

Constructing efficient exact designs of experiments using integer quadratic programming

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Abstract

We propose a method of computing exact experimental designs by integer quadratic programming. The key idea is a suitable quadratic approximation of the criterion of D -optimality in the neighbourhood of the approximate D -optimal information matrix, which we call the criterion of Q -optimality. We demonstrate on several examples that the D -efficiency of the exact Q -optimal designs is usually very high. An important advantage of the method is that it can be applied to situations with marginal and cost constraints on the design.

Keywords

D -optimal design, Q -optimal design, Exact design, Marginal restrictions, Cost restrictions, Integer quadratic programming.