

GeoFIS: an R-based open source software for analyzing and zoning spatial data

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Abstract

There is an emerging need to integrate spatial data into easy to use decision support tools. R provides many packages for analysing and modelling spatial data that are going to be useful for decision support in various fields, such as Geography, Environment and Digital Agriculture.

The GeoFIS software (<https://mulcyber.toulouse.inra.fr/projects/geofis/>) provides a simple scalable framework to view and analyze spatial data. The user-friendly interface is designed to be supplemented easily by the addition of R-functions. It imports and filters georeferenced data or GIS layers, to analyze their spatial structure and to represent them with zoning algorithms (based on Euclidean or fuzzy distances allowing to include expert knowledge, see Pedroso et al, 2010). A simplified representation using homogeneous zones helps users in their decision processes.

The GeoFIS interface is written in Java and uses the open source GeoTools library to display data layers. Geostatistical analyses are implemented through calls to R packages (sp, gstat, rgeos). The calling protocol is based on R-serve (<http://www.rforge.net/Rserve/>) and the encapsulation of S4 R objects into Java classes. Zoning algorithms include some C++ calls to accommodate large data sets. GeoFIS is used by students, engineers and researchers with little or no knowledge of R necessary. An R commander like interface allowing GeoFIS calls from inside R is under study.

Keywords: Georeferenced data, Visualization, Decision support, Expert knowledge, Uncertainty, Fuzzy Distance, Segmentation, Free software, R-serve, Simple interface.