

A gentle introduction to the Bayesian inference

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Contents

We provide a gentle introduction to the Bayesian inference. We introduce the main elements of a Bayesian analysis with three approaches: from an engineering point of view (i.e., a regularization approach), from an extended likelihood study, and a classical introduction. Monte Carlo sampling methods are also described in order to perform a complete Bayesian analysis in real-world applications.

Course schedule

Bayesian inference, an introduction (part 1)	<ul style="list-style-type: none">- C. Robert, The Bayesian Choice: From Decision-Theoretic Foundations to Computational Implementation, Springer Texts in Statistics, 2007.- A. Gelman, J. B. Carlin, H. S. Stern, D. B. Dusen. Bayesian Data Analysis. Chapman & Hall/CRC Texts in Statistical Science, 2013.- Tipping, M.E. (2004). Bayesian Inference: An Introduction to Principles and Practice in Machine Learning. https://www.miketipping.com/papers/met-mlbayes.pdf
Bayesian inference, an introduction (part 2)	<ul style="list-style-type: none">- Tipping, M.E. (2004). Bayesian Inference: An Introduction to Principles and Practice in Machine Learning. https://www.miketipping.com/papers/met-mlbayes.pdf
Estimators, uncertainty quantifications, benefits and drawbacks	<ul style="list-style-type: none">- C. P. Robert and G. Casella. Monte Carlo Statistical Methods. Springer, 2004
Numerical approximations, Monte Carlo sampling methods	<ul style="list-style-type: none">- C. P. Robert and G. Casella. Monte Carlo Statistical Methods. Springer, 2004- D. Luengo, L. Martino, M. Bugallo, V. Elvira, S. Sarkka, "A Survey of Monte Carlo Methods for Parameter Estimation", EURASIP Journal on Advances in Signal Processing, Article number: 25, 2020
Direct methods, Rejection sampling, MCMC, Importance Sampling	<ul style="list-style-type: none">- L. Martino, D. Luengo, J. Míguez, "Independent Random Sampling Methods", Springer, 2018;- L. Martino, V. Elvira. "Metropolis Sampling", Wiley StatsRef: Statistics Reference Online, 2017.- V. Elvira, L. Martino, "Advances in Importance Sampling", Wiley StatsRef: Statistics Reference Online, 2020.

Bimester: preferirei molto **May-June** (alternativa October-November)