Top Spatial R packages in 2025 : : **CHEATSHEET**

Core Packages:

- **sf**: main R package for vectorial data
- **terra** main R package for common raster and vectorial data
- **stars**: work with spatiotemporal arrays

Spatial Statistics:

- **spatstat**: point patterns, model-fitting, simulation, tests
- **gstat**: main package for geostatistics
- **geoR**: a good alternative for geostatistics
- **spdep**: package for spatial dependence
- **sfdep**: spatial dependence using tidy format
- **exactextract**: C++ implementation of zonal statistics

Machine Learning:

- **mlr3/mlr3spatial:** a flexible and extensible R framework which can be used for spatial machine learning
- **tidymodels:** unified framework in R for tabular data modeling using tidy principles
- **spatialsample:** spatial resampling in tidymodels
- **tensorflow & keras3:** deep learning framework. It can be used for ANN, object detection, semantic segmentation…

Mapping & Webmapping:

- **ggplot2:** main R package to create static plots/maps
- **tidyterra:** utility functions to plot {terra} objects in {ggplot2}, and other {tidyverse} functions
- **tmap:** flexible package for creating static and interactive thematic maps (extensions: {tmap.mapgl}, {tmap.cartogram}, {tmap.glyphs}, {tmap.networks})
- **mapsf:** creates statis thematic maps with simple syntax
- **leaflet:** main package for creating interactive web maps (extensions: {leafpop}, {leaflet.extras}, {leaflet.extras2}, {leafem}, {leafsync})
- **mapview:** quickly view of leaflet interactive maps
- **mapgl:** high-performance package to create interactive visualizations using Mapbox and MapLibre
- **mapdeck:** R interfacto to Mapbox and Deck.gl
- **ggspatial:** {ggplot2} extension. North arrow, scale bar…
- **maptiles:** {ggplot2} extension to easily add base maps
- **classInt:** useful package to create class intervals

Remote Sensing:

- **rgee**: interface to Google Earth Engine (unfortunately, not maintanted anymore)
- **rstac**: access/download data via SpatioTemporal Asset Catalog (STAC)
- **rsi**: easy implementation of {rstac} to access Landsat, Sentinel-1, Sentinel-2 catalogs, and others. Spectral indices
- **RSToolbox**: tools for remote sensing data analysis
- **gdalcubes**: processing of data cubes from satellite image collections

LiDAR:

- **lidR**: main package for Airborne LiDAR data, with focus on forestry applications. Focused on academic research
- **lasR**: efficient and faster implementation of {lidR} focused on production
- **lidRviewer**: uses {rgl} to visualize point clouds in R
- **lidRmetrics**: additional metrics to use with {lidR}
- **lidaRtRee**: forest analysis with ALS data
- **FORTLS**: process TLS LiDAR data, with focus on forestry applications
- **ITSMe**: individual tree structural metrics

GIS software connectors:

- **Rsagacmd:** implements SAGA-GIS functions contained within an S3 object
- **rgrass**: interface between R and GRASS
- **rpostgis**: interface between R and PostGIS
- **link2GI**: connects with several GIS software (GRASS, SAGA, GDAL, Orfeo Toolbox)
- **arcgis**: metapackage to access ArcGIS location services
- **whitebox**: access to the WhiteBox Tools software for raster analysis (geomorphometric, hydrological, LiDAR, machine learning…)

High performance:

- **arrow / geoarrow**: geoparquet format
- **duckspatial**: spatial extension to DuckDB
- **fasterRaster**: fast implementation of terra through GRASS

R as a Geographic Information System

R is a programming language with a high potential for spatial data analysis.

This Cheat Sheet summarises some of the most important and most used spatial data packages according to categories.

For a more exhaustive list of packages, visit *https://cran.r-project.org/web/views/Spatial.html*

Note that the packages *sp, rgdal, rgeos, maptools*, and *raster* were the standards until the development of terra/sf.