COURSE SYLLABUS

Bayesian Statistics

2223-2-F8204B019-F8204B035M

Learning objectives

The course aims at giving the fundamental concepts of the Bayesian approach to inference together with an overview of some widespread models.

Contents

- Introduction to Bayesian modeling.
- Prior selection.
- Bayesian calculations.
- Decision-theoretic foundations.
- Bayesian inference.
- Linear model

Detailed program

1. Introduction to Bayesian modeling: prior distribution, likelihood function, posterior distribution. From prior to posterior: Bayes theorem.
2. Prior selection: subjective determination, non informative priors, conjugate priors, predictive distribution based priors.
3. Bayesians calculations: Monte Carlo and Markov chain Monte Carlo methods
4. Decision-theoretic foundations: loss functions, optimality criteria, risk functions, posterior expected loss.
5. Bayesian inference: estimation, credible regions, hypothesis testing and Bayes factor.
6. The linear model

Prerequisites

Elements of inferential statistics, stochastic processes and R programming

Teaching methods

Class lessons and lab sessions.

Assessment methods

Written and lab examination

Textbooks and Reading Materials

- Berger J.O., Statistical Decision Theory and Bayesian Analysis, Springer-Verlag, 1985.
- Lee P.M., Bayesian Statistics: an Introduction, Arnold, 2004.
- Piccinato L., Metodi per le Decisioni Statistiche, Springer-Verlag Italia, 1996.
- Robert C.P., The Bayesian Choice, 2nd edition, Springer, 2001.
- Additional material (R-codes and past exams) are made available through the e-learning web page of the course.

Semester

First part (six weeks) of the first semester.

Teaching language

Italian

Sustainable Development Goals