Math 541b - Introduction to Mathematical Statistics

Course Content:

- Hypotheses testing

  Neyman-Pearson lemma, Uniformly most powerful tests, consistency, power
  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
  Monte Carlo Markov Chain methods.

- Additional topics as time permits

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Office Hours: Monday 10-11, Friday 1-2:30

Grader: Panagiotis Tsilifis. KAP 446. tsilifis at usc dot edu, (213) 234-8642
Office Hours: MW 9-10 and W 1-2 in the Math Center

Lecture 39750R, MWF 11-11:50, KAP-148

See the registration calendar for important (drop) dates.

Texts and References

Required Text:
Statistical Inference, by Casella and Berger.

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

Classic Text on Hypothesis testing: Testing Statistical Hypotheses, Erich Lehmann

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 MR0684867 (85e:62049)

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%: Friday, October 10th. Will cover all material on testing hypotheses, and interval estimation. The exam will be closed book, closed notes.

  25^{th} percentile 105, median 180, 75^{th} percentile 277, high score 300

- Midterm II, 25%: Friday, November 7th. Will cover resampling schemes. Closed book, closed notes.

  25^{th} percentile 123, median 165, 75^{th} percentile 189, three high scores of 200

- Final Exam, 30%, Wednesday, December 10th, 11-1; will be comprehensive, with possible emphasis on material not covered in the first two midterms.

Homework

Due dates are not finalized until they appear in bold. All homework is due in Grader's mailbox in math graduate student lounge, 4th floor KAP.

Cramer-Rao: 3,4,5 Due Tuesday 9/9
Chapter 8: 1,2,12,13,14,15. Due Tuesday 9/16

Chapter 8: 5, 6, 8,17, 28,33, 34, 46, and Problem Set #1, due Friday 10/10
Chapter 9: 2,3a,4,5,9, due Tuesday 10/14
Problem Set #2, due Thursday 10/30
Problem Set #3, due Thursday 11/20
Problem Set #4, due Monday, 12/8