aRT: R-TerraLib API

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Statistical spatial data analysis and Geographical Information Systems (GIS) can act together in order to understand and model spatially distributed data. Geoprocessing operations can equip statistical models with relevant information which on their hand can be used to better understand main features of usually noisy and multidimensional data. Therefore integration between GIS and statistical software can be highly beneficial for both sides.

There are some pieces of work in this direction within the scope of the R project as part of the R-Spatial Task View. We present here the implementation of an R package named aRT to access a GIS library called TerraLib. TerraLib is a set of C++ classes that offers functions and data structures for building customized geographical applications. TerraLib is an open source and free software, and its main objective is to provide a powerful environment for GIS development in a new generation of GIS, once it incorporates space-time support to conventional Database Management Systems (DBMS), for instance MySQL and PostgreSQL.

The package encapsulates C++ classes into S4, therefore the user can manipulate TerraLib objects directly in memory using the implemented wrappers. aRT can manipulate spatial data using the data structures of the sp package, reading and writing *Spatial* data in the database.

Some functionalities already implemented in the package are:

- spatial predicates, such as *touches*, *within*, *contains*, *crosses* and *overlaps*;
- polygons operations, as *union*, *intersection*, *difference* and *simplification*;
- manipulation of temporal tables, and temporal slicing, given a time interval.

aRT is available as source code and also a cross-compiled Windows binary, at `http://www.est.ufpr.br/aRT`.