"FOSS4G Europe Marne-La-Vallée 2017"

Hotspot Analysis: an experimental Python plugin to enable LISA mapping into QGIS

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Abstract

The possibility of linking maps with statistical processes represents one of the meaningful advantages characterizing the latest generation of GIS software. In the last decades, manifold statistical techniques have been adapted as well as designed to enable geographic data analysis.
Among these techniques, particularly popular - and widely adopted in many research fields - is the spatial autocorrelation analysis using LISA (Local Indicators for Spatial Association).
LISA statistics are currently implemented into different programming libraries (e.g R-spdep https://cran.r-project.org/web/packages/spdep, Python-PySAL http://pysal.github.io, etc.), into Free and Open Source spatial statistical Software (eg. GeoDA http://geodacenter.github.io) as well as into proprietary GIS software suites. Within the most famous FOSS GIS, the access to LISA mapping capabilities is currently enabled only through command line while dedicated plugins have not been formally made available yet.
We present here the Hotspot Analysis plugin, an experimental QGIS Python plugin aimed both to facilitate the access to to LISA mapping tools for users with no advanced programming skills – exploiting the user-friendly QGIS environment - as well as to contribute to the growth of the mapping capabilities of this FOSS GIS software.
The Hotspot Analysis plugin is based mainly on the Exploratory Spatial Data Analysis (ESDA) module of PySAL and PyQGIS, providing a simplified interface to run LISA tools starting from vector layers.
The stable version of plugin is available on the QGIS Python Plugins Repository (https://plugins.qgis.org/plugins/HotspotAnalysis) while the development version as well as documentation and test data are available on GitHUB (https://github.com/danioxoli/HotSpotAnalysis_Plugin).
The main plugin features, including installation requirements and computational procedures, are here described together with an example of the possible applications of the Hotspot analysis.

Keywords

ESDA, Hotspot Analysis, QGIS Plugin, Python, FOSS4G

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