
Robust Methods

Chair: Debbie Dupuis (HEC Montréal)

PHILIPPE GAGNON, Université de Montréal

Robustness to Outliers in a Bayesian Simple Linear Regression Model

In the field of statistics, and more precisely in a linear regression analysis context, data samples frequently contain outliers. Consequently, statistical inference can be contaminated, leading to results in disagreement with the majority of the observations. The least squares method in regression analysis is generally used but it can lead to inference which is not robust to outliers. This work deals with this problematic in a context of simple linear parametric Bayesian regression model. Indeed, theoretical results ensuring that the posterior inference is robust to outliers are described.

MARYAM SOHRABI, University of Ottawa

Bootstrapping the Robust Estimates of the Mean Vector for Multivariate Heavy-Tailed Distributions with Different Indices of Stability

We consider a robust estimation of the mean vector for a sequence of independent and identically distributed observations in the domain of attraction of a stable law with different indices of stability $(\alpha_1, \dots, \alpha_p)$ such that $1 < \alpha_i \leq 2$, $i = 1, \dots, p$. The suggested estimator is asymptotically normal depending on some unknown parameters. We apply an asymptotically valid bootstrap to construct confidence intervals and confidence regions for the mean vector.

Key words: Stable process; M-estimation; Confidence interval; Bootstrap.

WEI TU, University of Alberta

Robust Efficient Generalized M-Estimation in Regression Models

A new class of robust estimators for the linear regression model and logistic regression model were introduced. They are generalized M-estimators by absorbing a goodness of fit measure into a continuous weight function. Goodness-of-fit measure was computed using the empirical distribution of the residuals of an initial robust estimator in linear regression models, and squared Mahalanobis distances in logistic regression models. A Monte Carlo study showed that the proposed estimators operated at almost full efficiency while maintaining good robustness properties. The asymptotic consistency was proved using empirical process methods.

OLU AWOSOGA, University of Lethbridge

Meta-type Analysis of Multiple Baseline Time Series Design Intervention Models for Dependent and Independent Series

A traditional meta-type analysis for multiple baseline series was developed in this study using robust methodology. The design matrices provided for two-phase (AB) design allow for change in level and change in slope between each phase and the subsequent phase. The robust procedures are similar to the parametric procedures except another norm in place of Euclidean norm is used. A Monte-Carlo study of the methods is provided. Validity of the procedures and power comparisons between the parametric and robust methods was investigated and the results are presented. Diagnostic procedures for the analysis of these data are also developed.

YANG ZHAO, University of Regina

Robust Imputation to Unified Approach for Regression Models with Data Missing by Design

Multiple imputations are widely used in statistical analysis with missing data. However, valid inference based on imputed full data depends on the "correctness" of the imputation models for the missing data especially when the missing percentage is high.

In this article we describe a robust imputation to unified approach for regression models with data missing under two-stage studies, where parameter estimation and inference are valid even when the imputation models are not correct. Our simulation studies in various settings indicate that the performance of the proposed method is acceptable for practical implementation.