Mathematical Statistics and Data Analysis

Lecture 0: Course Introduction

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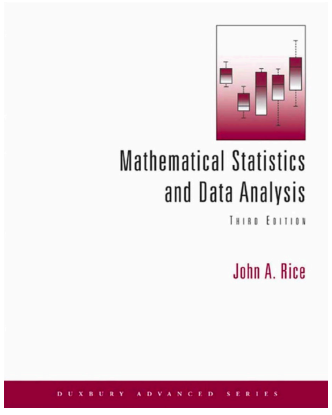
Outline

Textbooks & References

Required Textbook

- Mathematical Statistics and Data Analysis, 3e
- Author: John A. Rice
- Reason:
  - Used in Stanford;
  - Intermediate level;
  - Good feedback;



Textbooks & References

Required Textbook

- 概率论与数理统计教程，第二版
- Author: 茆诗松，程依明，濮晓龙
- Reason:
  - Used in School of Statistics, ECNU;
  - Intermediate level;
  - My textbook;

Textbooks & References

References

- Mario F. Triola, Elementary Statistics 13e;
- George Casella & Roger L. Berger, Statistical Inference;
- Bradley Efron, Trevor Hastie, Computer Age Statistical Inference: Algorithms, Evidence and Data Science;
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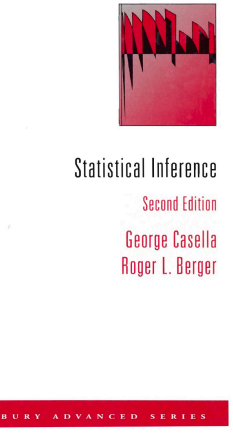

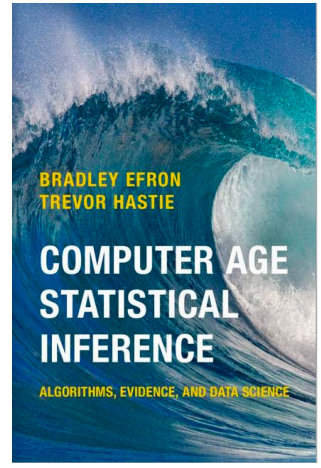

Requirements & Assessment

Requirements

- Slides are sent to everyone at least 1 day before lecture;
- Students are expected to
  - read the assigned readings (before and) after the lecture;
  - think through the answers of tutorial after every lecture;
  - finish a course project;
- Examinations: quiz, midterm and final exam;

Requirements & Assessment

Grading policy

- Project: 20%;
- Quiz, Mid-term Exam & Attendance: 20%;
- Final Exam: 60%;

Contact Information

Lecturer

倪葎 **(Ni, Lyu)**

- Office: Room 103, Geography Building;
- Phone: 62231660;
- Email: lni@dase.ecnu.edu.cn;
- Research interests:
  - Feature screening;
  - Missing covariates;

Overview of This Course

Course goals and objectives

- Recognize the importance of data collection, identify limitations in data collection methods and determine how they affect the scope of inference;
- Use statistical software to summarize data numerically and visually, and to perform data analysis;
- Apply estimation and testing method to analyze single variables or the relationship between two variables in order to understand natural phenomena and make data-drive decisions;
- Interpret results correctly, effectively, and in context without relying on statistical jargon;
- Critique data-drive claims and evaluate data-driven decisions.

Overview of This Course

Learning units and course outline

- Review of Probability
  - Random Variables;
  - Joint Distributions;
  - Limit Theorems;
- **Distributions Derived from the Normal Distribution;**
- **Estimation of Parameters and Fitting of Probability Distributions;**
- **Testing Hypotheses and Assessing Goodness of Fit;**
- **Comparing Two Samples;**
- **Linear Least Squares;**
- **The Analysis of Variance;**
- **The Analysis of Categorical Data;**

Take-aways

Advices to learning statistics

- Not a reading course;
- More than a mathematics course, it is therefore workload-heavy;
- Heaven helps those who help themselves;