STAT GR5293-002: Design and Analysis of Online Experiments Final Project

Fall 2024

Due Dec 9 midnight (ET)

Throughout this semester, we will cover various topics related to online experiment design and analysis, ranging from remedies and designs to solve SUTVA violations to experiment diagnostics (e.g. SRM and simulated AA) to ML-based estimation techniques. In this project, you will be implementing an algorithm or a method described in a conference paper (e.g. KDD) or an Engineering blog post. The goals of this project include:

- Assess your understanding about the topic (you are entitled to pick any topics we've covered)
- Get your hands dirty with real code implementations
- Learn how to write high quality report to convey your ideas

Requirements:

- There are no particular restrictions on the topic selection, but it has to be related to online experiment design and analysis that we've covered in this semester. Topics may include a special design that solves a particular AB challenge or a new estimation technique that improves the analysis precision.
- Group collaboration is encouraged, but cap your group size at 5.
- List out the contribution of each member.
- Your write up/report needs to include the following sections:
    - Context:
        - What types of problems are you solving? (problem description)
        - What is the practical application or significance of it? (Why it is worth solving)
        - What are the challenges?
        - Tips: for any person without any domain knowledge, can you use plain language and explain clearly to them what is going on?
    - Executive summary
        - Use 2-3 sentences summarizing your key findings and learnings
    - Methodology review
        - Describe in detail the design and method in the paper using your own language. Do not simply copy and paste the descriptions from the original paper
    - Data analysis

        - Replicate the method or algorithm proposed by the paper/blog post
        - You can use simulation or fake data to test the algorithm. You are encouraged to use your own dataset as well
        - Make sure you provide sufficient description about your data, simulation setup, and analysis procedure
        - Are you able to replicate the results or achieve the claimed improvement over other methods mentioned in the paper?
    - Conclusions
        - Summarize your study: provide conclusions about what you've tested and implemented. What are the key learnings or insights?
    - Citation
        - You need to provide a citation and link to the paper/blog post you studied.
        - You shouldn't simply copy/paste the source code from the original paper and such behaviors will be detected and penalized.
- Your final submission needs include the final report and your source code.

Some examples:

- Winner's Curse: Bias Estimation for Total Effects of Features in Online Controlled Experiments [KDD 2018]

Some useful dataset:

- Datasets for Online Controlled Experiments
    - datasheet: https://osf.io/vyuce
    - data: https://osf.io/64jsb/