Chicago Neighborhood Project

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ABSTRACT:

The Chicago Neighborhood Project (2022) uses spatial and demographic survey response data from across the city of Chicago to identify both shared and diverging patterns across neighborhood structures and how these regional understandings relate to socio-demographic variables. Despite the many opportunities presented by public perception-based spatial data for analysis of urban compositions, the utilization of a crowd-sourced dataset for neighborhood classification is relatively novel. There exist few methodological precedents for how to approach the unique challenges posed by large-scale spatial survey data of this nature. This work details the methodological approaches undertaken in the Chicago Neighborhood Project and how these approaches have led to the generation of a broader understanding of residents' cognition of Chicago neighborhoods.

Initially we generated novel approaches to both clean the data and assess its representative validity. To clean the data, a flagging approach was created that identified outliers in polygon size, errors in polygonal vertex overlap, polygons that fell outside of the Chicago city boundary, and most significantly, polygonal outliers in compactness. Compactness score analysis applied modern gerrymandering scoring metrics to neighborhood boundaries, creating a new approach to data cleaning. This cleaning approach specifically utilizes the Polsby Popper score, the Convex Hull score, and the Length-Width score, in conjunction with the identification of polygons with non-compact shapes, which were treated as potentially unrepresentative of typical neighborhood delineations. This approach has not been used extensively outside of gerrymandering applications, thus its incorporation into neighborhood research is particularly exciting for the field.

Representative validity too posed a challenge as there existed significant heterogeneity in spatial response across demographic groups. For example, Black and Hispanic populations were initially underrepresented in our sample, corresponding with patterns of racial segregation in large swaths of the South and West sides of the city. We modeled this representativeness problem through mapping the disparity between true proportions and sampled proportions across Chicago, thus allowing the research team to better focus data collection effort towards underrepresented groups and assess the overall sampling bias. A rates-based cluster analysis was also conducted to further examine specific areas of geographic under and overrepresentation.

Future work in this analysis examines questions of the topological composition of neighborhoods in Chicago, such as shared and nested spaces, versus contested spaces. This work additionally highlights the important role of spatial proximity, both to boundaries and other respondents. Further, this data illustrates the significant differences in levels of social cohesion, demonstrated through varying levels of agreement on the size of neighborhoods, but also their specific locations and respondents' self-assessment of neighborhood cohesion through questions adapted from the Project on Human Development in Chicago Neighborhoods (PHDCN; Earls et al., 1995)

We expect that the findings of this research will reshape our understanding of how Chicagoans perceive their city and how researchers approach questions of defining urban neighborhoods. Further, we hope the methods used in this research will pave the way for continued methodological exploration regarding the analysis of neighborhood-based public survey data.

KEYWORDS: *Chicago neighborhoods, urban GIS, crowd-sourced data, spatial cluster analysis, compactness scores*

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