Factor Selection in Screening Experiments

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Abstract:
Screening designs are used in design of experiments when, with limited resources, important factors are to be identified from a large pool of factors. Typically, a screening experiment will be followed by a second experiment to study the effect of the identified factors in more detail. As a result, the screening experiment should ideally screen out a large number of factors to make the follow-up experiment manageable, without screening out important factors. The Gauss-Dantzig Selector (GDS) is often the preferred analysis method for screening designs. While there is ample empirical evidence that fitting a main-effects model can lead to incorrect conclusions about the factors if there are interactions, including two-factor interactions in the model increases the number of model terms dramatically and challenges the GDS analysis. We discuss a new analysis method, called Gauss Dantzig Selector Aggregation over Random Models (GDS-ARM), which aggregates the effects from different iterations of the GDS analysis performed with different sets of randomly selected interaction columns each time.