Title: Optimizing input data collection for ranking and selection

Abstract: This talk will start by introducing a general challenge in the area of simulation analysis known as input uncertainty problem. When simulation model is calibrated with a finite amount of real-world input data, stochastic simulation output is subject to additional uncertainty caused by the calibration error referred to as input uncertainty. A vehicle content portfolio optimization problem at General Motors will be discussed as a motivating example.

In particular, this talk focuses on a Bayesian ranking and selection (R&S) problem when all solutions share the common estimated input models. In this case, the estimated best solution from the R&S procedure is subject to error due to input uncertainty. Assuming that there are multiple independent input data sources from which data can be collected at a cost to reduce input uncertainty, one can pose a question of how to optimize the data collection strategy to find the true best solution for the real-world problem. We first show that the most probable best (MPB)—the solution with the largest posterior probability of being optimal (posterior preference)—is a strongly consistent estimator for the true optimum. We investigate the optimal asymptotic static sampling ratios from the input data sources that maximize the exponential convergence rate of the MPB's posterior preference. A sequential sampling rule that balances the simulation and input data collection effort is proposed and demonstrated. The algorithm stops with posterior confidence in the solution quality.

Bio: Eunhye Song is a Coca-Cola Foundation Early Career Assistant Professor in the School of Industrial and Systems Engineering at Georgia Institute of Technology. She earned her BS and MS in Industrial and Systems Engineering at Korea Advanced Institute of Science and Technology in 2010 and 2012, respectively, and PhD degree in Industrial Engineering and Management Sciences at Northwestern University in 2017. Prior to joining Georgia Tech, she was on the faculty of Industrial and Manufacturing Engineering at Penn State University from 2017 to 2022. She won the honorable mention at the INFORMS Junior Faculty Interest Group Paper Competition and was awarded the US National Science Foundation CAREER Award in 2020. She is an active member of INFORMS Simulation Society and has served on the Simulation Society Diversity Committee from 2018 to 2020. She is an associate editor of the INFORMS Journal on Computing. Her research interests include simulation design of experiments, uncertainty and risk quantification, and simulation optimization. Her website can be found at: http://eunhyesong.info