IE Decision Systems Engineering
Spring ‘21 Seminar Series

Friday, April 9th, 12-1 p.m.

Zoom https://asu.zoom.us/j/81413425044

Q&A following presentation

“Building Load Control using Distributionally Robust Binary Chance-Constrained Programs with Right-Hand Side Uncertainty and the Adjustable Variants”

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Bio

Yiling Zhang is an Assistant Professor in the Department of Industrial and Systems Engineering at the University of Minnesota. She received her Ph.D. in Industrial and Operations Engineering from the University of Michigan. Her research interests include stochastic programming, integer programming, nonlinear programming, optimization techniques, and statistical analysis. Her research has applications to various complex service systems, including shared mobility, power systems, and scheduling. Her research has been published in journals such as Operations Research, Manufacturing and Service Operations Management, and SIAM Journal on Optimization. Her work has been recognized by several awards, including Honorable Mention for INFORMS Optimization Society Student Paper Prize, IISE Pritsker Doctoral Dissertation Award (2nd Place), and the Richard & Eleanor Towner Prize for Distinguished Academic Achievement.

Abstract

Aggregation of heating, ventilation, and air conditioning (HVAC) loads can provide reserves to absorb volatile renewable energy, especially solar photo-voltaic (PV) generation. However, the time-varying PV generation is not perfectly known when the system operator decides the HVAC control schedules. In this talk, we consider a distributionally robust binary chance-constrained (DBCC) building load control problem under two typical ambiguity sets: moment-based and Wasserstein ambiguity sets. We derive mixed integer linear programming (MILP) reformulations for DBCC problems under both sets. Especially for the DBCC problem under Wasserstein ambiguity set, we utilize the right-hand side (RHS) uncertainty to derive a more compact MILP reformulation than the commonly known big-M MILP reformulations. All the results also apply to general individual chance constraint binary programs with RHS uncertainty. Furthermore, we propose an adjustable chance-constrained formulation to achieve a reasonable trade-off between operational risk and costs. We derive MILP reformulations under both ambiguity sets. Using real-world data, we conduct computational studies to demonstrate the efficiency of the solution approaches and the effectiveness of the solutions.

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Hosted by: Geunyeong Byeon

Talk Recordings: https://drive.google.com/drive/folders/1jpDBDDIRZUMpS_puphQmOOYIc2igZM0W?usp=sharing

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