

Comparison of Designs for Multivariate Generalized Linear Models

S. Mukhopadhyay and A. I. Khuri

Department of Statistics, University of Florida, P.O. Box 118545,
Gainesville, Florida 32611-8545, U.S.A.

The purpose of this article is to discuss response surface designs for multivariate generalized linear models (GLMs). Such models are considered whenever several response variables can be measured for each setting of a group of control variables, and the response variables are adequately represented by GLMs. The mean-squared error of prediction (MSEP) matrix is used to assess the quality of prediction associated with a given design. The MSEP incorporates both the prediction variance and the prediction bias, which results from using maximum likelihood estimates of the parameters of the fitted linear predictor. For a given design, quantiles of a scalar-valued function of the MSEP are obtained within a certain region of interest. The quantiles depend on the unknown parameters of the linear predictor. The dispersion of these quantiles over the space of the unknown parameters is determined and then depicted by the so-called quantile dispersion graphs. An application of the proposed methodology is presented using the special case of the bivariate binary distribution.

Key Words: Bivariate binary distribution; mean-squared error of prediction; prediction bias; prediction variance; quantile dispersion graphs; quantiles of the mean-squared error of prediction; response surface design.