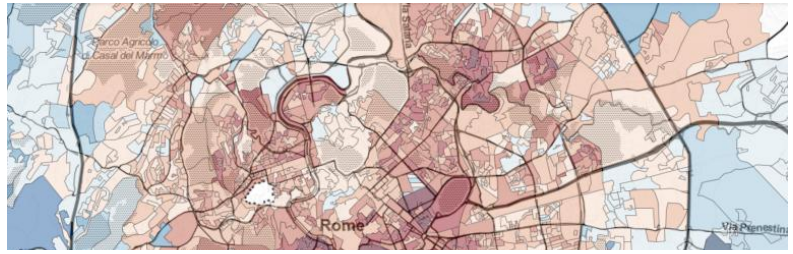


Is there an index to measure territorial political representation?

- *Turnout* → measures political participation
- *Government/opposition vote share* → measures government representation
- *Candidate "dominance" (Ames 1995)* → measures candidate representation

<u>These metrics typically evaluate representation from the perspective of political agents.</u>

Other alternatives: place of residence or origin of the politicians



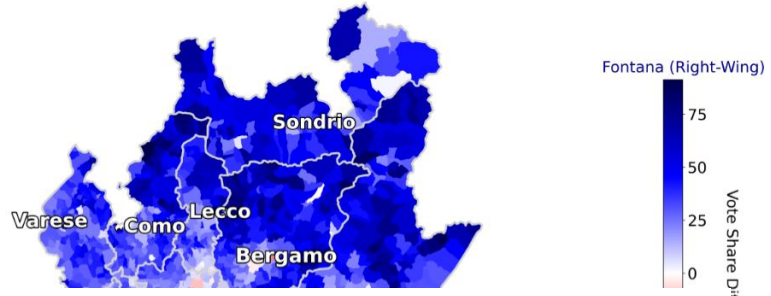
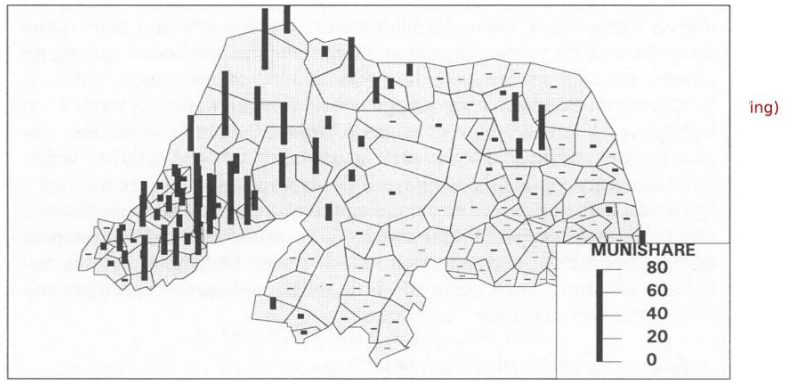


Figure 1. A Concentrated-Dominant Vote Distribution: Municipal Vote Share of Laire Rosado Maia, PMDB-RN



Is there an index to measure territorial political representation?

Our proposal (1):

Neighborhood Representation Index (NRI), which assesses whether a neighborhood's representation—**defined as the ratio of preference votes received by city-council members to the number of electors**—exceeds or falls below the citywide average.

Formally:

$$\pi_{i,k,t} = \frac{Preferences_{i,k,t}}{Electors_{i,k,t}}$$

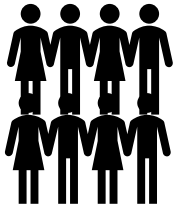
Relative to the city-wide average

$$NRI_{i,k,t} = \pi_{i,k,t} - \bar{\pi}_{.,k,t}$$

Is there an index to measure territorial political representation?

Example:

SCENARIO:
CANDIDATE A -> ELECTED
CANDIDATE B -> NOT ELECTED

	ELECTORS	VOTE FOR CANDIDATE A	VOTE FOR CANDIDATE B	TURNOUT	PREFERENCES FOR ELECTED	NRI INDEX = VOTE FOR CANDIDATE A / ELECTORS
Neighborhood 1 	4	3	0	75%	1	0,75
Neighborhood 2 	4	2	2	100%	1	0,5
Neighborhood 3 	8	4	3	87%	4	0,5

Is there an index to measure territorial political representation?

Our proposal (2):

Equitable Territorial Representation Index (ETRI), **a concise measure of how uniformly (or unevenly) electoral support for elected politicians is distributed across the city** (inspired by the Gallagher Index). PLUS a spatial variant (to detect spatial clusters).

Formally:

$$ETRI_{k,t} = \sqrt{\frac{1}{2}\sum_{i=1}^{N} w_{i,k,t}\, NRI_{i,k,t}{}^{2}} = \sqrt{\frac{1}{2}\sum_{i=1}^{N} w_{i,k,t}\,(\pi_{i,k,t} - \bar{\pi}_{\cdot,k,t})^{2}} \qquad (3)$$

