Cloud mapping platforms, such as Google Maps, CartoDB, MapZen, and the like have become powerful alternatives to traditional desktop-based mapping and GIS applications. However, unlike their desktop counterparts, web mapping platforms typically do not contain any but the most basic spatial analytical functionality. In this paper, we outline the architecture, discuss the implementation and illustrate the functionality of GeoDa-Web, a web-based collection of geospatial analytical tools that leverages the code base from the widely used GeoDa desktop software for spatial data exploration [2] and the PySAL Python library of spatial analytical functions [3].

GeoDa-Web runs as a thin client web application in a browser-based user interface. This can be equally accessed through a traditional desktop as well as through a tablet or smartphone. GeoDa-Web is envisaged as a cloud-to-cloud solution that applies the latest web technologies (such as HTML5 Canvas, Local Storage, etc.) to integrate various cloud-based software services and application programming interfaces (API) and thereby gain access to data, analytical functions, mapping and social media. More specifically, the architecture of GeoDa-Web integrates four different types of API pertaining respectively to data access, spatial analysis, mapping and the publication of results. A number of Open Data (e.g., Google Places, Socrata) and Cloud Storage (e.g., Dropbox, OneDrive) API are applied to obtain data from the web, in addition to (or in combination with) data from local storage on the user’s desktop. Spatial analysis functionality is accessed from a web service implementation of the PySAL library (accessed through a RESTful API) as well as GeoDa Cloud API. Mapping and database services are integrated through cloud mapping API, including Google Maps, CartoDB, MapBox and MapZen. In addition, results can be published and shared by means of social network API, such as tumblr, Facebook and Twitter.

The current prototype includes functionality for geovisualization (choropleth mapping, kernel density mapping), multivariate EDA (histogram, scatterplot, scatterplot matrix, parallel coordinate plot, bubble plot and chord diagram), which integrates D3 toolkits with GeoDa-like visualization ported to javascript (including linked views for dynamic selection). In addition, spatial analysis leverages the PySAL and GeoDa code for global and local spatial autocorrelation analysis for both areal units as well as points on networks. Finally, the spatial regression functionality implements the complete range of modern spatial econometric models [1].

References

