TessPy – Spatial Tessellation Made Easy

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Abstract : Discretization of urban areas is a crucial aspect in many spatial analyses. The process of discretization of space into subspaces without overlaps and gaps is called tessellation. It helps understanding spatial space and provides a framework for analyzing geospatial data. Tessellation methods can be divided into two groups: regular tessellations and irregular tessellations. While regular tessellation methods, like squares-grids or hexagons-grids, are suitable for addressing pure geometry problems, they cannot take the unique characteristics of different subareas into account. However, irregular tessellation methods allow the border between the subareas to be defined more realistically based on urban features like a road network or Points of Interest (POI). Even though Python is one of the most used programming languages when it comes to spatial analysis, there is currently no library that combines different tessellation methods to enable users and researchers to compare different techniques. To close this gap, we are proposing TessPy, an open-source Python package, which combines all above-mentioned tessellation methods and makes them easily accessible to everyone. The core functions of TessPy represent the five different tessellation methods: squares, hexagons, adaptive squares, Voronoi polygons, and city blocks. By using regular methods, users can set the resolution of the tessellation which defines the finesse of the discretization and the desired number of tiles. Irregular tessellation methods allow users to define which spatial data to consider (e.g., amenity, building, office) and how fine the tessellation should be. The spatial data used is open-source and provided by OpenStreetMap. This data can be easily extracted and used for further analyses. Besides the methodology of the different techniques, the state-of-the-art, including examples and future work, will be discussed. All dependencies can be installed using conda or pip; however, the former is more recommended.

Keywords : geospatial data science, geospatial data analysis, tessellations, urban studies

Conference Title : ICSASS 2022 : International Conference on Spatial Analysis and Spatial Statistics
Conference Location : Dubai, United Arab Emirates
Conference Dates : December 20-21, 2022