Subset Selection in Two-Factor Experiments Using Randomization Restricted Designs

Thomas J. Santner
Department of Statistics
Ohio State University
Columbus, OH, 43210

Guohua Pan
Department of Mathematical Sciences
Oakland University
Rochester, MI 48309

Abstract

This paper studies subset selection procedures for screening in two-factor treatment designs that employ either a split-plot or strip-plot randomization restricted experimental design laid out in blocks. The goal is to select a subset of treatment combinations associated with the largest mean. In the split-plot design, it is assumed that the block effects, the confounding effects (whole-plot error) and the measurement errors are normally distributed. None of the selection procedures developed depend on the block variances. Subset selection procedures are given for both the case of additive and non-additive factors and for a variety of circumstances concerning the confounding effect and measurement error variances. In particular, procedures are given for (1) known confounding effect and measurement error variances (2) unknown measurement error variance but known confounding effect (3) unknown confounding effect and measurement error variances. The constants required to implement the procedures are shown to be obtainable from available FORTRAN programs and tables. Generalization to the case of strip-plot randomization restriction is considered.

Keywords: ranking and selection; split-plot design; strip-plot design; two-way layout; optimal design; least favorable configuration; subset selection approach; restricted randomization.