

Stat927: Bayesian Analysis

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Fall 2010

Lecture: MW, 1:30-3:00, F36 JMHH

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Office Hours: 3:00-5:00 Monday

Topics:

We will focus on the theoretical aspects of contemporary Bayesian Analysis. Topics include: Bayesian inference; Decision theoretic foundations; Tests and confidence regions; Model choice; Empirical and hierarchical approaches; Bayesian computations and Nonparametric Bayesian analysis.

References:

The Bayesian Choice, Second Edition,
Christian P. Robert, Springer, 2001
(Chapter 1-7 and 10 will be covered with additional topics.)

An Introduction to Bayesian Analysis: Theory and Methods
Jayanta K. Ghosh, Mohan Delampady, Tapas Samanta, Springer, 2006

Statistical Decision Theory and Bayesian Analysis, Second Edition
James O. Berger, Springer-Verlag, 1985

Bayesian Data Analysis, Second Edition,
Andrew Gelman, John Carlin, Hal Stern and Donald Rubin, Chapman & Hall/CRC, 2003

Course plan:

Homework: About 5 homework sets will be given.

Topic presentations: Each student is responsible to find a topic related to Bayesian methods. It may involve simulation or data analysis in addition to the literature review. A written report and an in-class presentation are required. A list of possible topics will be provided by me (or from you).

Requirements: You need an approval from me on the topic chosen. The report should be very clear. I am looking for a thorough and as complete as possible treatment for the report. Give references. The presentation is one hour and ten minutes.

Possible Topics:

1. High dimensional multiple testing:
 - Frequentists approaches
 - Bayesian approaches
2. Multivariate normal mean problems with heteroscedasty

3. Contingency tables, generalized linear model
4. Kalman Filter
 - State space model
 - Financial data
5. Bayesian nonparametric regression
 - Wavelet setup
 - Confidence intervals
6. Bayesian model selection
 - Bayesian CART
7. Nonparametric Bayesian
8. P-values
 - Bayesian P-values
 - Frequentist P-values