Benchmarking Adaptive Multivariate Surrogate Modeling Techniques

Dirk Gorissen, Wouter Hendrickx, Tom Dhaene

Abstract

The increasing computational complexity of computer simulation codes and the need for high fidelity simulation of large scale systems, has caused cheap meta-models to become standard practice in engineering design. Due to their compact representation and efficient implementation, these surrogate models allow fast exploration of the design space and extensive what-if analysis. In this contribution we compare three multivariate surrogate modeling techniques: rational functions, multi-layer perceptrons and support vector machines. Both predefined functions and real world engineering problems are used to check the performance of the meta-models. The results reveal the strengths and weaknesses of the different meta-model types and demonstrate the importance of adaptive meta-modeling and sequential design.