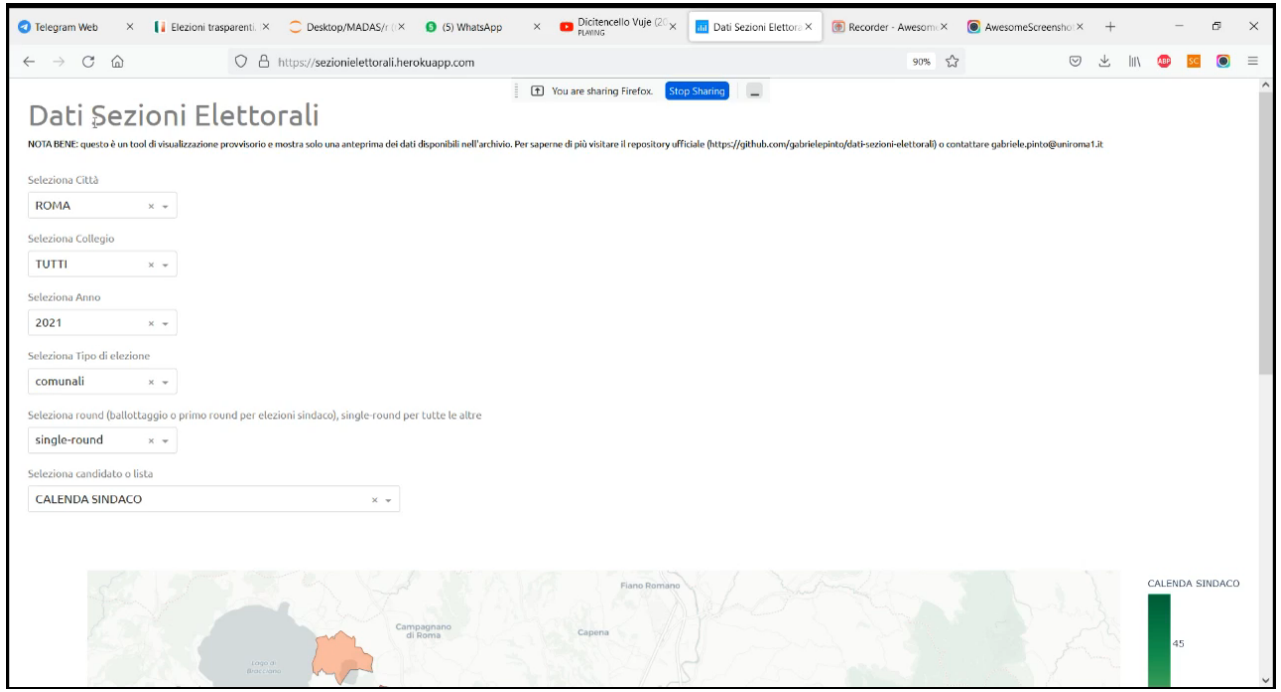
where the weighting by $w_{i,k,t} = \frac{Electors_{i,k,t}}{\sum_{j=1}^{N} Electors_{j,k,t}}$ takes into account that neighborhoods might differ in number of electors and, therefore, ensures that neighborhoods with larger electorates contribute more to the overall measure.

Data

→ **“Sezioni Elettorali Italiane” (SEI)** dataset (Pinto, 2023), which contains geocoded, precinct-level electoral results for some of the largest Italian municipalities.

→ Typically, precincts encompass between 500 and 1,200 voters (~1km sq.), representing the smallest unit at which election data can be obtained.

→ The SEI dataset integrates census data from the Italian Institute of Statistics (Istat) through spatial interpolation, allowing for the analysis of demographic and socio-economic determinants of spatial voting patterns.



Context

→ **Rome**, **Milan**, **Turin**, and **Palermo,** municipal **elections of 2016 and 2021**

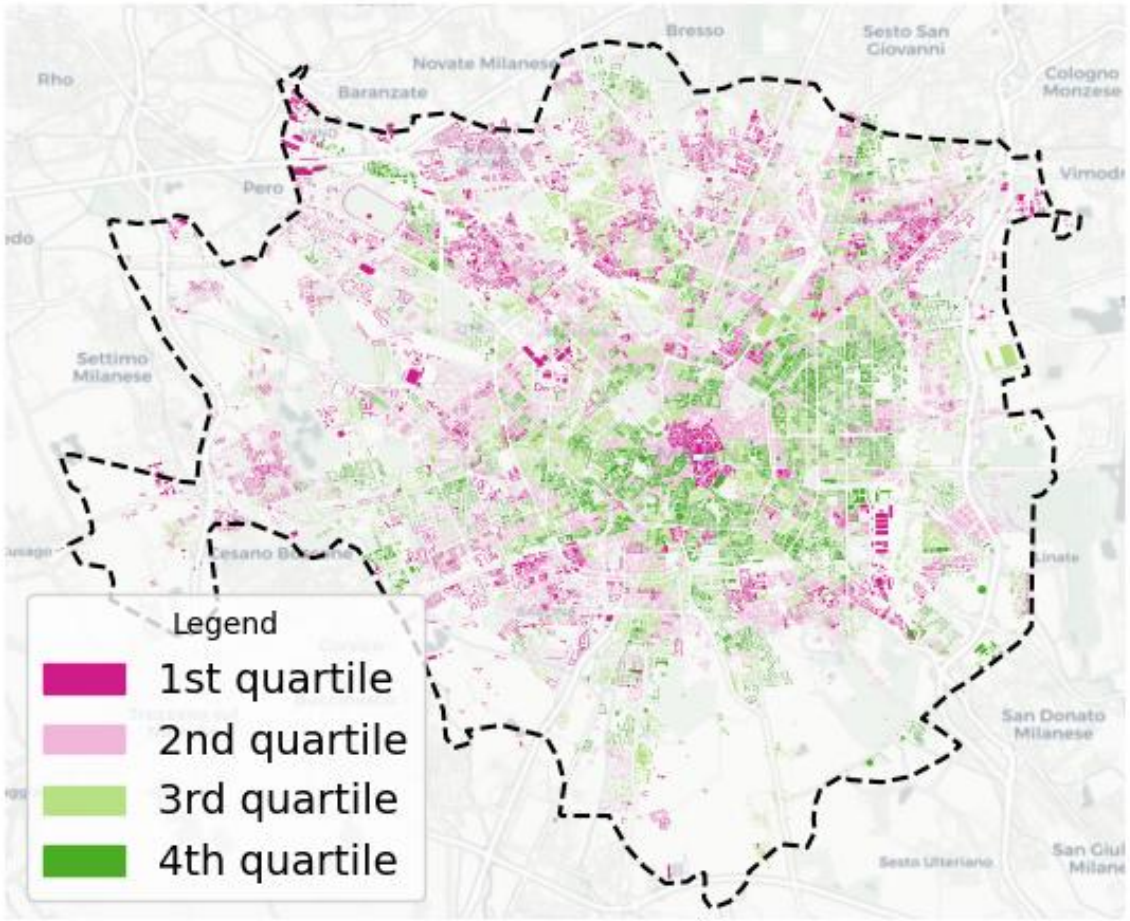
- Members of the municipality assembly (*consiglio comunale)*
- Preference votes received by **each <u>elected</u> member** in each precinct



