CS 5A

Feb 28

Final Project Logistics

1. Sign up for your final project teams in **groups of 3-4** on the Final Project Sign-Up Sheet by Monday, **March 3, 2025 at 5:00 p.m**, or you will be randomly assigned one!
2. Important dates
    a. Final project **notebook** submission is due on Thursday, **March 13 at 11:59 p.m**, **NO late submissions**
    b. Midterm **presentation** will hold on Friday, **March 14**.
3. Logistics
    a. 25% of overall grade; score out of 100 points (70 pts notebook + 30 pts oral presentation)
    b. split up responsibilities in writing before starting, and complete a individual survey after submission

More detailed information on Ed

Presentation Logistics

- Each team will prepare a **6-8 min presentation**, on results of notebook
- Presentations during section on **Friday, March 14**
  - Check the sign up sheet for your assigned presentation day/time
- All team members need to attend their own presentation

- Oral presentation slides are due to the Google Drive by **Friday, March 14, 2024 at 10 a.m**
  - Ensure the presentation title includes all partners' full names and the topic of your midterm
    - (ex: Bob_Smith+John_Doe_+Mary_Brown_AQI)

Final Grading

- Final project is worth 25% of overall grade and is scored out of 100 pts
  - 70 points for notebook submission and 30 points for presentation

- Please **compile all ChatGPT prompts** used in their corresponding questions on submitted notebook
  - You are not required to use ChatGPT, but if you do, you must include the prompt

- See EdStem post for question-by-question, grading rubric

Lab and Worksheets Logistics

- Lab 6 is an extra credit lab (optional)
  - Due **Thursday, March 13 (11:59 p.m.)**
- Worksheets 7 and 8 released (optional)
  - Due **Thursday, March 6 (11:59 p.m.)**

Lab 06 - Assessing a Model

A model is a set of assumptions about data, i.e assumptions about chance processes that affect the distribution of data

-> A model helps us understand data and allows us to make predictions

Evaluation: We can evaluate the quality of a model, with previous techniques

Simulation -> Chosen Statistic -> Expectation -> Evaluation

Example: If the behavior die deviates significantly from a fair die, we can assume (or model) the die is unfair

Lab 06 - Null and Alternative Hypothesis

Null Hypothesis states that there is no effect, no difference, or no relationship in the population being studied.

- It represents the default or "status quo" assumption. It is what we assume to be true **unless proven otherwise**.
- Example: "There is no difference in average test scores between two groups."

Alternative Hypothesis states that there is an effect, a difference, or a relationship in the population. It is what the researcher **aims to support or prove**.

Example: "There is a difference in average test scores between two groups."

Lab 06 - Null and Alternative Hypothesis

How Do We Use These Hypotheses?

- We **collect data** and perform a statistical test (like a t-test or chi-square test).
- If the data provides **strong evidence** against H_0, we **reject** the null hypothesis and accept H_1.
- If the data does **not** provide strong evidence against H_0, we **fail to reject** the null hypothesis (but we don't say H_0 is absolutely true).

Lab 06 - p-value

p-value is the probability of observing the data (or something more extreme), assuming the null hypothesis is True.

- A small p-value (typically less than 0.05) indicates that the observed data is unlikely under the null hypothesis, leading to its rejection in favor of the alternative hypothesis
- A large p-value suggests that the data is consistent with the null hypothesis, so there is no strong evidence to reject null hypothesis

p-value is a means to evaluate the quality of a model

Lab 06 - A/B Testing

A/B testing is a statistical method used to determine if two numerical samples come from the same underlying distribution, by checking if there is a significant difference between them.

1) **Hypothesis**: null hypothesis assumes there is no difference between the two groups; alternative hypothesis assumes that there is a significant difference.
2) **Randomization**: randomly assign individuals to either Group A or Group B, to ensure that any differences observed between the groups are **only** due to the treatment
3) **Data Collection**: We collect data from both groups, measuring a specific variable of interest
4) **Statistical Analysis**: Using statistical techniques, we analyze the collected data to determine if there is a significant difference between the two groups (t-tests, chi-square tests, or ANOVA)
5) **Interpretation**: Based on the statistical analysis, we either reject or fail to reject the null hypothesis

Lab 06 - Example of A/B Testing

Scenario: Testing a New Button on a Website

- Goal: test if a red "Buy Now" button gets more clicks than the blue one
- Setup:
  - Group A: Sees the blue button (current version).
  - Group B: Sees the red button (new version).
- Data Collection: Track the number of clicks for each button.
- Statistical Analysis: Use a **t-test** to compare the click rates.
- Result:
  - If $p < 0.05$, the red button performs significantly better
    → use the red button.
  - If $p \geq 0.05$, there is no strong evidence that the red button is better
    → keep the blue button.

Work Period for the Rest of Section

Please call us over if you have any questions!

Midterm TA Evaluation: Please fill this form for participation credit