Broadcasted Nonparametric Tensor Regression

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Abstract: In this talk, we propose a broadcasted model to study the problem of nonlinear regressions with tensor covariates. The curse of dimensionality is tamed by simultaneously utilizing the low-rank tensor structure and broadcasting a uni-dimensional function within each component. With a regularized estimation, the proposed model shows the advantages of improved prediction performance and suggesting the important regions on the tensor covariates. A novel result on the upper and lower bounds for the eigenvalues of the spline basis matrix is derived in this paper to develop the asymptotic theory. We use both synthetic and real data sets to evaluate the empirical performance of the proposed broadcasted nonparametric regression model with some comparison methods, and the results confirm our theoretical findings.