Fourth SIGKDD Workshop on Temporal Data Mining: Network Reconstruction from Dynamic Data

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ABSTRACT

Established in 2001, the SIGKDD workshop series on Temporal Data Mining (TDM) is aimed at inferring patterns from large databases that contain either explicit or implicit temporal information. Over the past decade, many powerful data mining techniques have been developed to analyze temporal and sequential data. The time is now fertile for addressing problems of larger scope under the purview of Temporal Data Mining. Hence, the focus of this year's workshop dwells on the question: *What can we infer about the structure of a complex dynamical system from observed temporal data?* The goals of the workshop are to critically evaluate the need in this area by bringing together leading researchers from industry and academia, and to identify promising technologies and methodologies for doing the same.

Categories and Subject Descriptors: H.2.8 [Database Management]: Database Applications - Data Mining; I.2.6 [Artificial Intelligence]: Learning

General Terms: Algorithms.

Keywords: temporal data mining, network reconstruction.

1. INTRODUCTION

The problem of reconstructing system dynamics from sequential data traces is an important one in many areas:

- Neuroscience: Determining functional connectivity in neuronal systems form multi-electrode data;

- Genetics: Inferring gene regulatory networks from time-series of gene expression measurements;

- Epidemiology: Disease spread modeling from people movement data;

- Chemical Engineering: Chemical process and pathway reconstruction from concentration measurements;

- Manufacturing: Root-cause diagonstic inference from plant-floor data; and

- Automotive: Prognostics and fault diagnostics from vehicle data.

In all these applications, the aim is to construct the underlying system model (reflecting connectivity, hierarchy, and/or strength of influences) from observed time-indexed discrete symbol sequences (and, sometimes, continuous-valued measurements). In many of the areas mentioned above, there are isolated pieces of work (see for example, [1], [2]) beginning to appear. A special area of interest to the organizers is neuroscience, where this approach can help discover neural codes and facilitate the creation of brain-computer interfaces [3].

The fourth SIGKDD (half-day) workshop on temporal data mining serves as a forum to discuss network reconstruction as a concerted theme, critically evaluate the need in this area by bringing together leading researchers from industry and academia, and identify technologies and methodologies that worked (and didn't) in specific application contexts. Confirmed invited speakers include C. Lee Giles (Penn State University), Simon Haykin (McMaster University), Bhubaneshwar Mishra (New York University), and Vijay Nair (University of Michigan). In addition, the organizers plan to contribute two papers as background work. Expected outcomes from the workshop include a position paper defining the topic of network reconstruction, creation and release of a challenge dataset that embodies multiple facets of network reconstruction, and collaborative efforts to adapt algorithms developed in diverse contexts toward network reconstruction goals.

2. REFERENCES

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