A Parallel Optimization Method Based on Kriging Model

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Abstract

In many practical engineering designs, the forms of objective functions are not easily available in terms of the design variables. So as to obtain relatively accurate optimal solutions, a lot of computing iterations must be taken into account, which results in huge computational consumption. A parallel optimization method based on Kriging model is proposed in this paper: by developing entropy-based expected improvement algorithm on the Kriging model, this approach progressively provides a designer a rich and evenly distributed set of Pareto optimal points; meanwhile the implementation of the method proposed on a super-server is discussed, with speedup and efficiency described by statistical data. Two mathematical optimization problems and two engineering optimization problems are presented as testing cases, with the results showing that the proposed method can be effectively used for engineering optimization designs. The method developed in this paper could help the designers to search and compare near optimal design alternatives intelligently in the early design stages by utilizing high performance computing resources.

Keywords: expected improvement, engineering optimization, Kriging model.