POLITECNICO MILANO 1863

mecc PhD

DIPARTIMENTO DI MECCANICA

LECTURES

Prof. Kamran Paynabar

Georgia Institute of Technology

Low-Dimensional learning from High-Dimensional Streaming Data for System Performance Improvement

May 31st, 2018
12:00 noon

Sala Consiglio
Dipartimento di Meccanica
Via La Masa 1, Milano

Abstract

Nowadays most systems are instrumented with sensing networks that generate rich datasets and provide distinctive opportunities for performance improvement. However, the complex characteristics of data streams pose significant analytical challenges yet to be addressed. Some common characteristics of these datasets include high variety, high dimensionality, high velocity and intricate spatial and temporal structure. In this talk, I try to address some of these challenges in manufacturing systems. The first part of this talk is focused on the use of machine learning methods in analysis of high-dimensional data for process modeling, monitoring and optimization. A general tensor-based framework is introduced and validated using various datasets obtained from manufacturing systems. In the second part of the talk, I will discuss how statistical and machine learning techniques can be used to develop scalable prognostics models for predicting the residual useful lifetime and providing advance warning of impending failures of industrial assets. Specifically, a (log)-location-scale tensor regression model is proposed in which the time-to-failure is treated as the response and degradation image streams as covariates. The proposed methodology is validated using extensive simulations and a case study.

Speaker short CV

Kamran Paynabar is the Fouts Family Early Career Professor and Assistant Professor in the Stewart School of Industrial and Systems Engineering at Georgia Tech. He received his B.Sc. and M.Sc. in Industrial Engineering from Iran in 2002 and 2004, respectively, and his Ph.D. in Industrial and Operations Engineering from The University of Michigan in 2012. He also holds an M.A. in Statistics from The University of Michigan. His research interests comprise both applied and methodological aspects of machine-learning and statistical modeling integrated with engineering principles. His current research focuses on the analysis of high-dimensional complex data including multi-stream signals, images, point-clouds and network data, for system modeling, monitoring, diagnosis and prognosis. He is a recipient of the INFORMS Data Mining Best Student Paper Award, the Best Application Paper Award from IIE Transactions, the Best QSR refereed paper from INFORMS, and the Best Paper Award from POMS. He has been recognized with the Georgia Tech campus level 2014 CETL/BP Junior Faculty Teaching Excellence Award. He is serving as the chair of QSR of INFORMS, and the president of QCRE of IISE.

Contact and registration:
phd-dmec@polimi.it