A Basis-based Response Surface Method for Computer Experiment Optimization

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Aiming at solving optimization problems arising in computer experiments, we propose a basis-based response surface method that is capable of efficiently finding multiple extreme points for both smooth and oscillatory response surfaces. Techniques taken from experimental design, statistical approximation, and image representation are incorporated carefully in the proposed algorithm. The method iteratively constructs surrogate surfaces over the whole experimental region by using overcomplete basis functions to predict possible optimal points and next experiment points. Numerical results show that the method is quite promising for finding single or multiple optima of smooth response surfaces. Furthermore, the method is especially efficient for the problem with complicated and oscillatory response surface.

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