

Friday, May 15th, 2020

10:00 AM – 12:00 PM CST

Defense held online via Zoom

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Ph.D. Dissertation Defense

Advisor: Dr. Gino J. Lim



"Stochastic Models for the Operating Room Scheduling Problem under Uncertainty"

Abstract

Surgical procedures are complex tasks requiring a variety of specialized and expensive resources. They are recognized amongst the most crucial activities in hospitals from social, medical and economic points of view. The required time for surgical interventions in operating rooms (OR) may vary significantly from the predicted values depending on the type of operations being performed, the surgical team, and the patient. These deviations diminish the efficient utilization of OR resources and result in the disruption of projected surgery start times. The proposed research focuses on developing stochastic models to minimize the associated costs as well as mitigate the risk of disruptions (e.g. OR overtime, patient waiting time). We developed two types of stochastic models using Conditional Value-at-Risk (CVaR) and chance constraints that are adjustable based on the risk attitude of decision makers. The models are compared with the widely used expectation-based models using several criteria such as computational efficiency and cost measures. Extensive numerical experiments are performed to derive valuable insights about the performance of the proposed models and highlight their advantages and disadvantages. Moreover, we developed decomposition algorithms to solve large-scale test instances of the OR scheduling problem, that of which is known to be NP-hard. Strong valid inequalities and bounds are generated iteratively in order to accelerate the convergence speed. It is shown that the decomposition algorithms converge to global optimality in finite iterations.

Zoom link: <https://uofh.zoom.us/j/94030025191>

Meeting ID: 940 3002 5191