Chapter 06: Maps

Stan Piotrowski

October 25 2021

Contents

Setup

This chapter focuses on drawing base maps and adding metadata from other sources using `geom_polygon()`, `geom_sf()`, and `geom_raster()`.

```
## Linking to GEOS 3.8.1, GDAL 3.2.1, PROJ 7.2.1
```

```
## Registered S3 method overwritten by 'geojsonlint':
##   method         from
##   print.location dplyr
```

Notes

Below are notes for the various subsections of this chapter:

Simple features maps

Notes: * Simple features objects generally contain a `geometry` field composed of a multipolygon list defining the shape of the object. * The user doesn't need to explicity map the `geometry` aesthetic in a `geom_sf()` call-the function automatically looks for the field called `geometry` or if one doesn't exist, looks for a multipolygon field to map. * Additional annotations can be mapped onto the same grob using standard ggplot2 syntax.

Map projections

Notes: * Geodetic datum refers to the set of assumptions about the shape of the Earth, which along with the map projection, dictates the location of a coordinate on a 2-D map. Some of the most popular are the North American Datum (NAD83) and the World Geodetic System (WGS84). * Map projections refer to how an ellipsoid shape like the Earth is mapped onto a 2-D plane (e.g., a plot). * There are two types of map projections: 1) Area-preserving projections- these ensure that regions of the same area are drawn with equal area on the map. 2) Shape-preserving (conformal) projections- these ensure that the local shape of a region is preserved. * The geodetic datum and the map projection together is referred to as the coordinate reference system (CRS), essentially a set of assumptions and rules to draw multipolygons onto a 2-D map. * The `st_crs()` function can be used to inspect the CRS of a given sf object. * The function `coord_sf()` ensures that all of the layers in a ggplot2 grob are plotted with the same projection, and using a similar behavior of mapping aesthetics to x and y coordinates uses the CRS of the `geometry` field in the data. * In addition to retrieving the CRS from an object, `st_crs()` can be used to define the unambiguous strings for a given CRS using a compact syntax by defining the EPSG code. * For example, using `st_crs(ozmaps_states)` generates several lines of well-known text describing the CRS for the object, which is all summarized in the EPSG code 4283. In fact, by typing `st_crs(4283)` we get the same well-known text string output. * EPSG

Geodetic Parameter Dataset is a collection of CRS and transformations that can be queried using a variety of methods (e.g., searching on a map, using strings, etc.).

Raster maps

Notes: * Raster data are in the form of images, unlike simple features format data, which are in the form of points, lines, and polygons.