In-class lab 1

Geospatial analysis in R
KDI School Fall 2024

You can find all of the data in the assignments/in-class1/data folder. The datasets are:

- seoulgrid.shp: a grid of 100m x 100m cells covering Seoul
- seoulgu.shp: the administrative districts (gu/) of Seoul
- seoulrail.shp: the rail stations in Seoul
- seoulwater.shp: the water bodies in Seoul
- seoulpoints.csv: points of interest in Seoul

As a quick note: you can still get full credit even if you do not get through all of these tasks. I would rather you do a few things well than many things poorly. While time pressures are an important consideration in the real world, it usually isn't the most important consideration. Quality is much more important. I will grade you on both the quality and the quantity of your work, but with a much larger emphasis on the former.

By the end of class, you need to turn in a raw markdown file AND the pdf output. Please make sure ALL STUDENTS' names are on the assignment. Here are your tasks for today:

- Let's start easy. The grid shapefile has a variable in it: estimated population in the grid cell (from WorldPop). Load the grid shapefile and plot the population distribution in Seoul. Please make the map look nice.
  - You'll notice there are a lot of grid cells with missing values. Please write what you think might be going on there.
- Next, filter out any grid cells that are majority water. Plot the population distribution in Seoul again.
  - Please write what you think the missing values are again.
- Finally, filter out any grid cells with zero estimated population (i.e. with a missing population value).
- I forgot to put the Gu identifier into the grid cells. Please add that using the seoulgu.shp file.

  - Create a new map where grid cells are colored by the Gu they are in.

- A big question in urban design is where to place schools. Please load the seoulpoints.csv file.
  - For each grid cell, find the distance to the closest elementary school, the closest middle school, and the closest high school.
  - Create a figure with three panels, one for each of the school types, showing distance to difference school types.

- I would like you to create a table with the following information:
  - I want four columns: "Points", "Within 1km", "Within 2km", "Within 5km"
  - I want three rows: "Elementary", "Middle", "High"
  - I want you to calculate the proportion of the population in Seoul that is within 1km, 2km, and 5km of each school type and include it in the table.

- Another big question is how far people are from public transportation. Please load the seoulrail.shp file.
  - Create a figure that shows the distribution of distances to the nearest rail stations. Please note that I am NOT asking for a map. Instead, I want something like a density plot or histogram.

- Access to health facilities is also an important consideration.
  - Create a buffer of 1km around all "hospitals" in the seoulpoints.csv file.
  - Calculate the percentage of the population in Seoul that is within 1km of a hospital.

Please treat this like a paper. Include a short description of figures and write in full sentences.