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# Surrogate modeling of multifidelity data for large samples

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## Abstract

The problem of construction of a surrogate model based on available low and high-fidelity data is considered. The low-fidelity data can be obtained, e.g., by performing the computer simulation and the high-fidelity data can be obtained by performing experiments in a wind tunnel. A regression model based on Gaussian processes proves to be convenient for modeling variable-fidelity data. Using this model, one can efficiently reconstruct nonlinear dependences and estimate the prediction accuracy at a specified point. However, if the sample size exceeds several thousand points, direct use of the Gaussian process regression becomes impossible due to a high computational complexity of the algorithm. We develop new algorithms for processing multifidelity data based on Gaussian process model, which are efficient even for large samples. We illustrate application of the developed algorithms by constructing surrogate models of a complex engineering system.

## Keywords

multifidelity data – uncertainty estimate – Gaussian processes – covariance matrix approximation – cokriging

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