



TOPIC	Diagnosing infeasible optimization models
ORGANIZERS	Student Leadership Council and Faculty of ACIT Institute and TECHLAV Center
AREA	Diagnosing Infeasible Optimization Models
SPEAKER	Yash Puranik
DATE	Friday March 02, 2018
TIME	3:00 – 4:00 P.M. (EST)
VENUE	Fort IRC 410, North Carolina A&T State University, UTSA and SIPI will be joining through video-conferencing
FEES	No Charge

SYNOPSIS

With increase in the computing power available, optimization models used to make business and engineering decisions are becoming more and more complex. As models continue to grow larger, analyzing models giving erroneous results and correcting them becomes increasingly difficult. Identification of Irreducible Inconsistent Sets (IIS) in a model can help speed up the process of correcting infeasible models [1]. An Irreducible Inconsistent Set is defined as an infeasible set of constraints with every proper subset being feasible. Identifying an IIS provides the model with a set of mutual inconsistencies that need to be eliminated. However, efficient implementations for IIS isolation are only available for linear programs (LPs). This talk will present details of the implementation of IIS isolation methods in the global solver BARON [2] that is general and applicable to LPs as well as nonlinear programs (NLPs) and mixed-integer nonlinear programs (MINLPs). A unique feature of this implementation is the novel deletion presolve algorithm which allows for massive computational speedups for IIS isolation for LPs as well as NLPs and MINLPs.

As a practical application the use of infeasibility analysis for batch scheduling will be demonstrated. Planning and scheduling software are crucial for industries and must provide feasible, robust, and operationally acceptable schedules. The infeasibility isolation methods are used to derive meaningful insights from infeasible instances of a batch scheduling problem. Results from the infeasibility isolation can be conveyed to users of scheduling software in an intuitive manner.

[1] H. J. Greenberg. An empirical analysis of infeasibility diagnosis for instances of linear programming blending models. *IMA Journal of Mathematics in Business and Industry*, 3:163-210, 1992.

[2] Y. Puranik and N. V. Sahinidis. Deletion presolve for accelerating infeasibility diagnosis in optimization models. *INFORMS Journal on Computing*, 29:754-766, 2017.

ABOUT THE SPEAKER

Yash Puranik completed his Dual Degree (B. Tech + M. Tech) in Chemical Engineering with a specialization in Process Systems Engineering from IIT Bombay, India. He completed his PhD at Carnegie Mellon University with research focusing on global optimization algorithms and their applications in July 2016. Yash's research in diagnosis of infeasibilities in optimization models has culminated in the development of an infeasibility diagnosis tool that has been released through the global solver BARON. Yash currently serves as a Research Scientist at Rockwell Automation. At Rockwell, he is researching the use of data-based analytics for process operations.