Generalized Aberration-type Criteria for Regular and Irregular Factorial Designs

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Abstract

Minimum aberration criterion has been a popular criterion for comparing regular factorial designs. Tang and Deng (1999) extended it to irregular two-level fractional factorial designs and proposed the minimum G_2-aberration (GMA) criterion. Cheng, Deng and Tang (2002) showed that the GMA criterion indirectly takes efficiencies into account and can provide a good surrogate for model robustness. Somewhat separately from the concept of aberration, Tsai, Gilmour and Mead (2000) introduced a criterion, denoted by Q, based on the average A_s-efficiency of a design over the lower-dimensional submodels. It has been shown that designs with lower Q are more likely to have efficient projections and can provide useful information after a small number of active factors have been identified. In this talk, we will show that the Q criterion is also in the aberration camp, in that it picks out designs which allow more models to be estimated, rather than the alphabetic optimality camp, which picks designs which more efficiently estimate the parameters in one candidate model. A new definition of the generalized worthlength pattern will be introduced. An application to the choice of orthogonal three-level main effects designs in 18 runs will be used to illustrate the similarities and differences between the related criteria.