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Copula-based robust optimal block designs

Tuesday, 14 September 2021 16:00 (30 minutes)

Blocking is often used to reduce known variability in designed experiments by collecting together homogeneous experimental units. A common modeling assumption for such experiments is that responses from units within a block are dependent. Accounting for such dependencies in both the design of the experiment and the modeling of the resulting data when the response is not normally distributed can be challenging, particularly in terms of the computation required to find an optimal design. The application of copulas and marginal modeling provides a computationally efficient approach for estimating population-average treatment effects. Motivated by an experiment from materials testing, we develop and demonstrate designs with blocks of size two using copula models. Such designs are also important in applications ranging from microarray experiments to experiments on human eyes or limbs with naturally occurring blocks of size two. We present a methodology for design selection, make comparisons to existing approaches in the literature, and assess the robustness of the designs to modeling assumptions.

Keywords

Binary response, equivalence theorem, generalized linear model, marginal model, pseudo-Bayesian D-optimality

Special/invited session

ISBIS session

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Session Classification: Advances in Statistical Modeling and Applications (ISBIS)

Track Classification: Design and analysis of experiments