

## Variable-Fidelity Surrogate Modelling with Kriging

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**Abstract :** Variable-fidelity surrogate modelling offers an efficient way to approximate function data available in multiple degrees of accuracy each with varying computational cost. In this paper, a Kriging-based variable-fidelity surrogate modelling approach is introduced to approximate such deterministic data. Initially, individual Kriging surrogate models, which are enhanced with gradient data of different degrees of accuracy, are constructed. Then these Gradient enhanced Kriging surrogate models are strategically coupled using a recursive CoKriging formulation to provide an accurate surrogate model for the highest fidelity data. While, intuitively, gradient data is useful to enhance the accuracy of surrogate models, the primary motivation behind this work is to investigate if it is also worthwhile incorporating gradient data of varying degrees of accuracy.

**Keywords :** Kriging, CoKriging, Surrogate modelling, Variable- fidelity modelling, Gradients

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