Residual Likelihood Approach for Single-Index Model Selection

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The single-index model \( E(y|x) = g(x'\beta) \), where \( g \) is an unknown function, is a flexible alternative to the linear regression model while providing more structure than a fully nonparametric approach. In this talk, we first derive RIC, a model selection criterion based on the residual log-likelihood function. This criterion is a general selection criterion that unifies model selection across both parametric and nonparametric functions. We then compare its performance with other selection criteria via Monte Carlo studies. Finally, we discuss the extension of RIC to partially linear model, additive single-index model, finite mixture model, survival model, and multivariate regression model.