DEPARTMENT of INDUSTRIAL ENGINEERING
UNIVERSITY of HOUSTON

FRIDAY SEMINAR SERIES
BROADEN HORIZONS | EXTEND MINDS

Dr. Adel Alaeddini
Associate Professor
Department of Mechanical Engineering
The University of Texas at San Antonio (UTSA)

Date: Friday Nov 5

Time: 1:00-1:50 PM CT

Zoom Meeting ID:

Password:

Sample Efficient Estimation and Optimization of Expensive to Evaluate Black-Box Functions

Abstract: In many complex engineering problems, efficient estimation and optimization of black-box functions is a major concern. It requires an extensive number of evaluations which is often not available due to the time, budget, or technical constraints. For efficient estimation, we propose an active learning method based on the integration of the Laplacian regularization and gradient directed kernel for identification of the most informative points for learning expensive noisy black-box functions with a minimum number of points. Using a case study for analysis of the kinematics of pitching in baseball as well as simulation experiments, we demonstrate the performance of the proposed algorithm against existing methods in the literature. For global optimization, we propose a multi-armed bandit inspired regularized expected improvement (BREI) to adaptively adjust and improve the balance between the exploration and exploitation for efficient optimization of expensive experiments. Using a case study in the optimization of collision avoidance algorithm in mobile robot motion planning as well as extensive simulations, we validate the proposed algorithm against existing methods in the literature under different levels of noise.

Biography: Dr. Adel Alaeddini is an Associate Professor of Mechanical Engineering and Director of the Advanced Data Engineering Lab at the University of Texas at San Antonio (UTSA). Prior to joining UTSA, he was a Postdoctoral Researcher at the University of Michigan IOE Department. He received his Ph.D. in Industrial and Systems Engineering from Wayne State University. Dr. Alaeddini received a number of awards including the Air Force (Young Investigator Award), NIH/NIGMS, NSF, and VA. Dr. Alaeddini is an associate editor of the Journal of Applied Statistics, Healthcare Management Science, and IISE Transactions on Healthcare Systems Engineering. He is currently serving as the President of the Quality Control & Reliability Engineering (QCRE) Division of the Institute for Industrial & Systems Engineers (IISE), and Chair-Elect of the Quality, Statistics and Reliability Division of INFORMS.