Regularized Kriging

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Abstract

Kriging is a commonly used technique for developing meta-models as a surrogate for computationally intensive simulation models. A difficulty with kriging is the potential numerical instability in the computation of the inverse of the covariance matrix. When the covariance matrix is nearly singular, numerical instability is serious because it would lead to large variability or even unreliability of the kriging predictor. A regularized version of kriging is proposed to overcome this difficulty. It is particularly useful for computationally intensive simulations with large sample size or input variables. Some asymptotic results on its interpolation bias and mean-squared errors are presented. A simulation study is performed to show the differences between kriging and regularized kriging and to demonstrate the advantages of regularized kriging.

key words：Computer experiment; ridge analysis; Gaussian process.