STATISTICAL ANALYSIS AND DATA MINING

Research Article

A decoupled exponential random graph model for prediction of structure and attributes in temporal social networks

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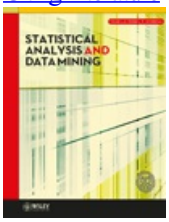
Abstract

The analysis of social networks often assumes time invariant scenario, while in practice actor attributes and links in such networks often evolve over time and are inextricably dependent on each other. In this article, we propose a new method to predict actor attributes and links in temporal networks. Our approach takes into account the attributes corresponding to the participating actors together with topological and structural changes of the network over time. This is achieved by building two conditional predictors to jointly infer links and actor attributes. The proposed prediction method was significantly more accurate than alternatives when evaluated on synthetic data sets and two well-studied real-life temporal social networks. In addition, the new algorithm is computationally more efficient than a related alternative scaling up linearly with the number of temporal observations and quadratically with the number of actors considered. © 2011 Wiley Periodicals, Inc. Statistical Analysis and Data Mining 4: 470–486, 2011



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