Exploration and Definition of Urban Neighborhood Units Using Big Data: Spatial Behavior Pattern Analysis

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Abstract:

Neighborhood units refer to the spatial range within which people conduct their daily lives. As they represent the most suitable spatial units for recognizing daily lifestyle patterns and establishing functional transportation systems, identifying differences in neighborhood unit segmentation patterns based on urban characteristics and timeframes is essential for creating and providing optimized transportation services for each space. In this study, we applied a Community Detection method to mobile travel data processed from cellular base station data to derive multi-level neighborhood units for Seoul, South Korea, including the concept of a 15-minute city. Seoul's travel movement data is derived from mobile signals aggregated at base stations, showing population movements between origin and destination points. Additionally, the network-based community detection approach has advantages over traditional functional region analysis methods, as it does not rely on distinguishing between central and peripheral areas or on predefined criteria to establish functional regions. Instead, it determines regional integrations and the final number of functional zones within the model itself, eliminating arbitrariness in the analysis process.

Keywords:

Neighborhood, Community Detection, Mobile Travel Data, Spatial Behavior Patterns.