Optimal tolerance regions for some functions of multiple regression model with Student-t errors

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Abstract

This paper considers the multiple regression model to determine optimal β-expectation tolerance regions for the *Future Regression Vector* (FRV) and *Future Residual Sum of Squares* (FRSS) by using the prediction distributions of some appropriate functions of future responses. It is assumed that the errors of the regression model follow a multivariate Student-t distribution with unknown shape parameter, ν. The prediction distribution of the FRV, conditional on the observed responses, is a multivariate Student-t distribution but its shape parameter does not depend on the unknown degrees of freedom of the Student-t model. Similarly, the prediction distribution of the FRSS is a beta distribution. The optimal β-expectation tolerance regions for the FRV and FRSS have been obtained based on the F-distribution and beta distribution respectively.

Keywords and phrases : *Multiple regression model, prediction distribution, optimal β-expectation tolerance region, invariant differential, non-informative prior, multivariate Student-t, beta and F-distributions.*

1. Introduction

A statistical tolerance region (interval in one dimension) is a region, defined on the sample space, that contains a specified proportion of the future responses, or any suitable function of future responses of a random

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