

STAT8810 Term Project

October 4, 2017

Your project can be one of three general types:

1. An analysis project. This should include comparing multiple existing methods to an application of interest.
2. A comparison project where you implement 2 or more methods of interest and compare their performance in some sense.
3. A methodological project, where you may look at extending an existing modeling approach or researching a new approach.

All projects are required to include a data component (for instance, analysing a dataset or emulating a simulator/mathematical model of interest). Choose wisely and plan your time carefully to ensure you will have results within the timeframe allowed.

Your project will consist of three components:

1. A project proposal. This should be 2 pages maximum, and should outline:
 - The project you envision doing.
 - Why your proposal is interesting.
 - What data/simulator/etc. you will use.
 - What methodological approaches you will apply or investigate.
 - How you will implement the methodology, perform experiments or analyze data.
 - How each team member is expected to contribute.

2. A project report consisting of approximately 10-12 pages including plots, tables, etc. but not including the cover page, list of references or appendices:
 - Introduction (2-3 paragraphs): Outline the problem of interest and the aim of your project. Explain what is new, noteworthy or novel about your work.
 - Background (1-2 pages): Summarize the methods being used and a description of the motivating problem or dataset. Reference important related literature.
 - Methodology (5-7 pages): If you are attempting a methodological development, describe your model including key equations (detailed derivations can appear in an appendix), modeling assumptions and algorithm pseudo-code explaining how your approach is implemented. If you are performing an analysis or comparative study, explain your experimental approach (pseudo-code might be appropriate here as well), explain how prior distributions were calibrated to your dataset, what sort of uncertainties you are quantifying and what metrics you are using to compare/evaluate the quality of fit(s) and why. Be careful to include enough information that someone else could replicate your study. Your analysis should include R code attached in an appendix.
 - Results (3-4 pages): Summarize the outcome of your project using well-chosen plots, tables and other summary information as you see fit. Include diagnostic evaluation of your model(s). Interpret your results while being careful to not ignore the uncertainties involved.
 - Discussion (1-2 pages): What were the key outcomes of your project? What were the key limitations? Were there any unexpected issues? Did your project motivate interesting questions that could be explored in the future?
 - Appendix: At minimum, you should have an appendix that includes your neatly organized and commented R source code.
3. A project presentation. This should be prepared using slides and you will have 20 minutes to present your project, followed by 10 minutes of Q&A.

Due Dates

Project Proposal: Due **Friday October 27th**. I recommend first discussing your proposal with me during the week of October 23rd.

Project Presentations: On **December 4th and 6th**

Project Report: Due **Friday December 8th**, emailed to me in PDF format.

Grading Scheme

Proposal: 10%

Presentation: 20%

Report: 70%

Grading Scheme Details

Written/Verbal communication

- Excellent: Clear and concise. Thoughtful exposition of techniques, careful explanation or response to questions.
- Average: Generally clear and concise. Some variability in clarity.
- Poor: Unclear. Errors present. Does not appear to understand the material.

Methodological Approach

- Excellent: Very sound understanding of methods. Highlights most salient points. References literature so reader can explore additional methodological details. Provides a succinct and useful description of methods.
- Average: Generally a reasonable outline of methods. Sometimes may be lacking in the level of detail helpful to the reader. Some literature reference, but may be inadequate if reader wishes to replicate methodology.
- Poor: Little understanding of methodologies used. Inappropriate or inaccurate use of methodologies. Errors in derivations or implementation. Uninspired and lacking effort. No use of references.

Experiment and Results

- Excellent: Clear and concise experimental approach. A focus on answering a very particular question and excellent use of statistical approaches to investigate the question. Clear indication of assumptions and limitations of the results. Good insight and interpretation of results and their implications for future research.
- Average: Fairly clear experimental approach, may have some unclear assumptions or questionable choice of experimental settings or other problems only realized in hindsight. Average to good insight and interpretation of results. Some ideas on future research.
- Poor: Unclear or poorly thought-out experimental approach. Assumptions not understood or ignored. Poor choice of experimental settings leading to results that are not interpretable or insightful. Weak effort and understanding. Errors in use of statistical techniques.