Extending Widely–Applicable Information Criterion: Posterior covariance and its applications

Keisuke Yano

The Institute of Statistical Mathematics

Abstract

In this talk, we present a novel computationally low-cost method for estimating a general predictive measure of generalized Bayesian inference. The proposed method utilizes posterior covariance and provides estimators of the Gibbs and the plugin generalization errors. We present theoretical guarantees of the proposed method, linking it to Bayesian sensitivity analysis and the infinitesimal jackknife approximation of Bayesian leave-one-out cross validation. We demonstrate that the proposed method achieves accurate, stable generalization error estimates, across a range of settings, including differentially private learning, hierarchical models, regression with influential observations, and models with strong priors, and remains effective in high-dimensional settings.

-Yukito Iba and Keisuke Yano, Posterior Covariance Information Criterion for general loss functions, *Bayesian Analysis*, 2025 (DOI: `https://doi.org/10.1214/25-BA1536`)
-Yukito Iba and Keisuke Yano, Posterior Covariance Information Criterion for Weighted Inference, *Neural Computation*, vol. 35, 1340–1361, 2023 (DOI: `https://doi.org/10.1162/neco_a_01592`)