# PROJECT MILESTONE 1: STUDY GOALS AND LITERATURE REVIEW

**Instructions**

1. Have one member of your team submit a write-up on Canvas by the deadline.
2. Write-ups must be no longer than 1200 words.

# Learning Outcomes

By the end of this milestone, you will be able to,

1. Discuss the goals of a data analysis problem within its larger context.
2. Search for and explain literature on data visualization relevant to a problem domain.
3. Identify key themes from across a broad collection of visualization concepts.

# Overall Description

You and your teammates have a choice between two types of course-long projects.

* + Exploratory Interface: Many experts in data visualization build interfaces that help a specific audience accurately answer questions about their data. For example, newspapers often have stories built from interactive visualizations, and scientific research labs often use dashboards to check and learn from experiments. In this type of project, you will design an interface to help your readers reach their analysis goals. You will identify a dataset (or datasets) and questions to study. You will map out relevant visual tasks and then design a suitable interface.
  + Critical Report: A real-world statistical investigation often culminates in a report that answers their audience’s questions. The report must present a logical series of visualizations that highlight the most salient aspects of the data, anticipate potential critiques, and presents multiple angles to give readers confidence in the answers that have been shared. As in the exploratory interface, you will choose your own dataset(s) and associated questions.

You do not need to choose right away.

When considering which data to use within the project, think carefully about whether the measurement methodology is appropriate. Do not simply choose a dataset because it is easy to access or has many samples. To evaluate the methodology, consider biases (are the samples representative?) and precision (are the measurements reliable?). No dataset is perfect, and part of your later analysis will be to check for biases and reliability. Nonetheless, the more you find the data meaningful, the easier it will be to focus on studying it in depth.

You will develop your project over the course of the semester. Please choose a topic in an area that you are genuinely interested! Consider this project as an opportunity to develop your team’s critical and creative data science skills. If you are involved in a research project on campus, you may use them as a source of data for either type of project. Nonetheless, don’t confuse “seriousness” with “interest.” I have seen great projects about personal hobbies, like music, sports, art, and astrology, and some about business and healthcare topics were too distant from any teammates’ expertise to allow for in-depth study.

Examples belonging to each project type are given at the end of this document. We do not expect you to write a report at this level in a one-semester introduction to data visualization — view these instead as ideal reports within each project modality. If you have a project proposal which does not fit into either of these categories, you may meet with the teaching team to discuss potential suitability.

# Milestone Description

For this initial step, you will choose a project type, focus on a problem of interest, and survey visualization literature relevant to the task. We expect that by the time you submit your milestone, you have become broadly familiar with prior work in the area and to have read several sources in close detail. In your writing, do not simply list facts — explain key themes and develop your own commentary (e.g., how are proposed methods related to what we have learned in class, what are the main existing approaches, which visual idioms recur most frequently, what concerns do you have about existing work…). Be generous with including diagrams or screenshots to illustrate your points.

When you structure your report, make sure the following points are clearly visible,

1. Motivation and goals: You should identify a dataset and explain several tasks you would like your visualizations to support. Describe your audience (it could be yourself) and the most important questions you want to help them answer. What objective tests could you include to see whether the interface is effective (e.g., time to complete tasks, diversity of discovered patterns)?
2. Literature review: Prepare an overview of visualization research literature and / or packages related to your problem. Provide a discussion of the main challenges, approaches, and themes.

# Rubric

*Motivation and goals* (9 points): The report demonstrates that its authors have immersed themselves in the problem context and make a compelling case for their visualization goals.

*Literature review* (9 points): The report draws from a variety of complementary resources and connects concepts across them. Commentary demonstrates a deep familiarity with prior work.

*Clarity and style* (7 points): The writing is compact, well-structured, and free from technical errors. Figures are annotated and citations are formatted consistently.

# Literature Examples

# Interactive Dashboards

1. [Poemage: Visualizing the Sonic Topology of a Poem](https://miriah.github.io/publications/poemage.pdf)
2. [Voltaire’s Correspondence Network](http://republicofletters.stanford.edu/publications/voltaire/letters/)
3. [Metagenomics with The Banfield Lab](https://stamen.com/work/banfield/)
4. [Whisper: Tracing the Spatiotemporal Process of Information Diffusion in Real Time](https://doi.org/10.1109/TVCG.2012.291)
5. [Ocupado: Visualizing Location-Based Counts Over Time Across Buildings](https://doi.org/10.1111/cgf.13968)
6. [EcoLens: Integration and interactive visualization of ecological datasets](https://doi.org/10.1016/j.ecoinf.2007.03.005)
7. [MatrixQCvis: shiny-based interactive data quality exploration for omics data](https://doi.org/10.1093/bioinformatics/btab748)
8. [Visinity: Visual Spatial Neighborhood Analysis for Multiplexed Tissue Imaging Data](https://doi.org/10.1109/TVCG.2022.3209378)

Reports

1. [The State of the World’s Children 2024 (Section 2)](https://www.unicef.org/media/165156/file/SOWC-2024-full-report-EN.pdf)
2. [Milky Way Census Shows Stars Take Varied Paths](https://www.scientificamerican.com/article/milky-way-census-shows-stars-take-varied-paths/)
3. [NASA’s World of Change](https://earthobservatory.nasa.gov/world-of-change)
4. [Americans’ Social Media Use](https://www.pewresearch.org/internet/2024/01/31/americans-social-media-use/)
5. Most articles from the [Upshot](https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.nytimes.com/international/section/upshot&ved=2ahUKEwjooKfOt_OKAxXmQkEAHdpeBUkQFnoECBgQAQ&usg=AOvVaw1Hb4rCAXIZHBphv8gc_RjV)

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