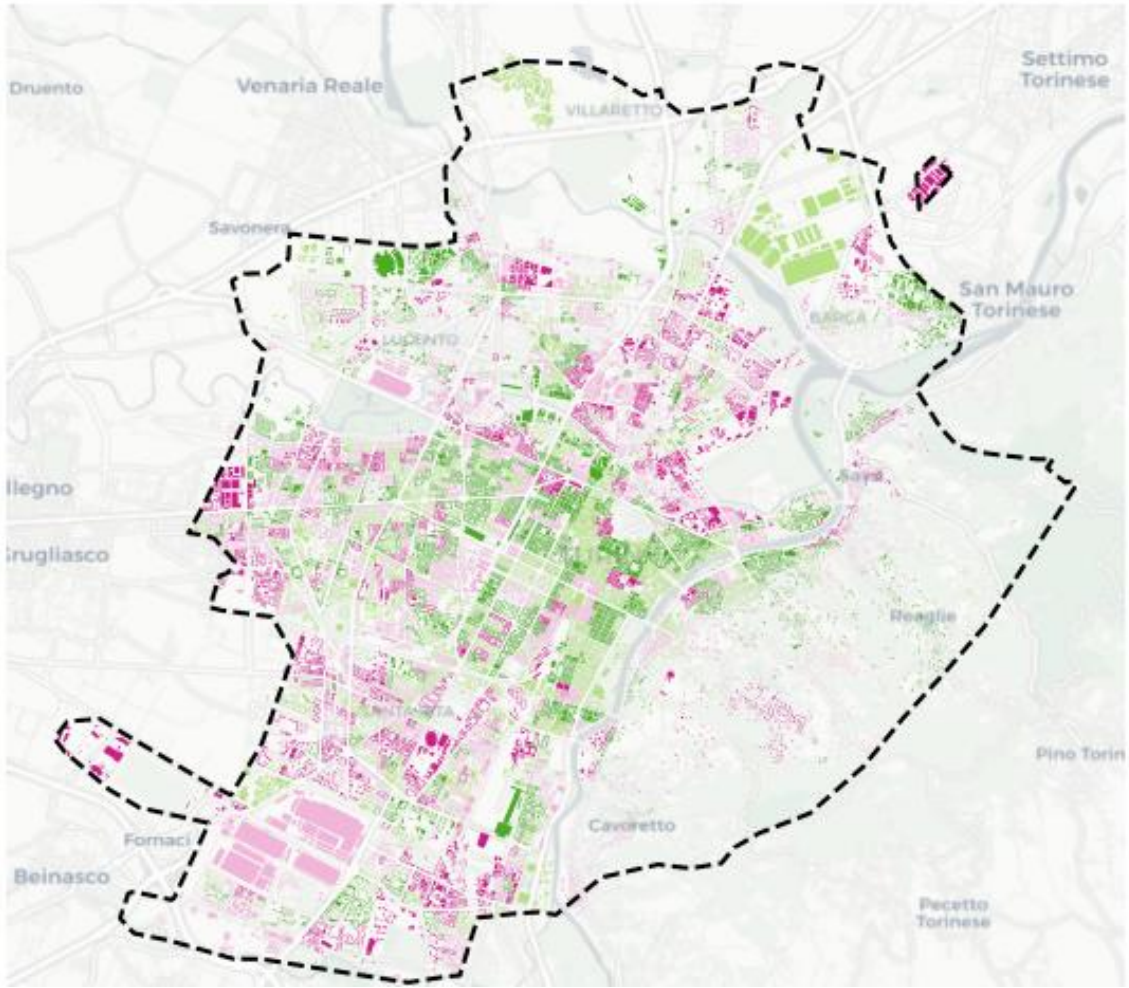


Neighborhood Representation Index

Milano 2016

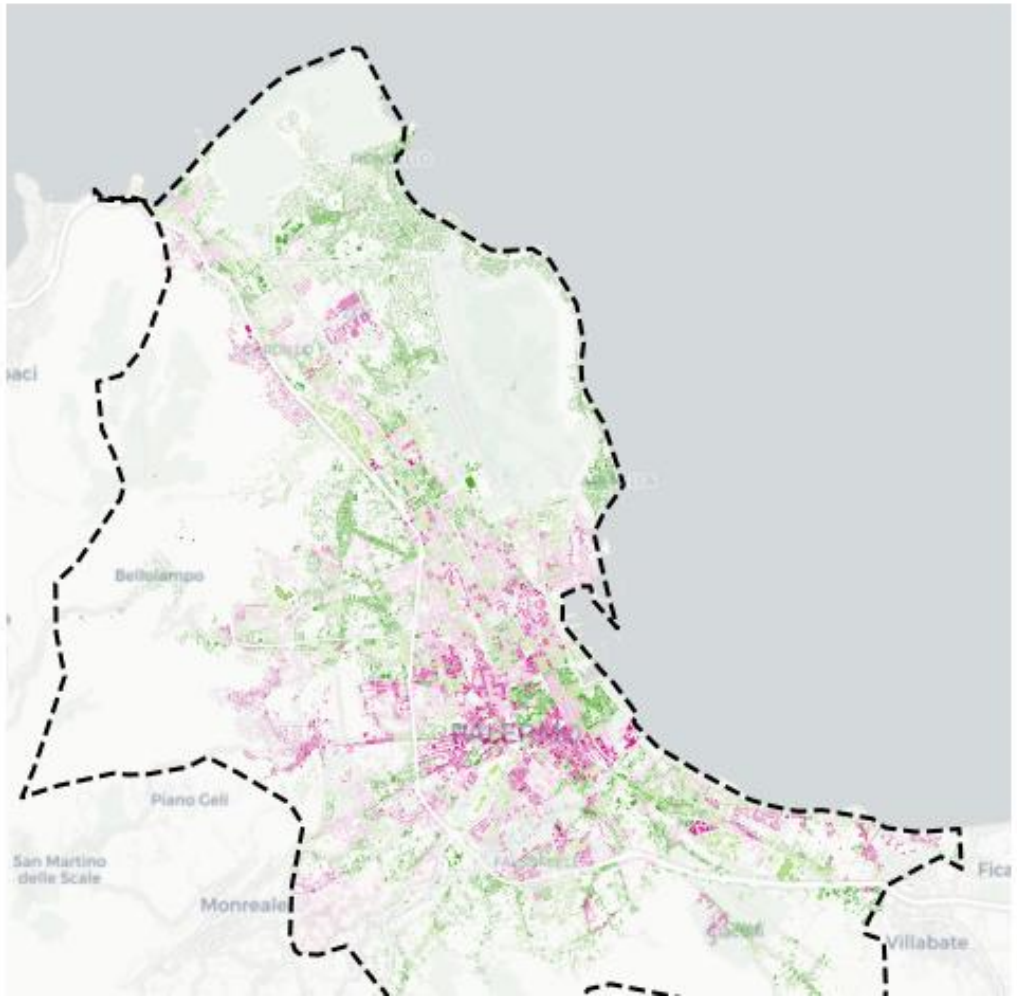


