A monte carlo simulation study on high leverage collinearity-enhancing observation and its effect on multicollinearity pattern.

ABSTRACT

Outliers in the X-direction or high leverage points are the latest known source of multicollinearity. Multicollinearity is a nonorthogonality of two or more explanatory variables in multiple regression models, which may have important influential impacts on interpreting a fitted regression model. In this paper, we performed Monte Carlo simulation studies to achieve two main objectives. The first objective was to study the effect of certain magnitude and percentage of high leverage points, which are two important issues in tending the high leverage points to be collinearity-enhancing observations, on the multicollinarity pattern of the data. The second objective was to investigate in which situations these points do make different degrees of multicollinearity, such as moderate or severe. According to the simulation results, high leverage points should be in large magnitude for at least two explanatory variables to guarantee that they are the cause of multicollinearity problems. We also proposed some practical Lower Bound (LB) and Upper Bound (UB) for High Leverage Collinearity Influential Measure (HLCIM) which is an essential measure in detecting the degree of multicollinearity. A well-known example is used to confirm the simulation results.