Non-stationary Dynamic Bayesian Network Learning

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Dynamic Bayesian networks (DBN) are a popular framework for managing uncertainty in time-evolving systems. Their efficient learning has thus received many contributions in the literature. But, most often, those assume that the data to be modeled by a DBN are generated by a stationary process, i.e., neither the structure nor the parameters of the BNs evolve over time. Unfortunately, there exist real-world problems where such a hypothesis is highly unrealistic, e.g., in video event recognition, social networks or road traffic analysis. In this talk, we propose a principled approach to learn the structure and parameters of "non-stationary DBNs", that can cope with such situations. Our algorithm is specifically designed to work in situations where all input data are streamed. Unlike previous works on non-stationary DBN learning, we make no restrictive assumption about the way the structure evolves or over parameters' independence during this evolution. Yet, as highlighted in experimentations, our algorithm scales very well. Its lack of restrictive assumptions makes it very effective to detect events (evolutions).