Shrinkage methods for linear regression problems

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Abstract

Based on Gauss-Markov Theorem, we know that ordinary least square (OLS) estimator is a best linear unbiased estimator (BLUE). However, in practice, we are often not satisfied with OLS estimators for the following reasons.
(1) Prediction accuracy: despite its unbiasness, OLS can have large variance and/or lead to over-fitted model.
(2) Existence: with highly correlated features, an OLS solution may not exist.
(3) Interpretability: with a large number of predictors, we often would like to determine a smaller subset of covariates that contribute most to the output.
In this talk, I will focus on two shrinkage regression methods that attempt to handle the above problems. Shrinkage regression refers to shrinkage methods of estimation or prediction in regression situations. With a term borrowed from approximation theory, these methods are also called regularization methods.