

Assignment 4 – GGS590 Spatial Computing

Due October 13th 2024

Please find the assignment questions enclosed, totaling 100 available points.

Remember, if you just rely on genAI, you will not learn the fundamental basics, and thus fail the graded closed-book test/exam planned for later in the semester. So, the important thing here is to really make a good attempt at solving these problems without any assistive tools, based on the materials you have learnt in the first few weeks of the class.

To submit the work, you need to write your answers in a colab .ipynb notebook and then:

1. Print the .ipynb notebook to a .pdf and submit for review on blackboard.
2. Submit also the actual .ipynb notebook on blackboard allowing your code to be easily run.

Without submitting both of these files like this, you will receive a 50-point penalty to your overall grade.

Submitted work may be checked for plagiarism, including for GenAI usage. The Mason honor code applies.

Q1. OpenStreetMap has a wealth of spatial data which we can apply to spatial computing tasks. We will want to utilize this resource to help us to develop a script which subsets key datasets of interest for a capital region (50 points).

1. Select a small country (e.g., so you can easily download and intersect the available data). Think Rwanda, Liechtenstein, Tuvalu, Malta, Monaco etc.
2. Download OSM data from the GeoFabrik server (.shp may be easiest).
3. Download the associated boundaries from GADM for your selected country (.shp may be easiest).
4. Subset a boundary shape for the capital city region.
5. Write code to intersect and export the road and rail network, and Points of Interest (PoIs).

Q2. Complete the following spatial computing question set (50 points):

1. Load in the building dataset for your chosen country.
2. Try to estimate the ground-floor building area in square meters.
3. Consider different scenarios for estimating the total building floorspace where the mean building height is 2, 3, or 4 floors high.
4. We have covered the steps for this in a previous class, where we took the geometry area of a chosen polygon or set of polygons. You need to work out how to implement this within the example. Consider reporting your results as plots.