Project Information

Statistical Modeling & Simulation in R

EDP 380C.28: Fall 2022

Unique: 12104

Brian Keller, Ph.D.
bk@utexas.edu
University of Texas at Austin

Project

You have two options for the final project:

1. **A small-scale Monte Carlo simulation study:**

   For the small-scale simulation, you must design, run, and analyze a small-scale Monte Carlo simulation that compares statistical methods across various conditions. This includes performing all the following in R: Implementing the data generation procedure, analyzing the data, and analyzing the simulation. The organization of all code and workspace must adhere to the guidelines discussed throughout the course labs (see points above). In addition, you must provide a written document that discusses the simulation conditions, the data generating model you used, how parameters were determined for the simulation, and a brief discussion of the results (tables and graphs are allowed). The number of conditions and replications highly depends on the type of statistical model. As a good rule of thumb, the simulation run time should be approximately something you can run during a weekend on your computer.

2. **A small documented R package:**

   For a small R package, you must design, implement, and test all functions and classes to achieve a specific purpose. In addition, you must provide complete help documentation for all exported R functions/classes and a brief vignette demonstrating how to use your package (see examples in R packages on CRAN). All code implementation, code documentation, and organization of the package must adhere to the guidelines discussed throughout the course labs (see points above). The number of specific functions and objects that must be exported and documented for the package will vary depending on the complexity of the task you choose. As a good rule of thumb, you must create one S4 class object, export five different methods, and five other functions.

Note that this project must be something new that you have not done before (i.e., if you are currently going through QP or dissertating, select something different). Regardless of the option, you must first provide an initial proposal and a project outline.

Proposal

The proposal is approximately half a page (no more than one page) and informs me of two things. First, which option you are selecting to do. Second, a statement of purpose for your project. This statement of purpose gives me a broad overview of the project and why you want to do it. Please do

not give me specifics (i.e., which conditions you will investigate in the simulation). Said differently, think of this as an abstract, a summary of what you envision. Once I review your initial proposal, I will give you the okay to move forward.

Outline

Once I've approved your project proposal, you can begin on the project outline. The substance of the project outline depends on which option you choose, and a separate document offers more details, but generally, it provides a much more detailed structure of your project. For a simulation, this includes (but is not limited to) the data generating model, a discussion of conditions that you will be manipulating, the number of replications, how you will estimate the resulting statistical models (I will allow the use of other packages and software), and what measures you will use to evaluate the simulation (e.g., bias, coverage, mean-square error). For an R package, you will need to outline the purpose of the package and provide a detailed skeleton of the published functions, classes, and methods you will include without the actual implementations.

Submission and Due Dates

All submissions will be made under the Assignments section in the course canvas. The specific directions to submit are on each assignment page, and the due dates and times are included as part of the assignment. Each assignment closes at the end of the date, and you will no longer be able to submit the assignment. If you have trouble completing the assignment in time, please contact me, and we can discuss options. Below are the due dates for your reference.

Assignment	**Due Date**
Proposal	September 12, 2022
Outline	October 14, 2022
Project	December 2, 2022