

“Hunting for Interactions -- A Bayesian Approach”

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Abstract

In a regression or classification problem, one often has many potential predictors (independent variables), and these predictors may interact with each other to exert non-additive effects. I will present a Bayesian approach to search for these interactions. We were motivated by the epistasis detection problem in population-based genetic association studies, i.e., to detect interactions among multiple genetic defects (mutations) that may be causal to a specific complex disease. Existing methods are either of low power or computationally infeasible when facing a large number of genetic markers, and sometimes also many quantitative traits. Aided with MCMC sampling techniques, our Bayesian method can efficiently detect interactions among many thousands of markers. We will discuss how to extend this method to deal with general classification problems. This can be viewed as an extension of the naive Bayes method.