

Adaptive nonparametric Bayesian methods for SDEs

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We consider continuous time observations $(X_t)_{0 \leq t \leq T}$ of the SDE $dX_t = \theta(X_t)dt + dW_t$. Our goal is estimating the unknown drift function θ . Gaussian process priors lead to the optimal convergence rate, when the smoothness of θ matches the smoothness of the Gaussian process. Adaptivity can be obtained by equipping the hyperparameter(s) of the Gaussian process prior with an additional prior. We discuss several choices for such hyperparameters.

A new promising approach to obtain adaptivity is empirical Bayes. Here the optimal hyperparameters for the Gaussian process prior are first estimated from the data and then the prior with those hyperparameters plugged-in is used for the inference.

This talk is based on van Waaij, [2018](#) and joint work with Frank van der Meulen (TU Delft), Moritz Schauer (Leiden University) and Harry van Zanten (University of Amsterdam).

References

van Waaij, J. (2018). “Adaptive posterior contraction rates for diffusions”. PhD thesis. University of Amsterdam. ISBN: 978-94-028-0883-4. eprint: <http://hdl.handle.net/11245.1/6b890997-2565-4718-9b0f-719c755fa0d9>.