Torino 2016

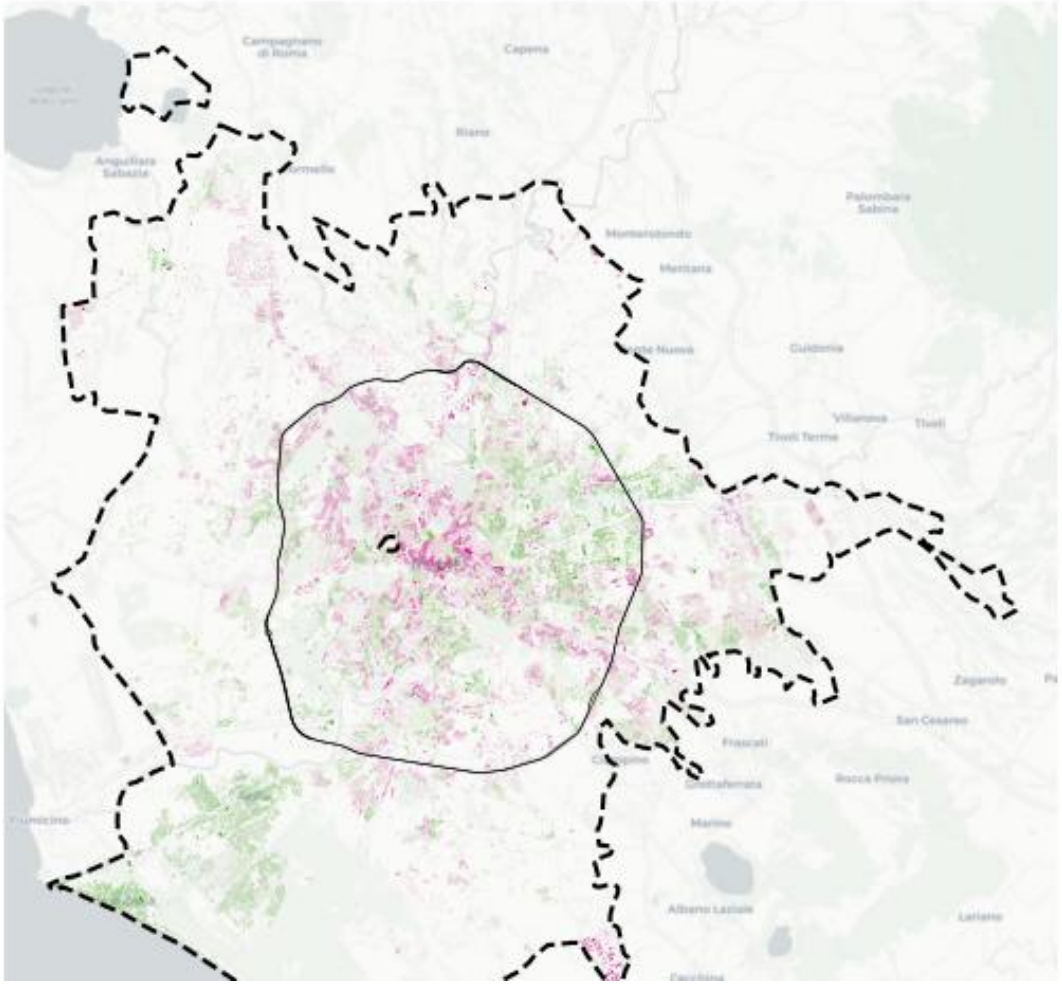


Neighborhood Representation Index

Palermo 2016

