Abstract

The goal of this work is to create methods for enhancing measurement error using regression calibration as a strategy by combining two samples, thereby increasing the relative efficiency of linear regression models. Because two or more samples are more likely to provide an accurate representation of the population than a single sample under inquiry, utilizing two samples in regression calibration is likely to produce a realistic depiction of what the actual population is when error-free. This study has generated independent estimates from two samples and combined them with weights equal to the inverse of their estimated probabilities of sample inclusion. It has also integrated two data sets into a single data set and suitably adjusted the weights on each sampled unit. The regression calibration method is most commonly used to correct predictor-response bias caused by variable measurement imperfections. Because of its simplicity, this method is often used. The fundamental principle behind regression calibration is to estimate the conditional expectation of a genuine response, given predictors measured with error and other covariates supposed to be measured without error. The predicted values are then estimated and used to assess the relationship between the response and an outcome in place of the unknown genuine response. Further information on the unobservable true predictors is required by the regression calibration program. This data is frequently obtained from a validation study that employs unbiased measurements for genuine predictors. This study has employed and compared the results obtained from the two sample approaches. Measuring errors can be produced by a variety of sources, including instrument error, laboratory error, human error, problems in documenting or executing measurements, self-reporting errors, and natural oscillations in the underlying amount. Covariate measurement error has three effects: In addition to hiding the properties of the data, which makes graphical model analysis difficult, it produces bias in parameter estimates for statistical models, resulting in a sometimes-significant loss of power for detecting fascinating correlations between variables. The two sample approaches employed by the study have yielded acceptable results.