Reading Seminar « Markov Processes »

By Gersende Fort and Alderic Joulin

1st Part

The first part of the reading seminar will be devoted to the theory of Markov chains with general state space and its application to the design and analysis of a simulation-based integration method called Markov chain Monte Carlo (MCMC) sampling. During the lectures, we will first introduce the tools for the long-time behavior analysis of the chains; and then, we will motivate the use of MCMC and introduce the classical algorithms.

For the talks, it will be proposed either to investigate further the theory of Markov chains, or to explore the use of MCMC in Bayesian Statistics or in Stochastic Algorithms for statistical Learning.

References

- S. Meyn and R.L. Tweedie. Markov chains ans Stochastic Stability. Springer-Verlag (1993)
- M. Duflo. Algorithmes stochastiques. Springer (1996)
- C.P. Robert and G. Casella. Monte Carlo Statistical Methods. Springer (2004).

2nd Part

The purpose of these lectures is to further complement our understanding of Markov processes, with a special emphasis on diffusion processes, the main protagonist being the Ornstein-Uhlenbeck process associated to the standard Gaussian distribution. In particular, we will study the long run behavior of these stochastic processes by means of modern probabilistic and analytical tools.

References :

- Analysis and geometry of Markov diffusion operators. D. Bakry, I. Gentil and M. Ledoux. Grundlehren der mathematischen Wissenschaften, 348, Springer, Heidelberg, 2013.
- Autour de l'inégalité de Sobolev logarithmique. C. Ané, S. Blachère, D. Chafai, P. Fougères, I. Gentil, F. Malrieu, C. Roberto and G. Scheffer. Panoramas et Synthèses, vol. 10 (Société Mathématique de France, Paris, 2000).