

UTC INSTITUTE FOR ADVANCED SYSTEMS ENGINEERING DISTINGUISHED LECTURE SERIES

Monday April 10th, 2017

1:00 - 2:00PM

UConn, Storrs Campus – ITEB 336

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The ALAMO Approach to Machine Learning: Best Subset Selection, Adaptive Sampling, and Constrained Regression

A central problem in modern computational science is that of learning an algebraic model from data obtained from simulations or experiments. We present a methodology that is designed to use a small number of data points to learn models that are as accurate and as simple as possible. The approach relies on integer programming techniques to build low-complexity models. The models are then improved systematically through the use of derivative-free optimization solvers to adaptively sample new simulation or experimental points. Physical constraints and insights are enforced to the model through the solution of semi-infinite optimization and global optimization subproblems. The proposed methodology has been implemented in the ALAMO software for automated learning of algebraic models. We present extensive computational results with ALAMO and comparisons between ALAMO and a variety of machine learning techniques, including Latin hypercube sampling, simple least-squares regression, and the lasso.

Nick Sahinidis

Nick Sahinidis is the John E. Swearingen Professor and Director of the Center for Advanced Process Decision-making at Carnegie Mellon University. He joined Carnegie Mellon in 2007 after a sixteen-year long career at the University of Illinois at Urbana, where he taught in Industrial Engineering and Chemical Engineering. His research has included the development of theory, algorithms, and the BARON software for global optimization of mixed-integer nonlinear programs. Professor Sahinidis' research activities have been recognized by the INFORMS Computing Society Prize in 2004, the Beale-Orchard-Hays Prize from the Mathematical Programming Society in 2006, the Computing in Chemical Engineering Award in 2010, the Constantin Carathéodory Prize in 2015, and the National Award and Gold Medal from the Hellenic Operational Research Society in 2016. Professor Sahinidis has been an INFORMS Fellow since 2014

Upcoming Distinguished Lectures

5/08/17 – Ignacio Grossmann
Challenges in the Application of
Mathematical Programming
Approaches to Enterprise-wide
Optimization of Process Industries

Upcoming Seminars

4/17/17 – Dane Boysen
Democratizing Energy TECHNOLOGY
5/22/17 – James Davis

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