Mathematics, Statistics, and Computer Science **@ UIC**

Statistics and Data Science Seminar

Weighted Optimality Criteria and Design Search Algorithms

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Abstract: Standard design criteria like the A-, E-, and D-criterion implicitly assume the experimenter is equally interested in all estimable functions. Because of this, efficient designs under these criteria spread information evenly across the estimation space. In some cases, optimal designs can be analytically derived under these criteria but researchers are beginning to rely on design search algorithms to find these designs. These computer-generated designs are often found under the D-criterion because of its fast computations with point- and coordinate-exchange algorithms. However, the D-criterion is a poor assessment of a design when the goals of an experiment imply differential interest among the estimable functions. To reflect relative importance, Stallings and Morgan (Biometrika, 2015, in press) introduced general weighted optimality criteria, which assign weights to variances so that greater weight implies greater interest. These criteria are natural extensions of standard design criteria so that design search algorithms can be easily modified to perform optimization with respect to this new class of criteria. This talk first reviews the theory of general weighted optimality criteria and shows how the weighted analogues of standard criteria behave. A straightforward modification of typical design search algorithms is then shown to perform weighted optimization. The algorithm is implemented in SAS PROC OPTEX to find efficient blocked treatment-versus-control designs; unblocked and blocked factorial experiments that are focused on main effect estimation; and factorial experiments under a baseline parameterization.

Wednesday, October 14 at 4:00 PM in SEO 636