THE UNIVERSITY OF CHICAGO

Department of Statistics

MASTER'S THESIS PRESENTATION

CHEN XU

Department of Statistics
The University of Chicago

Efficient Predictive Inference with Jackknife+ under Ensemble Learning

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ZOOM Meeting, 5747 S. Ellis Avenue

ABSTRACT

Ensemble learning is widely used in applications to make predictions in complex decision problems—for example, averaging models fitted to a sequence of samples bootstrapped from the available training data. While such methods offer more accurate, stable, and robust predictions and model estimates, much less is known about how to perform valid, assumption-lean inference on the output of these types of procedures. In this paper, we compare the previously proposed jackknife+-after-bootstrap (J+aB) with another variant called the jackknife+-with-bootstrap (J+wB), both of which are computationally efficient and theoretically valid methods for distribution-free predictive inference under ensemble learning. Both methods offer predictive coverage guarantee that holds with minimal assumptions. In particular, we do not assume the distribution of the data, the nature of the fitted model, or how the individual bootstrap estimators are aggregated—at worst, the failure rate of the predictive interval is non-asymptotically inflated by either a factor of 2 for J+aB or a factor of 2 plus an explicit analytic expression that can be made arbitrarily small for J+wB. Our numerical experiments verify the coverage and accuracy of the resulting predictive intervals on real data.

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