

# Statistical approaches for identifying biomarkers for a group of cancer drugs

Jian Zhang

*University of Kent*

*E-mail: J.Zhang-79@kent.ac.uk*

**Abstract:** We propose a novel approach to nonparametric variable screening for sparse multivariate additive models with random effects, which includes two stages. In Stage 1, each nonparametric component is approximated by a linear combination of spline basis functions. Under this approximation, the above screening problem can be treated as selecting block-matrices of regression coefficients for a multivariate regression model. In Stage 2, a series of filtering operations are conducted by projections of the multiple response observations into the covariate space; each filter is tailored to a particular covariate and resistant to interferences originating from other covariates and from background noises. The filtering is further improved by sequentially nulling significant covariates detected in the previous steps. An asymptotic theory on the selection consistency has been established under some regularity conditions. By simulations, the proposed procedure is shown to outperform the existing procedures in terms of sensitivity and specificity over a wide range of scenarios. We apply the proposed approach to the integrative analysis of the anti-cancer drug data, identifying a few biomarkers that potentially influence the concentration of drugs in cancer cell lines.