The Taut String Estimator:
Weak Convergence and Confidence Bands

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Abstract

Davies and Kovac (2001) proposed their taut string estimator to estimate the conditional mean from a set of process data with iid errors within the framework of nonparametric regression. We prove the convergence of the taut string estimator in negative Sobolev spaces at the optimal rate of $n^{-1/2}$ as the sample size n goes to infinity and derive the confidence bands for the (unknown) conditional expectation, which is only assumed Hölder-continuous. Further, under an additional regularity assumption, the explicit form of the leading error term is derived. As an application, we show how the taut string estimator can be used to solve inverse problems with noise. An illustration based on real data is given and a numerical study on the robustness of our approach is presented.

This is joint work with J. Marcus Jobe (Miami University, Oxford, OH).