Hyungjin Kim

Postdoctoral researcher (Visiting scholar)
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Research Interests

Nonlinear Parameter Estimation & Inverse Problem

Stochastic Simulation

Machine Learning Based Optimization

Applications in Semiconductor Manufacturing & Logistics

Education

Ph.D. Industrial Engineering, Hanyang University, 2024.

Title: Computationally Efficient Parameter Estimation of a Simulation Model for Multiple Observation Vectors

Advisor: Dr. Chuljin Park

B.S. Industrial Engineering, Hanyang University, 2017.

Employment History

Postdoctoral researcher (Visiting scholar), Industrial and Systems Engineering, Georgia Institute of Technology	2024-current
Postdoctoral researcher, BK21 FOUR, Industrial and Systems Engineering, Hanyang University	2024-current

Publications

International Journal Articles (∗: Corresponding author)

Kim, S., **H. Kim**, C. Park*, J. Jeong, H. Yang, S. Kong (2024). Optimal computing budget allocation for operations of a zone-picking system, *International Journal of Simulation Modelling*, 23(2): 203-214.

Kim, H., C. Park*, Y. Kang (2020). Distribution-guided heuristic search for nonlinear parameter estimation with an application in semiconductor manufacturing, *IISE Transactions*, 52(11), 1246-1261.

Kim, H., C. Park*, H. Kim. Surrogate-assisted parameter estimation for multiple vectors of observations, *Computational Statistics and Data Analysis*, under the 3rd round revision.

Kim, H., A. Hwang, C. Park*, S.C. Tsai. Surrogate-assisted controlled random search for optimization via simulation with continuous variables, *Computers and Operations Research*, under the 1st round revision.

Kim, H., C. Park*, H. Kim. Surrogate-assisted Multiple-try Metropolis for parallel Bayesian inferences, to be submitted. (Target journal: *IISE Transactions*)

Kim, D. H., S.-H. Kim, C. Park*, **H. Kim**. Trisection algorithm with Bayes decisions for one-dimensional stochastic root finding problems, to be submitted. (Target Journal: *European Journal of Operational Research*)

Domestic Journal Articles (∗: Corresponding author)

Kim, H., J. Ahn, S. Lee, J. Na, C. Park* (2024). Uncertainty quantification in semiconductor structure measurement using Markov chain Monte Carlo, *Korean Management Science Review*, 41(1), 39-49.

Kim, H., C. Park* (2023). Application of Markov chain Monte Carlo to the optical critical dimension with multiple observation vectors in semiconductor manufacturing, *Korean Management Science Review*, 40(4), 21-38.

Patents

Method of measuring a critical dimension of a three-dimensional structure and apparatus for measuring the same, US Patent, Registration No.: 11,320,732 (Co-work with SK hynix).

Parameter estimation method using Markov chain Monte Carlo, Korean Patent, Application No.: 10-2023-0113244.

Method of measuring critical dimension of 3D feature and apparatus for the same, Korean Patent, Registration No.: 10-2548410 (Co-work with SK hynix).

Method for detecting location of abnormal state based on machine learning, learning method for detecting location of abnormal state, Korean Patent, Registration No.: 10-2307373.

Device of critical dimension based on controlled random search and method implementing thereof, Korean Patent, Registration No.: 10-2548410 (Co-work with SK hynix).

Method for detecting location of abnormal state based on machine learning, learning method for detecting location of abnormal state, Korean Patent, Registration No.: 10-2048519.

Teaching Experience

Hanyang University (Undergraduate, Instructor)- INE 1006 Simulation (Fall, 2023)

Research Grants

Bayesian inference and machine learning techniques for smart measurement system, National Research Foundation of Korea, Korea, **Principal Investigator**, Total Dollar Amount: $44,000 (Sep. 2024 - Aug. 2025)

Reinforcement learning-based decision support systems for operations of smart fulfillment centers, National Research Foundation of Korea, Korea, Co-Investigator (Jun. 2022 - Feb. 2025)

Improving efficiency for measuring critical dimensions of semiconductor devices via machine learning techniques, National Research Foundation of Korea, Korea, Co-Investigator (Jun. 2019 - Feb. 2022)

Optimal environmental monitoring network design using smart sensors, National Research Foundation of Korea, Korea, Co-Investigator (Jun. 2016 - Aug. 2019)

Smart operations management plan for emergency medical centers using information and communication technology, National Research Foundation of Korea, Korea, Co-Investigator (Jun. 2015 - Feb. 2018)

Development of OCD Spectrum Library Technology, SK hynix, Korea, Co-Investigator (Jul. 2016 - Jul. 2017)

An education and research team for sharing and cooperation based smart systems, Ministry of Education, Korea, Co-Investigator (Sep. 2020 - Aug. 2027)

2019 Second Half Excellent Integrated Master's and Doctoral Course Additional Support Program, Hanyang University, Korea (Sep. 2019 - Feb. 2020)

Presentations

International Conferences

Kim, H., C. Park, and H. Kim., "Efficient Parallel Bayesian Parameter Estimation of a Simulation Model via Surrogates-Assisted Multiple-Try Metropolis", INFORMS Annual Meeting, Seattle, United States (Oct. 2024)

Kim, H., C. Park, and H. Kim., "Parameter estimation via random search with surrogate and simulation models for multiple vectors of observations", INFORMS Annual Meeting, Phoenix, United States (Oct. 2023)

Park, C. and **H. Kim.**, "Repeatedly estimating correlated and normally distributed parameters of an expensive and highly nonlinear model", INFORMS Annual Meeting, Seattle, United States (Oct. 2019)

Kim, H. and C. Park, "Estimating correlated parameters for an expensive model with an application in semiconductor manufacturing", The Fifth International Conference on Interfaces Between Statistics and Engineering, Seoul, Korea (Jun. 2019)

Domestic Conferences

Kim, H., C. Park, H. Kim, "Efficient parameter estimation for multiple vectors of observations", KORMS, Seoul, Korea (Oct. 2023)

Kim, H., C. Park, "Simulation budget controls with a surrogate model for a batch of parameter estimation problems", KORMS, Seoul, Korea (Oct. 2022)

Hwang, A., **H. Kim**, C. Park, "Solving a simulation optimization problem with continuous variables by a surrogate-assisted heuristic search", KORMS, Seoul, Korea (Jun. 2022)

Park, S., **H. Kim**, C. Park, "Optimal decision making for a fulfillment center using a simulation model and multi-armed bandits", KORMS, Seoul, Korea (Jun. 2022)

Kim, H., C. Park, "Efficiently solving a batch of parameter estimations using a single-layered Bayesian neural network model", KORMS, Seoul, Korea (Jun. 2021)

Kim, K., **H. Kim**, C. Park, "Improving heuristic algorithms for a batch of the nonlinear parameter estimation problems", KSIE, Seoul, Korea (Jun. 2021)

Kim, H., C. Park, "Repeatedly estimating correlated and normally distributed parameters of an expensive and highly nonlinear model", KORMS, Seoul, Korea (Jun. 2019)

Awards

The Best Patent Award (2nd place), SK hynix, Korea (Mar. 2019)

Hanyang Brain Scholarship (Sep. 2016)

The Best Ph.D. Scholarship (Mar. 2017-Sep. 2019)