Math 541b - Introduction to Mathematical Statistics

Course Content:

- Hypotheses testing

  Neyman-Pearson lemma, Uniformly most powerful tests, consistency, power, large sample behavior
  Non-parametric tests
  Confidence intervals and interval estimation
  The Generalized Likelihood Ratio Procedure and its large sample behavior, goodness of fit tests

- Computationally intensive methods in statistics

  Resampling schemes, jackknife and bootstrap
  EM algorithm
  Simulation, Sampling and Monte Carlo Markov Chain methods

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Office Hours: TBD

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Office Hours: TBD, Math Center

Lecture 39750R, MWF 11-11:50, Zoom Link

Texts and References

Required Text:
Statistical Inference, by Casella and Berger.

Recommended Text:
A Course in Large Sample Theory. Tom Ferguson.

Classic and comprehensive Text on Hypothesis testing:

Testing Statistical Hypotheses, Erich Lehmann

General Reference
All of Statistics. Larry Wasserman

References: Computationally Intensive Methods

Resampling

The Jackknife, the Bootstrap and Other Resampling Plans. Bradley Efron
The Jackknife and Bootstrap. Jun Shao.
When does bootstrap work? : Asymptotic results and simulations. E. Mammen

EM Algorithm

The EM Algorithm and Extensions. McLachlan and Krishnan
On the convergence properties of the EM algorithm. C.F.J. Wu. The Annals of Statistics, 1983 vol. 11, pp 95-103

Monte Carlo Markov Chains

Finite Markov Chains and Algorithmic Applications. Olle Häggström
Monte Carlo Statistical Methods, Christian Robert, George Casella

The birth of MCMC:
Equation of State Calculation by Fast Computing Machines, Metropolis, Rosenbluth, Rosenbluth, Teller, and Teller.

Exams and Grading Policy

Homework:20%
Midterm I, 25%: Wednesday September 16th.
Midterm II, 25%: Wednesday, October 14th.
Final Exam, 30%: Wednesday, November 18th, 11-1; will be comprehensive, with possible emphasis on material not covered in the first two midterms.

Homework

Assignments and due dates are not finalized until they appear in **bold**. Homework may be submitted through Blackboard, or emailed to Jiajun.

Chapter 8: 1,2,12,13,14,15, Problem Set #1, due Tuesday 9/8
Chapter 8: 5, 6, 8,17, 28,33, 34, 46, and Problem Set #2, due
Chapter 9: 2,3a,4,5,9
Problem Set #3, due
Problem Set #4, due
Problem Set #5, due

Statement on Academic Coduct and Support Systems