Washington University in St. Louis

SCHOOL OF ENGINEERING & APPLIED SCIENCE

Preston M. Green Department of Electrical & Systems Engineering

Seminar Announcement

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Industrial Engineering and Operations Research
UC Berkeley

Thursday, December 8, 2016
Green Hall, Room 0120
10:00 A.M.

Designing Personalized Weight Loss Treatments Using Bilevel Programming

Abstract: Nearly 70% of US adults are overweight or obese, and its annual cost is an estimated $350 billion annually. Currently, the most effective treatments are weight loss programs consisting of counseling sessions and daily goals for physical activity and caloric consumption. But these programs are labor-intensive and expensive to operate, and so new approaches are needed to lower the average per-patient cost of such programs. This talk describes a proposed approach to designing weight loss treatments that uses mobile health data to personalize the daily physical activity goals and number/timing of counseling sessions, in order to reduce the average number of counseling sessions while not affecting the efficacy of the weight loss program. Our approach is based on a predictive modeling framework that incorporates time-varying motivational states (which describe the changing preferences of the patient) – thereby quantifying behavior as decisions generated by optimizing utility functions that depend upon time-varying system states, system inputs, and motivational states, all evolving according to some modeled dynamical process based on qualitative social science models of behavior change. This predictive modeling framework is used to construct a unique model for each patient, and then used to formulate an optimization problem to determine the personalized parameters of the weight loss program for that patient. Among the underlying methodological contributions are new statistically consistent approaches to estimating utility functions, and new duality-based approaches to solving bilevel programs.

Bio: Anil Aswani is currently an Assistant Professor in Industrial Engineering and Operations Research (IEOR) at UC Berkeley. He received his B.S. in Electrical Engineering from the University of Michigan in 2005, M.S. in Electrical Engineering and Computer Sciences (EECS) from UC Berkeley in 2007, and Ph.D. in EECS from UC Berkeley in 2010. He received a Hellman Fellowship for his research on food insecurity, the Leon O. Chua award from Berkeley for outstanding achievement in an area of nonlinear science, and a William Pierskalla Runner-Up Award from the INFORMS Health Applications Society for his work on Medicare incentives. His research interests include developing new methodological techniques for optimization and statistics, as well as applications to designing adaptive incentives and interventions through behavioral analytics, especially as applied to personalizing weight loss treatments using mobile technologies, addressing food insecurity in underserved communities, and studying the use of incentives to improve health care delivery.

Host: Dr. Humberto Gonzalez