Industrial & Systems Engineering

Seminar Announcement

Goodness of Fit in Inverse Optimization

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Abstract: The classical inverse optimization methodology for linear optimization assumes a given solution is a candidate to be optimal. Real data, however, is imperfect and noisy: there is no guarantee that a given solution is optimal for any cost vector. Inspired by regression, this paper presents a unified framework for cost function estimation in linear optimization consisting of a general inverse optimization model and a corresponding goodness-of-fit metric. Although our inverse optimization model is in general nonconvex, we derive a closed-form solution and present the corresponding geometric intuition. Our goodness-of-fit metric, rho, termed the coefficient of complementarity, has similar properties to R^2 from regression and is quasiconvex in the input data, leading to an intuitive geometric interpretation. We derive a lower bound for rho that possesses the same properties but is more tractable. We demonstrate the application of our framework for model estimation and evaluation in production planning and cancer therapy.

Bio: *Timothy Chan* is the Canada Research Chair in Novel Optimization and Analytics in Health, an Associate Professor in the department of Mechanical and Industrial Engineering and the Director of the Centre for Healthcare Engineering at the University of Toronto. His primary research interests are in optimization under uncertainty and the application of optimization methods to problems in healthcare, medicine, global engineering, sustainability, and sports. He received his B.Sc. in Applied Mathematics from the University of British Columbia, and his Ph.D. in Operations Research from the Massachusetts Institute of Technology. Before coming to Toronto, he was an Associate in the Chicago office of McKinsey and Company, a global management consulting firm. During that time, he advised leading companies in the fields of medical device technology, travel and hospitality, telecommunications, and energy on issues of strategy, organization, technology and operations.

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