

## Selection of Designs in Ordinal Regression Models under Linear Predictor Misspecification

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**Abstract :** The purpose of this article is to find a method of comparing designs for ordinal regression models using quantile dispersion graphs in the presence of linear predictor misspecification. The true relationship between response variable and the corresponding control variables are usually unknown. Experimenter assumes certain form of the linear predictor of the ordinal regression models. The assumed form of the linear predictor may not be correct always. Thus, the maximum likelihood estimates (MLE) of the unknown parameters of the model may be biased due to misspecification of the linear predictor. In this article, the uncertainty in the linear predictor is represented by an unknown function. An algorithm is provided to estimate the unknown function at the design points where observations are available. The unknown function is estimated at all points in the design region using multivariate parametric kriging. The comparison of the designs are based on a scalar valued function of the mean squared error of prediction (MSEP) matrix, which incorporates both variance and bias of the prediction caused by the misspecification in the linear predictor. The designs are compared using quantile dispersion graphs approach. The graphs also visually depict the robustness of the designs on the changes in the parameter values. Numerical examples are presented to illustrate the proposed methodology.

**Keywords :** model misspecification, multivariate kriging, multivariate logistic link, ordinal response models, quantile dispersion graphs

**Conference Title :** ICSRD 2020 : International Conference on Scientific Research and Development

**Conference Location :** Chicago, United States

**Conference Dates :** December 12-13, 2020