JISUN LEE

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EDUCATION

Ph.D. **University of California, Berkeley**, USA
- Industrial Engineering & Operations Research, August 2020 - present (expected May 2025)
- Advisor: Alper Atamtürk [link]

M.S. **Seoul National University (SNU)**, Republic of Korea
- Industrial Engineering, August 2019
- Advisor: Kyungsik Lee [link]
- Thesis: An Approximation Scheme for the Probability Maximizing Combinatorial Optimization Problem [link]

B.S. **Seoul National University (SNU)**, Republic of Korea
- Industrial Engineering, August 2017
- Thesis: A Study on the Corporate Credit Rating Prediction Model using Convolution Neural Network with Time Series Data

PAPERS

Convexification of multi-period mixed-integer quadratic optimization [pdf]

Jisun Lee, Andrés Gómez, and Alper Atamtürk.

(Manuscript, presented at INFORMS 2024, MIP Workshop 2024)

- Multi-period MIQPs are studied utilizing unique properties of (block) separable matrices. A convex hull representation and a polynomial-time algorithm are proposed.

Cut generation for multi-period mixed-integer quadratic optimization through coupling periods

Jisun Lee and Alper Atamtürk. (Working paper)

- Novel tightening cuts for multi-period MIQPs, leveraging matrix decomposition and second-order cone constraints, are developed.

Efficient sampling from ϵ-optimality solution set of mixed-integer programming problems [pdf]

Jisun Lee, Alper Atamtürk, and Ignacio Aravena Solís. (Working paper)

- A parallelizable sampling method that efficiently generates well-distributed points within an ϵ-optimal solution set is proposed.

Strong formulations for hybrid system control problem [pdf]

Jisun Lee, Hyungki Im, and Alper Atamtürk.

(Manuscript, presented at MIP Workshop 2023, INFORMS 2023, SIAM Optimization Conference 2023)

- Proposed strong formulations for MIQPs arising in hybrid model predictive control, utilizing cuts derived by disjunctive programming and perspective reformulation.
- Application to the energy management of power-split hybrid electrical vehicle is demonstrated.

A fully polynomial time approximation scheme for the probability maximizing shortest path problem [pdf]

Jisun Lee, Seulgi Joung, and Kyungsik Lee. European Journal of Operational Research, 2022.

- An FPTAS that iteratively solves deterministic shortest path problems to find an approximate solution with guaranteed bound on a directed graph with Gaussian random arc lengths is proposed.

PRESENTATIONS

2024 INFORMS Annual Meeting, Seattle, USA. [slides]
- Convexification of multi-period mixed-integer quadratic optimization.

2024 Mixed Integer Programming Workshop, Kentucky, USA. [poster]
- Strong formulation of hybrid control problem with tridiagonal inverse matrix.

2019 European Conference on Operational Research, Dublin, Ireland. [slides]
- An approximation scheme of the probability maximizing combinatorial optimization problem.

2019 Fall Conference of Korean Institute of Industrial Engineers, Seoul, Republic of Korea.
- A fully polynomial time approximation scheme for the probability maximizing shortest path problem.

2019 Spring Conference of Korean Institute of Industrial Engineers, Seoul, Republic of Korea.
- An approximation scheme of the probability maximizing combinatorial optimization problem.

RESEARCH EXPERIENCE

2021.5 - current **Berkeley Computational Optimization Lab (BCOL)**, USA
- Hybrid Control of Autonomous Systems with Mixed-Integer Quadratic Optimization
  - U.S. Department of Defense, ONR Grant 12951270 (2020-2023)

2024.6 - 2024.8 **Lawrence Livermore National Lab (LLNL)**, USA
- Graduate student research intern, Computational Engineering Division

TEACHING EXPERIENCE

IEOR 262A **Mathematical Programming I** UC Berkeley, Fall 2024

IEOR 165 **Engineering Statistics, Quality Control, and Forecasting** UC Berkeley, Spring 2024

IEOR 142 **Introduction to Machine Learning and Data Analytics** UC Berkeley, Spring 2023

RESEARCH INTEREST

- Integer Programming, Combinatorial Optimization, Convex Optimization
- Applications: Statistical Learning, Control Optimization
- Optimization Under Uncertainty: Stochastic Optimization, Robust Optimization

SKILLS

Programming Language: Python, Java, C++

Modeling & Analysis Tool: Gurobi, Mosek, Xpress, CPLEX, Drake, MPI, MATLAB, R, Arena

HONORS & AWARDS

Bonder Scholarship, Seth Bonder Foundation, 2024.
Exellence Prize (3rd Prize) in KIIE Master's Thesis Competition, 2019.
Brain Korea 21 Plus Scholarship, 2018.
National Scholarship for Science & Engineering, Korea Student Aid Foundation, 2016.
SNU Scholarship for Academic Achievement, 2015.
Uisan Engineering Scholarship, 2014.
4th Prize in SNU Big Data Institute 2nd Datathon, 2014.