Subgroup Analysis of Linear Model With Measurement Error

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Abstract: How to identify different subgroups in a heterogeneous population plays an important role in areas such as precision medicine, personalized goods and services. In real life, we usually can not obtain the exact values of the variables because of measurement error. How to estimate the model more accurately in the presence of measurement error is also a problem worth studying. Therefore, this paper simultaneously considers the subgroup analysis and measurement error. Under the framework of linear regression model, a new method is proposed to solve the subgroup analysis with measurement error. In this paper, the idea of constructing unbiased estimating equations with two replicate measurements is transformed into minimizing an objective function and then concave penalty is applied to pairwise differences of the coefficients in order to estimate the coefficients and identify the subgroups simultaneously. This paper develops an alternating direction method of multipliers algorithm with concave penalties and demonstrate its convergence. The proposed estimators are proved to be of consistency and asymptotic normality, which are also supported by simulation. Finally, we apply our method to the data from the Lifestyle Education for Activity and Nutrition study.