PYSAL, A PYTHON LIBRARY FOR SPATIAL ANALYTICAL FUNCTIONS

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BIOGRAPHY

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ABSTRACT

This paper outlines the motivation and structure of a modular, extensible and open source library of spatial analytical functions developed in the Python language and provides an illustration of its current implementation. The library is the result of a joint effort between the PySpace collection of modules for spatial econometrics (developed at the University of Illinois) and the STARS package for space-time analysis of regional systems (developed at San Diego State University).

The library contains a number of modules that facilitate the manipulation of spatial data, such as the creation of a wide range of spatial weights from various input formats, the computation of higher order weights and the construction of spatially lagged variables. It also implements the numerical procedures needed for spatial data analysis, ranging from exploration (such as rate smoothing and outlier detection), to description of local (local Moran, local Geary, Gi) and global (Moran, Geary, QAP) spatial autocorrelation and spatial regression (maximum likelihood and method of moments estimation). The rationale for combining this functionality into a library is to separate the core data

structures and computational algorithms from the user interface. This will allow the library to be used both as the engine behind a user-friendly front end, such as STARS, or to support analytical tools developed for the interface associated with ESRI's ArcGIS 9 spatial statistics toolbox.

The use of the library is illustrated with examples of smoothed maps and cluster detection in prostate cancer incidence.

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