Variable length Markov chain with exogenous covariates

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Abstract:
Variable Length Markov Chains (VLMC) model the transitions among states of a stochastic process by combining irrelevant past states together, hence avoiding the curse of dimensionality. The main objective of this study is to propose an extension of this class of tree structured models for binary state space along with exogenous covariates. The proposed approach models the transition probabilities to be dependent on both the history of past states as well as the history of the observed exogenous covariates through a logistic link. We show that the proposed algorithm is consistent in the sense that the probability that the estimated tree is equal to the true underlying tree goes to one with increasing sample size.