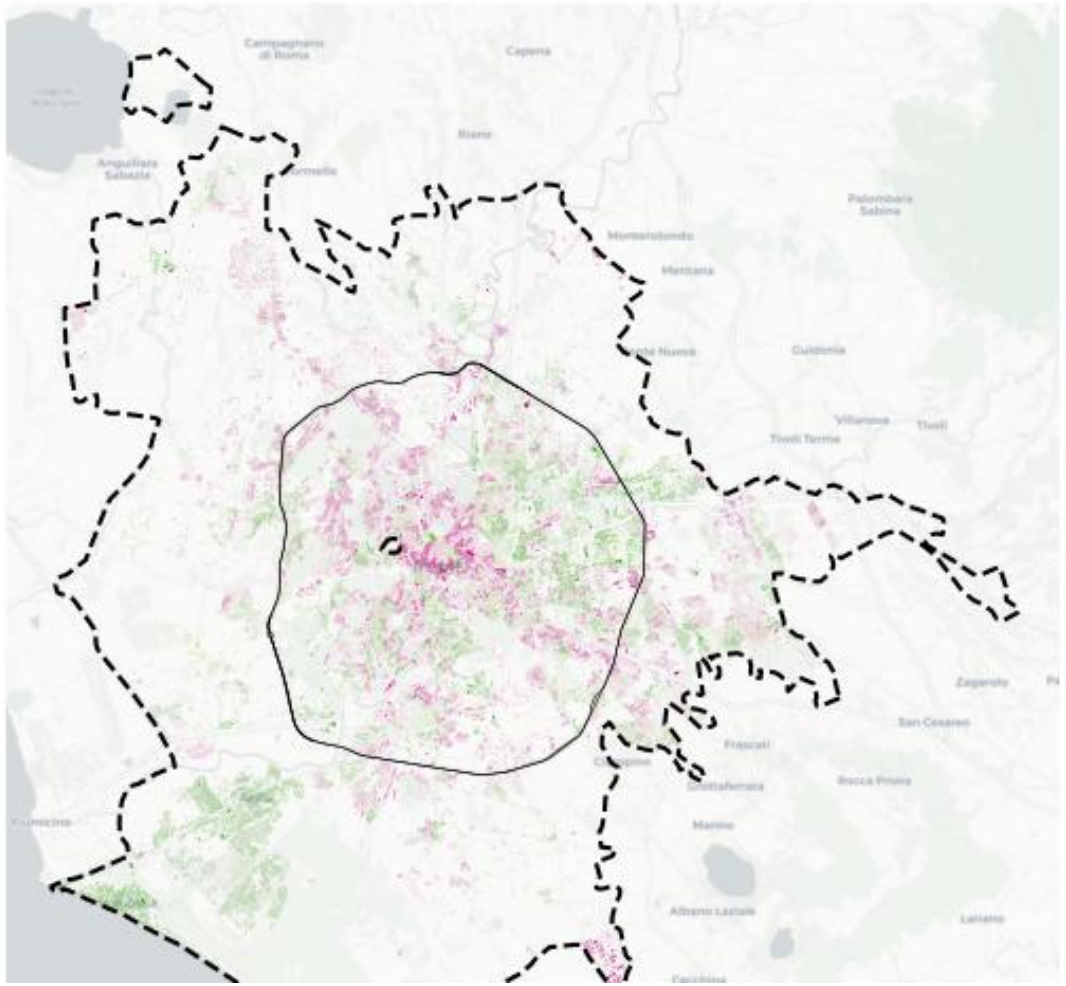


Roma 2016

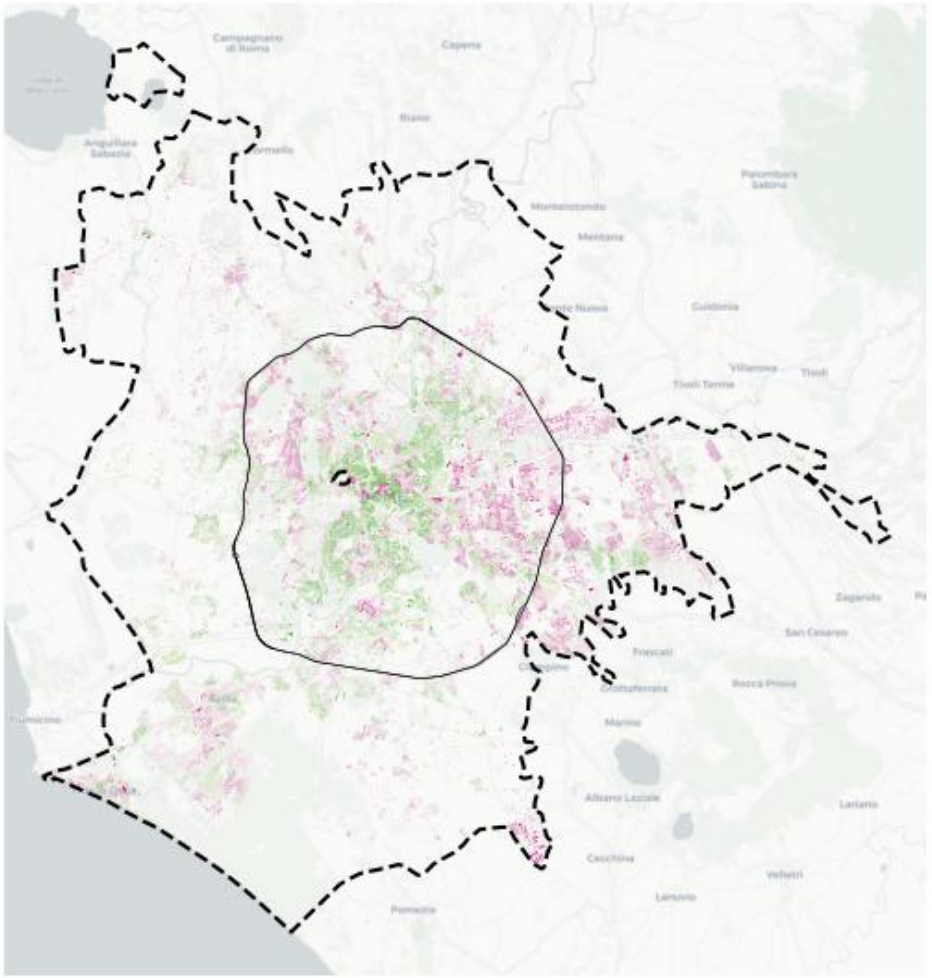


Neighborhood Representation Index

Roma 2016



