

URBAN SPATIAL DATA ANALYSIS: Towards Safe, Inclusive, and Sustainable Spaces



Cláudia Rodrigues

cbarodrigues@dei.uc.pt

Supervisor(s): Carlos Bento¹, Marco Veloso^{1,2}

1. Center for Informatics and Systems of the University of Coimbra (CISUC)
2. Polytechnic of Coimbra, Escola Superior de Tecnologia e Gestão de Oliveira do Hospital (ESTGOH)

**IDEAS
TO IMPACT**

MIT Portugal
2024 Annual Conference

Urban Spaces



Urbanization is one of the most significant socioeconomic trends shaping modern society. The rapid growth of cities and the increasing demands on urban spaces present considerable challenges for urban planners, who must create environments that meet the needs of their populations.

A complete understanding of urban dynamics, including landscapes, functional zoning, socioeconomic divisions, and urban mobility, plays a pivotal role in shaping perceptions of different areas and understanding their underlying dynamics. By analyzing these factors, potentially isolated zones can be identified, and planners can develop sustainable urban designs that ensure all zones are safe and inclusive for residents.

Objectives

This project aims to identify factors that impact the development of sustainable environments, with a particular focus on urban dynamics, safety, and inclusiveness, by analyzing spatial data.

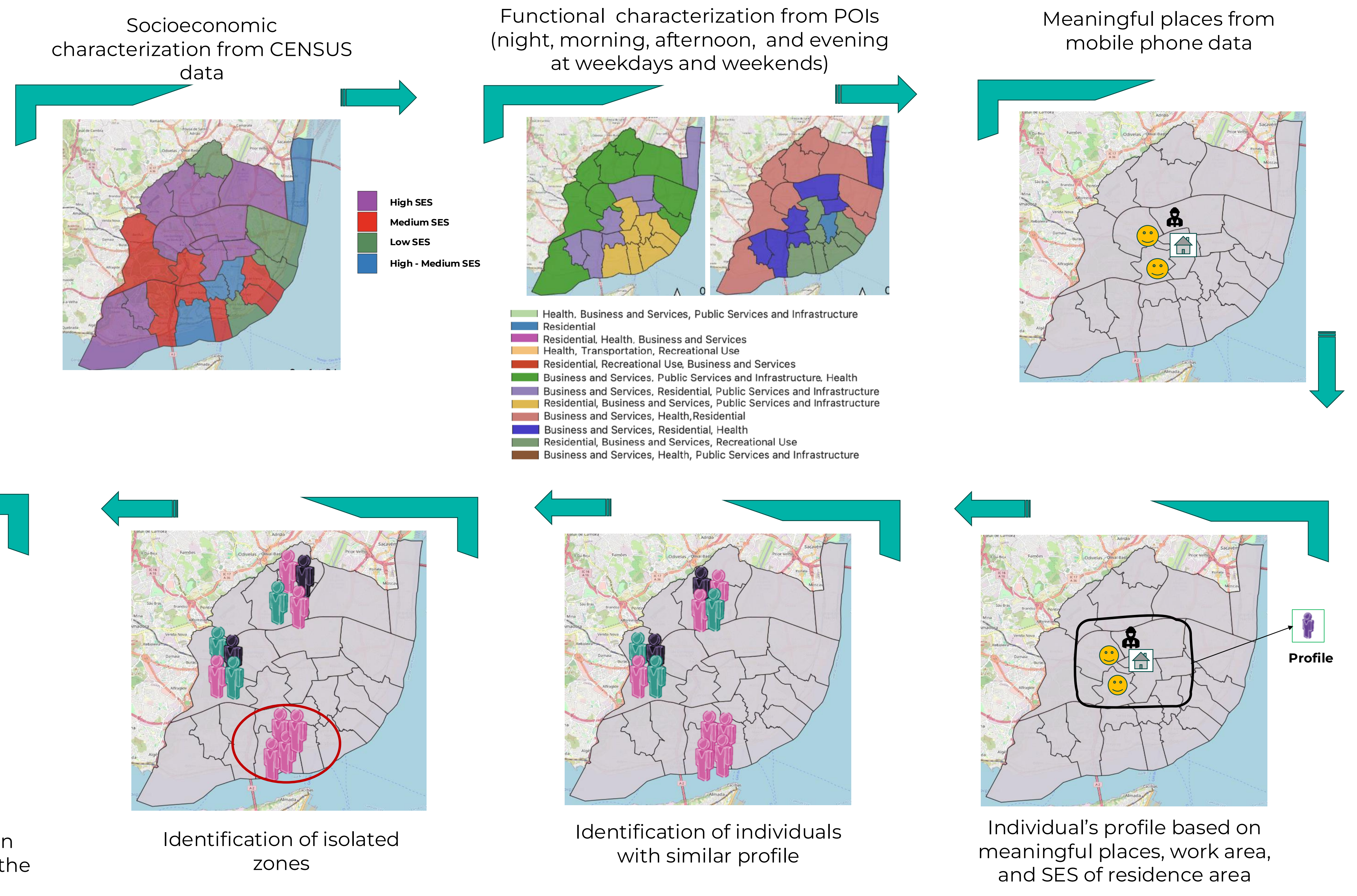
Mobile phone data, represents most of the population groups and plays a crucial role in inferring human mobility. By integrating data containing socioeconomic indicators and area semantics with insights from mobile phone data, indicating who visits specific locations and when, its possible to have a clearer perspective on how people move and interact within urban spaces. This approach helps to uncover patterns of connectivity and identify areas that may lack inclusiveness and safety.



Methodology

MAIN STEPS

- Zones are characterized in terms of socioeconomic status (SES) and functionality. The functionality varies depending on the POIs that are opened in different slots of the day
- The home, work, and other frequently visited locations of each individual are identified
- Based on the locations that are frequently visited and the characterization of the zones where meaningful places are located, the profile of the individual is built
- Individuals are grouped based on similar profiles
- Movement flows are identified at different hours
- Inclusiveness and safety are verified



Results and Main Contributions

Modeling human mobility and homophily (how people move and interact) to understand individual patterns and movement flows in a city brings useful insights for a variety of applications, including urban planning and security. The population density and movements can reflect the dynamic development of a city, including its growth, land use, urban economic development, safety, and inclusiveness.

The identification of vulnerable areas in public spaces can be used to promote safety and inclusiveness actions. This information is valuable for decision-making, to prevent crime, avoid potentially isolated communities, and generally, improve the quality of living in urban areas. Additionally, the recognition of citizens' mobility patterns can be used to improve public transport and, therefore, reduce traffic congestion and environmental pollution, which are consequences of accelerated urbanization.

Funded by:



under the Doctoral Grant PRT/BD/154266/2022 | Sustainable Cities