



DEPARTMENT OF MATHEMATICAL SCIENCES

Colloquium

Jie Yang

University of Illinois at Chicago

D-optimal Designs for Multinomial Logistic Models

ABSTRACT: Design of experiment with categorical responses is becoming increasingly popular in a rich variety of scientific disciplines. When the response is binary, generalized linear models have been widely used. For optimal designs with generalized linear models, the minimum number of distinct experimental settings required by a nondegenerate Fisher information matrix is equal to the number of parameters. It is also known that the experimental units should be uniformly allocated when a minimally supported design is adopted. When the response has three or more categories, the models used in the literature should rather be treated as a special class of the multivariate generalized linear models, known as multinomial logistic models. We show that, unlike the designs for binary responses, a feasible design for a multinomial logistic model may contain less experimental settings than parameters, which is of practical significance. We also conclude that even for a minimally supported design, a uniform allocation, which is typically used in practice, is not optimal in general for a multinomial logistic model. We develop efficient algorithms for searching D-optimal designs. Using examples based on real experiments, we show that the efficiency of an experiment can be significantly improved if our designs are adopted.

**Friday, September 25, 2020
11:00AM-11:50AM**

For Zoom information contact Professor Qingshuo Song qsong@wpi.edu