

ADAPTIVE SURROGATE MODELLING FOR GLOBAL OPTIMIZATION

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Key Words: *Kriging; adjoint gradients; Bayesian statistics; Gaussian-process regression*

We discuss surrogate modelling techniques for global optimization problems. The focus is on Efficient Global Optimization (EGO). In order to achieve a deep understanding of this probabilistic technique, we begin with a short introduction to probability theory and Bayesian statistics. This gives us the mathematical tools to develop Gaussian process regression. We examine how this surrogate modelling framework can be generalised to incorporate gradient information, variably-fidelity simulations, and even experimental data. Random and deterministic, non-adaptive and adaptive design space sampling techniques are discussed. Given this framework a derivation of EGO becomes entirely natural.

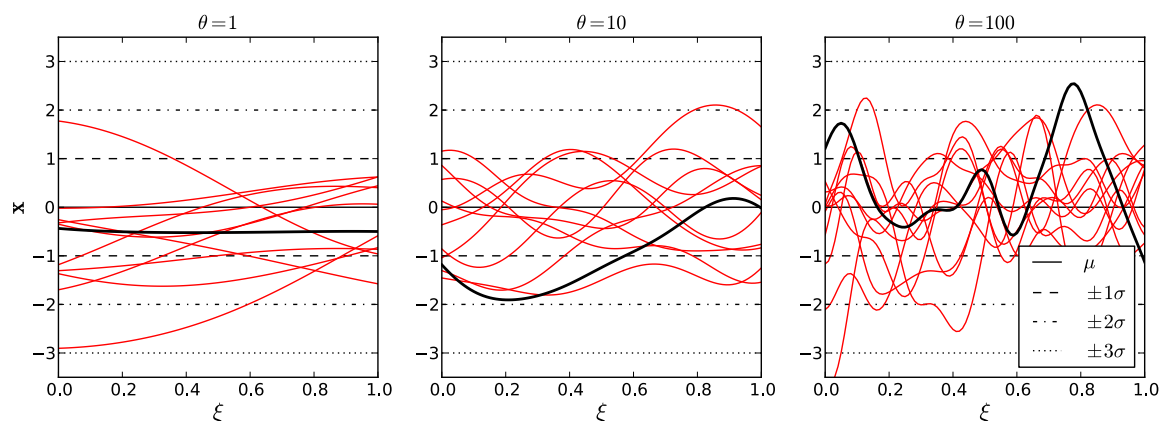


Figure 1: Samples from the prior of 1d Gaussian process regression with varying correlation length.

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