

Nonparametric Sieve Estimation with Dependent Data: Application to Deep Neural Networks

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Abstract : This paper establishes general conditions for the convergence rates of nonparametric sieve estimators with dependent data. We present two key results: one for nonstationary data and another for stationary mixing data. Previous theoretical results often lack practical applicability to deep neural networks (DNNs). Using these conditions, we derive convergence rates for DNN sieve estimators in nonparametric regression settings with both nonstationary and stationary mixing data. The DNN architectures considered adhere to current industry standards, featuring fully connected feedforward networks with rectified linear unit activation functions, unbounded weights, and a width and depth that grows with sample size.

Keywords : sieve extremum estimates, nonparametric estimation, deep learning, neural networks, rectified linear unit, nonstationary processes

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