HUMBERTO STEIN SHIROMOTO

BAYESIAN DATA ANALYSIS

The public is more familiar with bad design than good design. It is, in effect, conditioned to prefer bad design, because that is what it lives with. The new becomes threatening, the old reassuring.

Paul Rand, *Design, Form, and Chaos*

La perfection est atteinte, non pas lorsquíl n'y a plus rien à ajouter, mais lorsquíl n'y a plus rien à retirer.

Antoine de Saint-Exupéry

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Main references:

- [Mar18]
- [**Gelman13**]

1 | Bayesian Inference

[**Gelman2013**]
Initial definitions:

- $p(x)$: prior
- $p(x|\theta)$: likelihood
- $p(\theta|x)$: posterior
- $p(\theta)$: marginal likelihood

1.1 Probability Theory

1.2 General Probability Model

1.2.1 Choosing the Likelihood

2 | Bayesian Computation

[Gelman:2013]

3 | Regression Models

4 | Nonlinear Models

5 | Nonparametric Models

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[CE14] is a self-contained book. It presents the concepts of linear algebra used in the book. The book starts by with linear optimisation moving to cone and semidefinite optimisation. It also contains an introduction to solving algorithms and applications to machine learning, finance, control and engineering;

[Cla13] is a more theoretical book. It contains elements of functional analysis, nonsmooth analysis and optimisation (generalised gradients). The generality of the optimisation formulation is achieved with the use of calculus of variations;

[Lib12] is a comprehensive book on the optimisation. It starts the book by introducing finite and infinite-dimensional optimisation problems. The next subject is the calculus of variations, and optimal control.

[VB96]

References

[CE14] G. Calafiore and L. El Ghaoui. *Optimization Models*. Cambridge University Press, 2014 (cit. on p. 17).

[Cla13] F. H. Clarke. *Functional Analysis, Calculus of Variations and Optimal Control*. Vol. 264. Graduate Texts in Mathematics. Springer, 2013 (cit. on p. 17).

[Lib12] D. Liberzon. *Calculus of variations and optimial control: A concise introduction*. Princeton University Press, 2012 (cit. on p. 17).

[VB96] L. Vandenberghe and S. Boyd. "Semidefinite Programming". In: *SIAM Review* 38.1 (Mar. 1996), pp. 49–95. DOI: 10.1137/1038003 (cit. on p. 17).

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[Mar18] O. Martin. *Bayesian Analysis with Python*. 2nd. Packt, 2018 (cit. on p. 6).

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