

A New Class of Poisson-Inverse Gaussian Liu-type Regression Estimator

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Abstract:

Regression models are essential for understanding the relationship between dependent and independent variables. However, multicollinearity poses a significant challenge, leading to unstable and inefficient parameter estimates and inflated variance. The Poisson-Inverse Gaussian regression model (P-IGRM), a mixture of the Poisson and Inverse Gaussian distributions, is widely used to address overdispersion in count data. Although the maximum likelihood (ML) estimator is commonly used for parameter estimation in P-IGRM, it performs poorly in the presence of multicollinearity. To overcome this issue, several biased estimators, such as ridge, Liu, and Liu-type estimators, have been proposed. In this paper, we introduce a new class of Poisson-Inverse Gaussian Liu-type regression estimators as an alternative to existing methods. We compare the proposed estimator with ML, ridge, Liu, and Liu-type estimators using scalar mean square error (MSE) and matrix mean square error (MMSE) criteria. Monte Carlo simulations are conducted to evaluate the performance of the proposed estimator under different conditions. Additionally, we illustrate the effectiveness of all considered estimators using real data analysis.

Keywords:

Poisson-Inverse Gaussian regression model Liu estimator Liu-type estimator Maximum likelihood estimator Mean squared error Multicollinearity Ridge estimator.