Sparse Markov Models for High-Dimensional Inference

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Finite order Markov models are the most well-studied models for dependent data. However, due to the curse of dimensionality, only Markov models with small orders are used in applications. Here we introduce a sparse Markov model suitable for high-dimensional inference. The key innovation is a procedure for the selection of the relevant lags of the model. Our results are based on 1) a structure result of the sparse Markov model and 2) an improved martingale concentration inequality. In the end, we will show some simulations to illustrate our theoretical results.