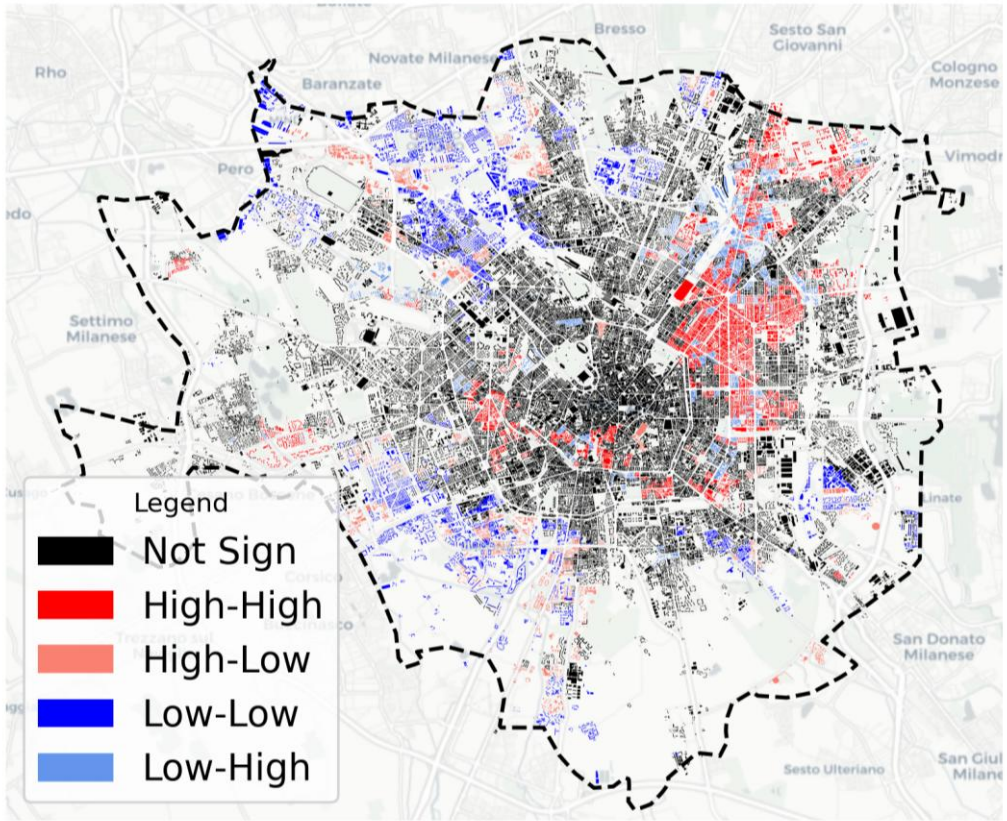
Roma 2021



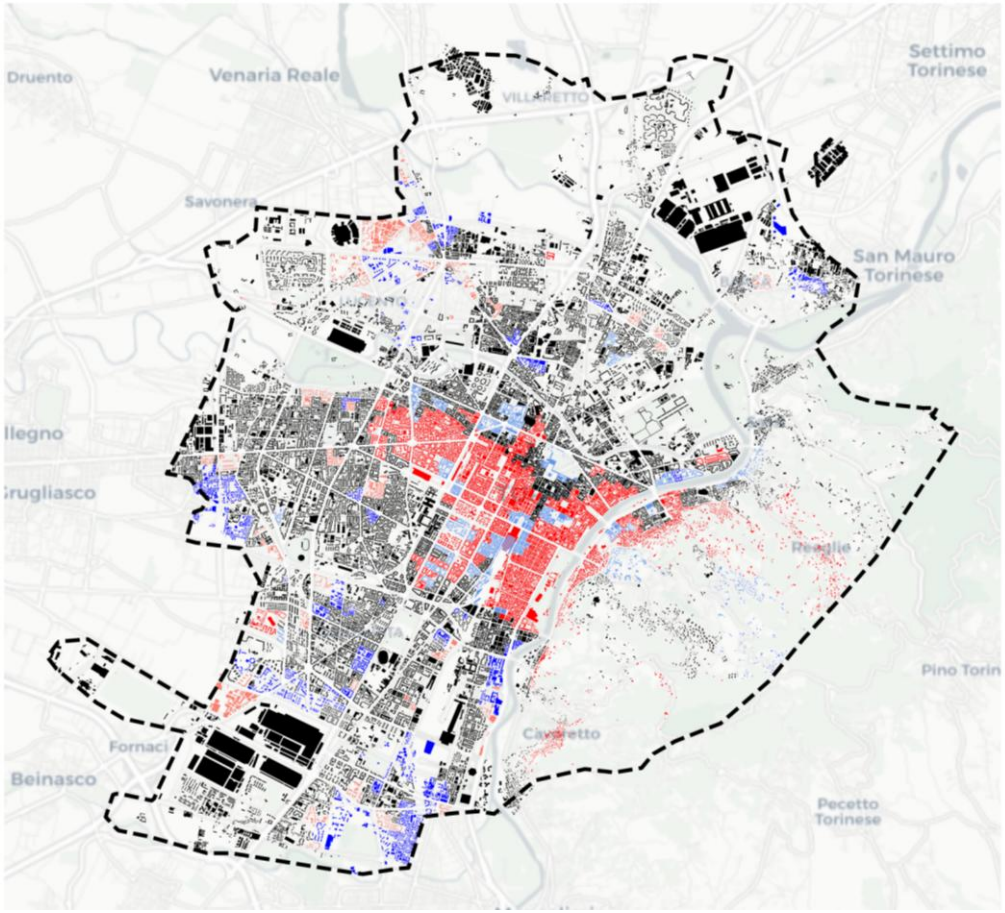
Where are the clusters?

