Robust Estimation of a Nonlinear Regression Model

Hybrid of a new forward search algorithm and bootstrap

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A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science in Statistics

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Abstract

We develop a robust estimation procedure for nonlinear regression models with contaminated data. A simulation study that considers misspecification error, structural change, and contamination from a different model was designed to compare the method with standard nonlinear least squares using the Levenberg-Marquardt algorithm. Simulation outputs suggest that the proposed estimation procedure, a hybrid of a modified forward search algorithm and bootstrap, performs well compared to the nonlinear least squares estimation procedure when data is contaminated by outliers. An outlier detection metric under the forward search framework is also developed and the simulation studies also exhibit its effectiveness in detecting outliers.

Keywords: *Forward Search Algorithm, Levenberg-Marquardt, Nonlinear Regression, Outliers, Robust estimation, Bootstrap*