

Optimizing Designs for the Arbitrary Factorial Term Model Space

Joseph Palascak, Dan Pritikin*, Byran Smucker

Department of Mathematics, Miami University, Oxford, OH 45056

`pritikd@miamioh.edu`

Consider experiments involving k factors. While a fractional factorial design may be used, such a design may be too large and not properly account for simultaneous interactions between more than two factors. To each model, we associate a hypergraph on k vertices, each hyperedge of size s corresponding to the s -way interaction between a specified s factors and the response variable. We study alternative designs when the experimenter has reasons for providing upper bounds on how many significant s -way interactions exist for each of $s = 1, 2, 3, \dots$. The Kruskal-Katona theorem sometimes implies improvements for the experimenter's upper bounds. Beyond that, we strategize to find designs that reasonably maximize estimation capacity while limiting the variance of the parameters.