Bivariate local moran's-I

Milano



Torino

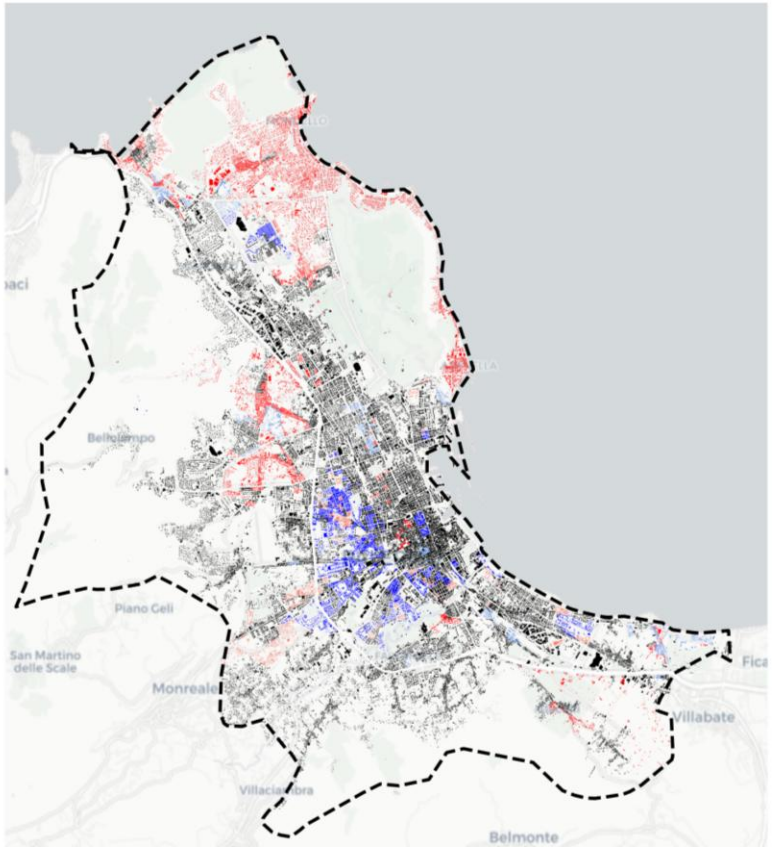


We can identify some areas consistently **under-represented (mainly peripherical areas)** **or over represented.**

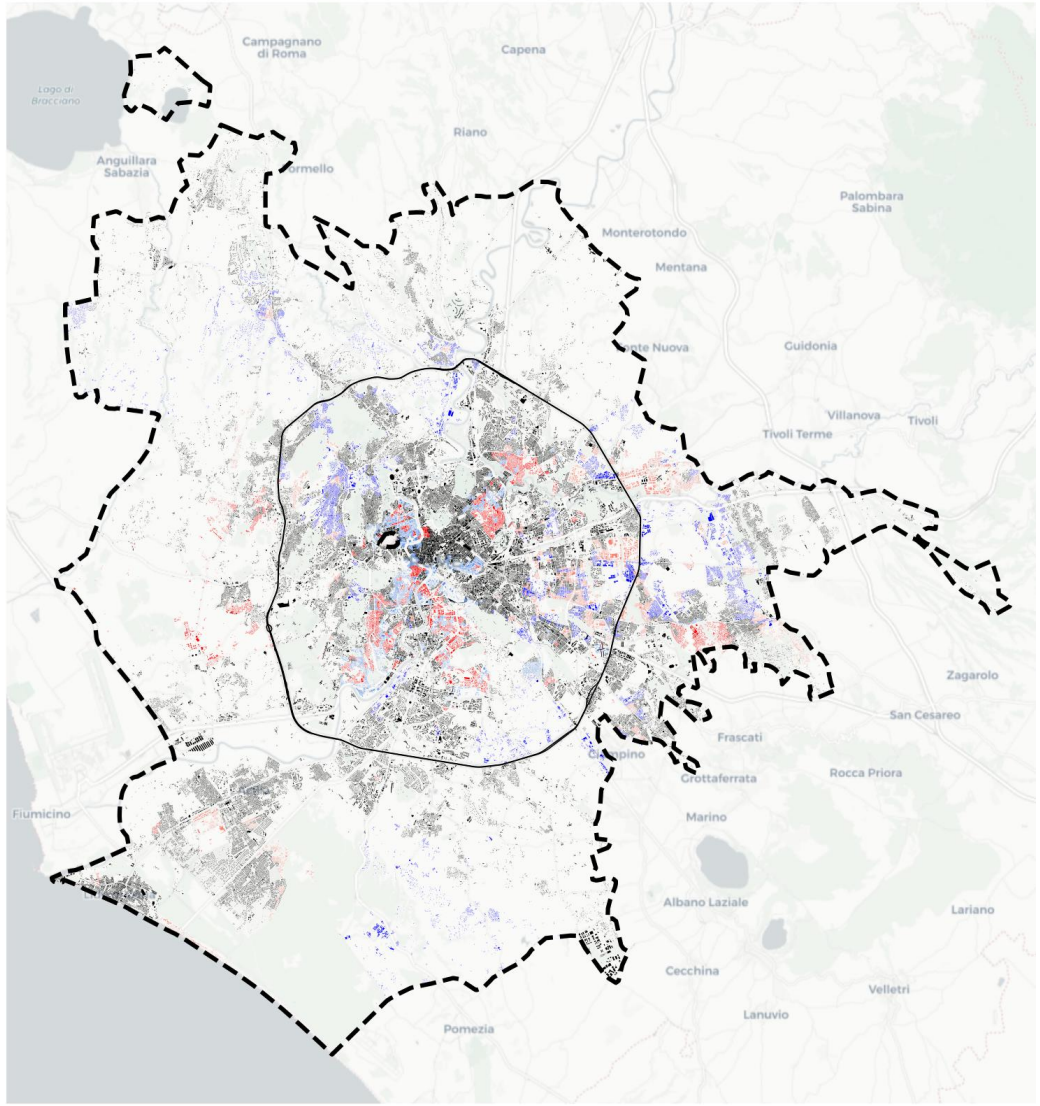
Where are the clusters?

