Three Stage Approach and the Initial Sample Size

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Abstract

We consider the problem of selecting one of the best simulated designs with high probability. We present a heuristic approach that call Three-Stage approach for solving this problem. In this approach, the ordinal optimization technique is used in the first stage to select a subset that overlaps with the set of the best $m\%$ designs with high probability, and then subset selection procedure is used to get a smaller subset that contains the best among the subset that is selected by the first stage. Finally, the indifference zone procedure is used to select the best design among the survivors in the second stage. In this paper, we consider the effect of the initial sample size on the performance of a Three-Stage approach. The results show that the choice of the initial sample size does affect the performance of Three-Stage approach.

Keywords: Ranking and Selection, Ordinal Optimization, Subset Selection, Indifference Zone.

1 Introduction

Statistical selection procedures are used to identify the best of a finite set of simulation alternatives, where the best simulated design is defined in terms of the minimum (maximum) expected value of each alternative. In this paper, we are considering the problem of selecting the best design from a finite and large set of alternatives, where the expected value of each alternative can be inferred by the simulation.

A Three-Stage approach proposed by Almomani and Arefaei [1], identify the best design by using three stages. At first stage, the Ordinal Optimization (OO) approach is used to select a subset that overlaps with the set of the best $m\%$ designs with high probability. At second stage, Subset Selection (SS) approach is used to get a smaller subset that contains the best among the subset that was selected at the first stage before. Finally, the Indifference-Zone (IZ) approach is used to select the best design among the subset from the second stage.

In many selection procedures, sample size in the first stage $t_1$ plays an important role to the performance of these procedures. In fact, the initial sample size $t_1$ cannot be too small since we might get poor estimates