Assignment 2: Geographically Weighted Regression

[**GUS5162\_Assignment2\_GWR.docx**](https://templeu.instructure.com/files/1948636/download?wrap=1)

**Instructions:**

Your response should be a report due via Canvas in .doc, .docx, or .pdf format. Please paste all graphics, code, and content into a single file.

**Explanation of Assignment**

Is there evidence of spatial stationarity (or lack thereof) in the model you generated in Assignment 1 (or any suitable replacement you want to generate for the purpose of this assignment)? To answer this question, we will perform a geographically weighted regression model, following these steps:

*A) Working with a multiple regression model of your choosing* from your submission for Assignment 1, to explain the variance in broadband availability at the inception of the Connect Kentucky project in January 2004. Explain your measures and the outcomes of the regression model.

B) Explain the questions that GWR asks that OLS regression disregards. What assumptions does it challenge? Diagnose the spatial dependency in the OLS model. Create a lists of distances and plot of them. Create a table of lagged means and a plot of them. Then use the lagged mean plot to conduct a Moran’s I test of spatial dependency

C) Conduct a GWR model, using your OLS model as a starting point. Interpret and present its relevant findings.

Ultimately, geographically weighted regression is a step removed from an actual hypothesis test of spatial stationarity. For this reason, in addition to explaining the outputs of the analysis you should visualize the results and explain what they suggest.

You should generate several visualizations, including descriptive measures, model outcomes, diagnostic plots, as well as the following choropleth maps aggregated to KY counties having performed the relevant operations in R:

1. The dependent variable
2. The residuals from the regression model (standardized)
3. Parameter estimates from GWR model
4. Local r-square
5. Prob(t) and/or significant/insignificant areas\* (this one is tough, so it's a desirable, but challenging map to create)

**Deliverable:**

*Assemble your various descriptive statistics, models, graphics, and output as well as textual explanations and interpretation into a report. Use the steps above as a guide to the structure for as you draft the report. There is no lower limit to the length. But make sure that you explain the various hypothesis tests, the methods you’re using, and your results in detail.*

*For this analysis*, your report should contain the following elements:

1. Research Question: What is being tested in GWR? How is that different from regression?
2. Measures: Explain your measures.
3. Methods: Explain the analysis you are performing. What hypothesis exactly are you testing? How does the test work? I.e., what are the mechanics of the test and how is/are test statistics calculated and then evaluated? How does the output of your test enable you to draw inferences about populations beyond the sample data you are working with?
4. Results: What are the results of the test? What are the relevant statistics and outputs that enable you to draw inferences? Paste your results in here.Here, you should provide and explain the GWR output and your maps (summarizing what they show).
5. Conclusion: What inferences can you draw from the test? How broadly would you accept the results of the test? Do the result seem plausible? Why or why not? If you are not sure (or even if you are) in the results, what next steps would you want to take to refine your analysis?

**FILES:**

* [ky\_counties.zip](https://templeu.instructure.com/courses/39956/files/1865012/preview)
* [KY.bband.csv](https://templeu.instructure.com/courses/39956/files/1865011/preview)