R Advanced Spatial Lessons

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Contents

Prerequisites

Lessons presented here are a continuation of the Geospatial workshop using R of Data Carpentry described more specifically for the Lawrence Berkeley National Lab: Sep 27-28, 2017.

This content is setup for now using bookdown (using the bookdown-demo) for expediency, and meant to eventually be folded into the Software Carpentry style.

Chapter 1

Tidy Spatial Analysis

Resources:

- Tidy spatial data in R: using dplyr, tidyr, and ggplot2 with sf

1.1 Overview

Questions - How to elegantly conduct complex spatial analysis?

Objectives - Understand how to use the "then" operator `%>%` to pass output from one function into input of the next. - Perform

1.2 Things You'll Need to Complete this Tutorial

R Skill Level: Intermediate - you've got basics of R down.

You'll need ...

1.3 Challenge: Explore Raster Metadata

Without using the `raster` function to read the file into `R`, determine the following about the `NEON-DS-Airborne-Remote-Sensing/HARV/DSM/HARV_DSMhill.tif` file:

1. Does this file has the same `CRS` as `DSM_HARV`?
2. What is the `NoDataValue`?
3. What is resolution of the raster data?
4. How large would a 5x5 pixel area would be on the Earth's surface?
5. Is the file a multi- or single-band raster?

Notice: this file is a `hillshade`. We will learn about hillshades in Work with Multi-band Rasters: Images in R.

1.3.1 Answers

```
rows       1367
columns    1697
```

```
bands        1
lower left origin.x        731453
lower left origin.y        4712471
res.x        1
res.y        1
ysign        -1
oblique.x   0
oblique.y   0
driver      GTiff
projection  +proj=utm +zone=18 +datum=WGS84 +units=m +no_defs
file        data/NEON-DS-Airborne-Remote-Sensing/HARV/DSM/HARV_DSMhill.tif
apparent band summary:
   GDType hasNoDataValue NoDataValue blockSize1 blockSize2
1 Float64          TRUE       -9999          1       1697
apparent band statistics:
        Bmin      Bmax      Bmean       Bsd
1 -0.7136298 0.9999997 0.3125525 0.4812939
Metadata:
AREA_OR_POINT=Area
```

1. If this file has the same CRS as DSM_HARV? Yes: UTM Zone 18, WGS84, meters.
2. What format `NoDataValues` take? -9999
3. The resolution of the raster data? 1x1
4. How large a 5x5 pixel area would be? 5mx5m How? We are given resolution of 1x1 and units in meters, therefore resolution of 5x5 means 5x5m.
5. Is the file a multi- or single-band raster? Single.

1.4   Key Points

- The Coordinate Reference System or CRS tells R where the raster is located in geographic space and what method should be used to "flatten" or project the raster.

Chapter 2

Literature

Here is a review of existing methods.

Chapter 3

Methods

We describe our methods in this chapter.

Chapter 4

Applications

Some *significant* applications are demonstrated in this chapter.

4.1   Example one

4.2   Example two

Chapter 5

Final Words

We have finished a nice book.