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# A fast and efficient conformal regressor with regularized extreme learning machine

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## Abstract

A conformal regressor combines conformal prediction and a traditional regressor for point predictions. It produces a valid prediction interval for a new testing input such that the probability of the target output being not included in the prediction interval is not more than a preset significance level. Although conformal prediction is both theoretically and empirically valid, one main drawback of the existing conformal regressors is their computational inefficiency. This paper proposes a novel fast and efficient conformal regressor named LW-JP-RELM, with combination of the local-weighted jackknife prediction(LW-JP), a new variant of conformal prediction, and the regularized extreme learning machine(RELM). The development of our learning algorithm is important both for the applications of extreme learning machine and conformal prediction. On the one hand, LW-JP-RELM complements ELM with interval predictions that satisfy a given level of confidence. On the other hand, the underlying learning process and the outstanding learning ability of RELM make LW-JP-RELM a very fast and informationally efficient conformal regressor. In the experiments, the empirical validity and informational efficiency of our method were compared to those of the state-of-art on 20 public data sets and the results confirmed that LW-JP-RELM is a competitive and promising conformal regressor.

*Keywords:* Conformal regressor; Jackknife prediction; Extreme learning

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