STAT 439: Introduction to Categorical Data Analysis

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Andy Hoegh

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E-mail: andrew.hoegh@montana.edu   Web: stat439.github.io
Office Hours: TBD   Class Hours: TR 8:00-9:15
Office: Wilson Hall 2-241   Class Room: *Wilson Hall 1-144*

Course Overview

This course provides an overview of testing and analysis of categorical data including contingency table analysis, Poisson regression, logistic regression, log-linear models, and multicategory logit models.

Learning Outcomes:

At the end of the course students will understand:

1. categorical response data and how it differs from continuous response data.

2. statistical inference for proportions, including the use of likelihood, Wald procedures, score procedures and likelihood-ratio procedures.

3. contingency table analysis including 2x2 and higher order tables, estimation and testing for odds ratios, chi-squared tests of independence, Fisher's Exact Test

4. the basic theory and interpretation of generalized linear models, including logistic regression, multinomial logistic regression, and Poisson regression.

5. analysis of matched pairs categorical data.

6. the basics of the analysis of correlated and clustered categorical response data including generalized estimating equations and generalized linear mixed models.

Prerequisites

STAT 412/512 as a pre-req or co-req.

Textbooks and Resources

1. Introduction to Categorical Data Analysis, 3rd Edition, by Alan Agresti.

Note: the MSU library has a free online version of Categorical Data Analysis, 2nd Edition, by Alan Agresti. This textbook is more advanced than the introductory version but will be sufficient for this class if you'd prefer not to purchase the introductory textbook.

Course Schedule

The course will be taught from a flipped perspective. Prior to attending class on Tuesdays, students will watch short online videos and submit homework assignments. Tuesdays will review online video lectures and include interactive computing components. Thursdays will be group labs which focus on implementing the programming covered during the week.

Course Policies

Grading Policy Course Evaluation:

- **10%** of your grade will be determined by short weekly homework assignments that correspond to watching online videos. Homework will be collected via gradescope.

- **30%** of your grade will be determined by group labs. Labs will be in-class group assignments conducted every Thursday. The labs will be designed to be completed in 75 minutes; however, there may be times that groups need to finish labs outside of class time. Labs will be submitted via gradescope.

- **30%** of your grade will be determined by a midterm exam. The midterm exam will have two parts: an in class exam and a take home portion.

- **30%** of your grade will be determined by a final exam. The final exam will have two parts: an in class exam and a take home portion.

Collaboration University policy states that, unless otherwise specified, students may not collaborate on graded material. Any exceptions to this policy will be stated explicitly for individual assignments. If you have any questions about the limits of collaboration, you are expected to ask for clarification.

In this class students are encouraged to collaborate on labs and homework assignments, but exams should be completed without collaboration.

Citing Sources When submitting work, please cite all sources and inspiration - including AI - for your submission.

Academic Misconduct Section 420 of the Student Conduct Code describes academic misconduct as including but not limited to plagiarism, cheating, multiple submissions, or facilitating others' misconduct. Possible sanctions for academic misconduct range from an oral reprimand to expulsion from the university.

Disabilities Policy Federal law mandates the provision of services at the university-level to qualified students with disabilities. If you have a documented disability for which you are or may be requesting an accommodation(s), you are encouraged to contact the Office of Disability Services and the instructor as soon as possible.