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COLLOQUIUM

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Robust BCa-JaB Method as a Diagnostic Tool for Linear Regression Models

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10:20 a.m. - 11:10 am
Refreshments 10:00 am
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Abstract:

The detection and evaluation of influential observations are critical aspects of data analysis in the context of linear regression models. The assessment of whether the change in the model resulting from the inclusion/exclusion of each respective data point is major is usually based on cut-off values for the influence measure obtained from asymptotic approximations. However, the asymptotic approximations used for these diagnostic measures suffer both because the null distributions of these quantities are very complex and because the approximations tend to be poor when sample sizes are small. As computing power has exploded over the intervening decades, computer-intensive methods such as Jackknife-after-Bootstrap (JaB) technique has been proposed by various authors as a method for detecting influence in regression models through refining the cut-off values for the common influence diagnostics used in linear regression models. The rationale behind the use of the JaB method in this context is its construction based on deleting observations one at a time, with cut-offs based on the bootstrap distribution of the influence measure calculated using the JaB approach which allows the consideration of bootstrap samples that are free of the influence of a particular data point. The method is based on the use of percentile-method bootstrap confidence intervals which have well-known deficiencies under skewed distributions. In the present context, using this method will manifest as a tendency to fail to flag points that may, in fact, be unusual.
In order to improve JaB, we propose using robust versions of bias-corrected and accelerated (BCa) bootstrap confidence intervals which tolerate skewed distributions. We show that, asymptotically, proposed equal-tailed two-sided interval is second-order accurate. The performances of the proposed robust BCa-JaB and conventional JaB methods are compared in the cases of DFFITS, Welsch's distance and modified Cook's distance influence diagnostics. In this talk, I will present the results for both real data examples and simulation study.

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