

Street Network Models and Indicators for Every Urban Area in the World

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Abstract

Street networks shape the urban form. They structure the circulation patterns of people and goods and underlie urban accessibility. Differences in street network geometry and topology — collectively, "form" — worldwide reflect different cultures, political systems, urbanization eras, technology, design paradigms, climates, and terrain. These networks in turn organize physical urban space and influence the ability to traverse it via different modes of transportation. This study models and analyzes the street networks of every urban area in the world, using boundaries derived from the Global Human Settlement Layer. Street network data are acquired and modeled from OpenStreetMap with the open-source OSMnx software. In total, this study models over 160 million OpenStreetMap street network nodes and over 320 million edges across 8,914 urban areas in 178 countries, and attaches elevation and grade data. This talk presents the reproducible computational workflow, introduces two new open data repositories of ready-to-use global street network models and calculated indicators, and discusses summary findings on street network form worldwide. First, it reports the methodological advances of this open-source workflow. Second, it demonstrates the new open data repository containing street network models for each urban area, useful for downstream studies of accessibility, resilience, and sustainability. Third, it demonstrates the new open data repository containing street network form indicators for each urban area: no such global urban street network indicator dataset has previously existed. Finally, it presents a summary descriptive analysis of urban street network form, highlighting the first such worldwide results in the literature.