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Palermo



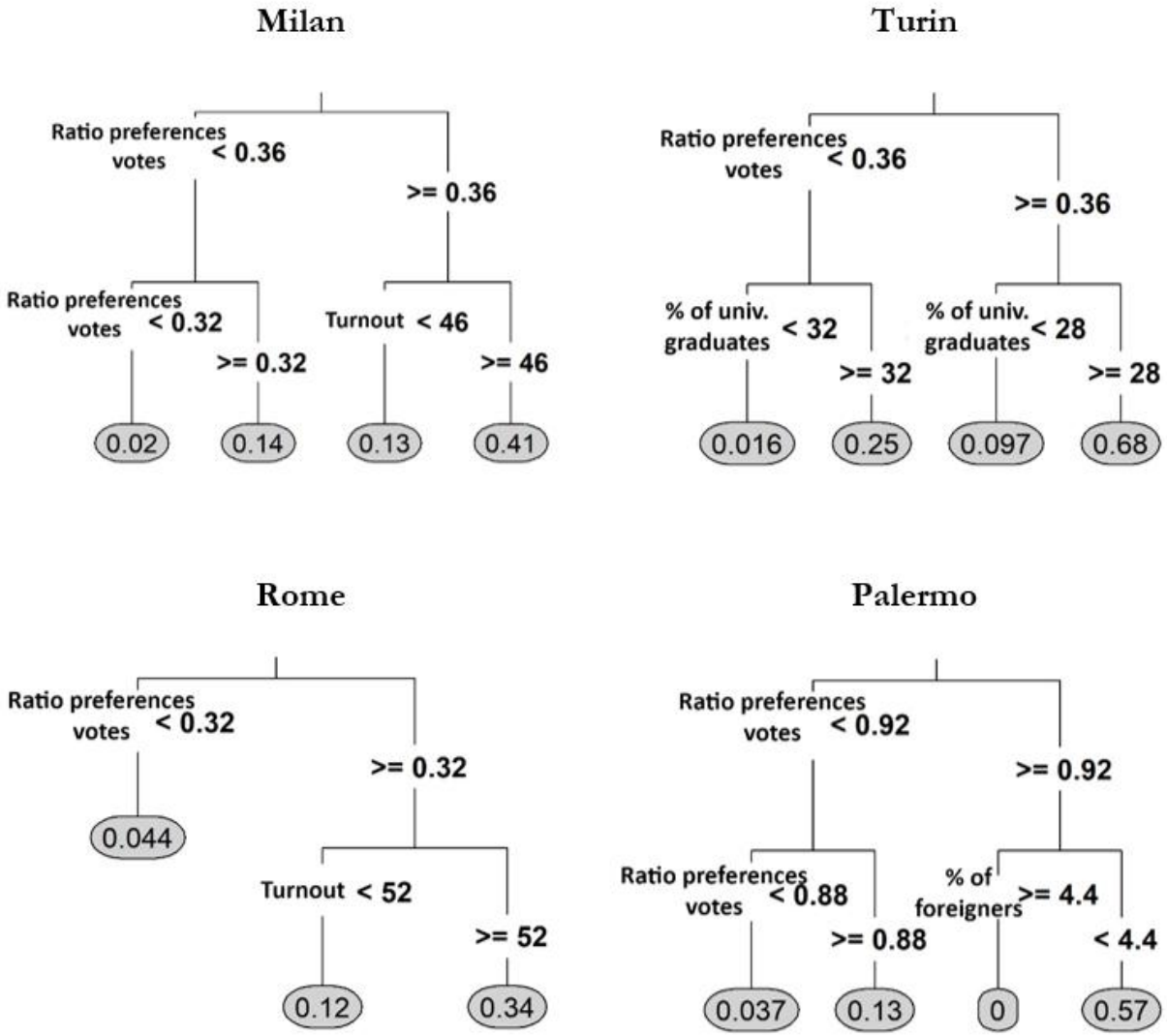
Roma



We can identify some areas consistently **under-represented (mainly peripherical areas)** **or over represented.**

What are the determinants of belonging to the high-high clustering (areas consistently over-represented)?

- → To analyze the clusters identified by the Bivariate Local Moran's Index, we employ a regression tree—a non-parametric method modeling the relationship between predictors and the probability that an electoral precinct falls into the High-High cluster for territorial political representation.
- → Variables:
  - → Turnout
  - → % Foreigners
  - → #Preferences / # Votes (Ratio Preference votes)
  - → Population
  - → Elderly
  - → University Degree
  - → Employment rate
- → **<u>Results are consistent with the notion that less politically represented area are more deprived</u>**



Conclusions

- **NOW:**
  - **A new tool to measure political territorial representation**
  - **Widespread Imbalances:** Every metropolitan area studied shows persistent and spatially clustered inequalities in territorial representation.
  - **Disadvantaged Areas Underrepresented:** Neighborhoods with weaker socio-economic and political profiles consistently have less voice in city councils.
- **NEXT**:
  - **Determinants :**
    - Supply: political competition
    - Demand: volatility, preferential voting dynamics, clientelism
  - **Effects:**
    - Self-reinforcing cycles? (less representation ->less resources -> political disengagement..)

THANKS

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