GIScience Research Project

This project is intended to deepen students engagement with the conceptual foundations of GIScience, while also encouraging them to critically evaluate how those concepts relate to applied topic.

Due: Student projects are due the Friday of Week 10

Project Options

Students have three options for their GIScience Research course project.

1. **Collective Literature Critique:** This is a group project option. The work will be done in collaboration with a group of students in the class. Over the course of the quarter, the students in each group will develop a critique of a body of published literature in GIScience or a related domain. The critique should evaluate the literature using of the frameworks covered in class. For example, how do the studies in this area handle ontological commitments and spatial representation? Where does uncertainty enter typical analyses? Are the spatial models and inferential claims well justified? Look at your selected literature as a GIScience problem. This assignment is designed to mirror how scholars actually engage with literature. The goals is not to summarize individual papers, but developing an original evaluative argument about how a community of researchers is approaching a spatial problem and where that approach could be strengthened.

   Early in the quarter, you will identify a subset of the literature and progressively deepen your analysis during the course. There will be structured check-ins throughout the quarter where you will share your progress, receive feedback, and refine your analysis. The final critique is due at the end of the quarter.
2. **Individual Research Critique:** This is an individual project option. Students interested in exploring the connection between their own research topic and GIScience (e.g., in preparation for the comprehensive exam) may pursue the literature critique individually. In this instance, the student will examine their own research topic as it relates to the GIScience literature. The goal of the project is for the student to deepen their own work by enriching it through the use of GIScience and spatial concepts, and/or to identify how their research will contribute to GIScience as a field of study. The final critique is due at the end of the quarter.
3. **Technical Exploration of a GIScience Topic:** This is a group or individual project option. Students interested in the computational implementation and execution of spatial concepts or techniques may develop a vignette exploring and explaining that concept and its implementation in a computational environment (I suggest Python or R). The goal would be to develop a vignette that could be used to teach this concept to an advanced undergraduate audience. Developing teaching materials is often one of the best ways to really understand a topic.

   Students selecting this option will discuss their topic and plan with the instructor early in the quarter. One approach would be to reproduce the analysis of a 'classic' geography paper that pivots on the examination or application of a core GIScience concept. For example, students might project like:

develop a vignette examining whether the Dimensionally Extended 9-Intersection Model is well understood by different LLMs, examine the effects if projections choices on protected area connectivity and area metrics, or recreate and extend the original MAUP experiments. Some examples of such vignettes can be found at opengiscience. The final vignette is due at the end of the quarter.

Assessment

Student assessment will be based on the criteria outlined below (Table 1.). The three project shared criteria that account for 65% of assessment, as well as project-specific criteria that account for the remaining 35% of assessment.

Criterion	Group	Individual	Technical
Conceptual Engagement with GIScience	30%	30%	30%
Scholarly Rigor	20%	20%	20%
Communication Quality	15%	15%	15%
Evaluative Argument	25%	—	—
Coherence as Collaborative Product	10%	—	—
Bidirectional Connection	—	25%	—
Scholarly Maturity	—	10%	—
Technical Quality	—	—	15%
Pedagogical Effectiveness	—	—	10%
Conceptual Fidelity and Reflection	—	—	10%

Definitions each criterion and expectations for high performance include:

Common Criteria

- **Conceptual Engagement with GIScience:** Demonstrates deep, sustained engagement with GIScience as a conceptual field. Course frameworks are applied with precision and used to generate original insight, not merely referenced.
- **Scholarly Rigor:** Sources are well chosen, appropriately cited, and critically engaged rather than merely referenced. Claims are well supported. The work demonstrates awareness of debates, limitations, and open questions in the relevant literature.
- **Communication Quality:** Writing (or code documentation) is clear, well organized, and appropriate to the intended audience. The argument or exposition is easy to follow and logically structured. Visual elements, if present, are purposeful and well integrated.
- **Evaluative Argument:** The critique constructs an original, well-supported evaluative argument about how a research community approaches a spatial problem. The argument goes beyond summarizing individual papers to identify patterns, tensions, gaps, or unexamined assumptions across the literature.

- **Coherence as Collaborative Product:** The final product reads as a unified, cohesive argument. If the project was completed by a group, the individual contributions are seamlessly integrated. Consistent voice, terminology, and analytical framework throughout.

Individual Critique Criteria

- **Bidirectional Connection:** The critique demonstrates a substantive, specific connection between the student's research area and GIScience that runs in both directions — showing how GIScience concepts enrich the student's own work and how the student's domain contributes questions, challenges, or insights back to GIScience.
- **Scholarly Maturity:** The student situates their work within broader intellectual debates and demonstrates an emerging scholarly voice. The critique reflects the kind of integrative thinking expected in proposal preparation. For example, the student weighs competing perspectives, identifies productive tensions, and articulates a well considered and supported position.

Technical Exploration Criteria

- **Technical Quality:** Code is correct, well structured, and clearly documented. Methods are appropriate to the concept being explored. Results are reproducible and accurately interpreted. Edge cases or limitations are acknowledged.
- **Pedagogical Effectiveness:** The vignette would effectively teach the target concept to an advanced undergraduate audience. Writing and explanation are clearly sequenced from foundational to advanced concepts. Annotations explain not only what each step does but why it matters. Examples are well chosen and build understanding progressively.
- **Conceptual Fidelity and Reflection:** If reproducing or extending existing work, the vignette is faithful to the original methodology and transparent about any additions. The student reflects thoughtfully on what the implementation revealed and discusses surprises, discrepancies, or new questions that arose through the development process.