JONGHYUN SIM

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RESEARCH INTERESTS

Sequential Decision-Making under Uncertainty, Robust and Stochastic Optimization, High-Dimensional Statistics

EDUCATION

Chung-Ang University Mar 2021–Feb 2027
Double Major, Cum Laude (Expected), GPA: 3.73/4.0 Seoul, Korea
Bachelor of Statistics, Applied Statistics
Bachelor of Business Administration, Global Finance

Selected Coursework

Machine Learning Theory and Practice, Statistical Computing, Applied Probability, Introduction to Statistical Learning*, Multivariate Statistical Analysis*, Bayesian Statistics*, Applied Statistics***

* In progress during the final semester (Fall 2026)
** Graduate Course, auditing during the final semester (Fall 2026)

PUBLICATION

1. **Jonghyun Sim**, Wonyoung Kim, "Dominant Arm Identification with Mixing and Recycling Observed Samples", Manuscript under review at AAAI 2027

RESEARCH EXPERIENCE

SIAI Lab, Undergraduate Researcher Apr 2025–Present
Advisor: Dr. Wonyoung Kim *Seoul, Korea*

· **Dominant Arm Identification with Mixing and Recycling Observed Samples**

- Proposed a novel dominance score criterion based on local distributional dominance, capturing crossing CDFs, tail behavior, and heterogeneous reward profiles that may be overlooked by mean-based comparisons.
- Developed a doubly robust estimator with a joint mixing-and-recycling mechanism that guarantees simultaneous convergence of the empirical distribution functions for all arms.
- Proposed the Doubly Robust Dominance Score Elimination (DRDSE) algorithm, which correctly identifies the best dominance score arm with a sample complexity upper bound that matches the lower bound up to logarithmic factors.

· **Best-Arm Identification with High-Dimensional Covariates**

- Developed an unbiased estimator using left singular vectors and an L1-norm-based randomized sampling mechanism to reconstruct high-dimensional signals from a single coordinate observation per decision step.
- Proved unbiasedness and covariance preservation and extended spectral analysis to feature selection using high-order perturbation analysis and the Sherman-Morrison formula.
- Implemented numerical experiments on SVD-constructed instances, confirming that empirical convergence rates align with the theoretical sample complexity and regret guarantees.

FUNDED RESEARCH PROJECTS

Decision Making Agent Learning Partially Observable Covariate with Maximally Explainable Basis Augmentation Mar 2026–Feb 2027

· Role: Research Assistant – High-Dimensional Reinforcement Learning

· Funding Agency: Ministry of Science and ICT (MSIT), South Korea
· Principal Investigator: Dr. Wonyoung Kim
· Project funding: $98,000 USD

Sequential Decision Making Algorithm with Partially Observable Features Sep 2025–Aug 2026

· Role: Research Assistant
· Funding Agency: Ministry of Science and ICT (MSIT), South Korea
· Principal Investigator: Dr. Wonyoung Kim
· Project funding: $67,000 USD

PROJECTS

Dominant Arm Identification for Clinical Treatment Selection
2026 C.O.R.E Academic Conference, Chung-Ang University

· Examined the applicability of the Dominant Arm Identification framework to clinical treatment selection.
· Identified statistical, clinical, ethical, and validation requirements for real-world adoption.

Insurance Risk Model Auditing: Fairness and Interpretability
2026 College of Business and Economics Academic Conference, Chung-Ang University

· Developed an ML pipeline for life-insurance risk classification using SMOTE, Random Forest, and XGBoost.
· Used SHAP-based interpretability analysis to examine feature contributions and potential fairness concerns.
· Advanced to the main round as one of 20 selected teams.

Backtesting Trading Strategies on FAANG
Course Project, Business and Economics SW Programming, Chung-Ang University

· Engineered RSI, moving-average crossovers, volume z-scores, and volatility bands from FAANG equity data.
· Built a rule-based backtesting engine using Sharpe ratio, win rate, maximum drawdown, and profit/loss ratio.
· Benchmarked three rule-based strategies against buy-and-hold and diagnosed profit/loss ratios from no-loss runs.

ACADEMIC SERVICE

Peer Review Assistant, AAAI 2027

· Reviewed two papers under faculty supervision and prepared corresponding review comments.

Peer Review Assistant, NeurIPS 2026 MLxOR Workshop

· Reviewed one paper under faculty supervision and prepared review comments.

ACADEMIC OUTREACH

Chung-Ang University, 2025 CAU AI Symposium Sep 2025
SIAI Lab Representative / Booth Exhibitor *Seoul, Korea*

· Managed the lab's booth, introducing published papers and ongoing projects to approximately 300 attendees from 15+ countries, including scholars, industry professionals, and exchange students.
· Assisted the PI with technology transfer consultations with corporate representatives, explaining the technical feasibility and industrial applications of the lab's AI research.
· Answered technical questions from international attendees, explained lab initiatives, and facilitated networking across academia and industry.

TEACHING EXPERIENCE

Private Academy, Mathematics Lecturer Jul 2026–Present
Subjects: (Pre)Algebra, Calculus, Geometry *Seoul, Korea*

- Taught a total of 20+ middle school students across small-group classes and individual sessions.
- Led intensive problem-solving sessions for classes of 5 to 10 students, demonstrating step-by-step solutions to help students master complex mathematical concepts.
- Managed regular grading and personalized feedback for all student assignments, handling a high volume of coursework and daily math inquiries.

Chung-Ang University, Teaching Assistant Jan 2026–Feb 2026
Subject: Data & AI Literacy *Seoul, Korea*

- Co-managed instructional support for a cohort of 1286 incoming students as one of two teaching assistants, guiding them through software curriculum content, practical exercises, and course assignments.

Private Academies, Mathematics Lecturer Mar 2021–Mar 2022
Subjects: (Pre)Calculus, Algebra, Statistics *Goyang, Korea*

- Taught a total of 100+ middle and high school students across multiple learning academies, managing small-group classes of 5 to 10 students alongside individual sessions.
- Led targeted problem-solving sessions by breaking down complex solution processes, helping students build structured and systematic approaches to mathematical concepts.
- Evaluated regular assignments and delivered personalized feedback for a high volume of coursework, efficiently resolving student inquiries on challenging problem sets.

WORK EXPERIENCE

INBANG INDUSTRIAL CO., LTD (Family Business) Jan 2026–Feb 2026
Operations Assistant

- Supported plant construction operations by organizing cost, procurement, subcontractor quotations, and construction progress data.
- Gained exposure to the full project lifecycle, from cost estimating and bidding through procurement, construction, and final account settlement.
- Assisted with cost and operational data management for plant construction contracts valued at approximately $20M.

Repulbic of Korea, Air Force Aug 2022–May 2024
Logistics and Supply Specialist

- Analyzed historical consumption data using defense logistics systems and Excel to forecast seasonal demand fluctuations (e.g., winter fuel and peak-season rations) to achieve a zero-stockout supply chain.
- Co-managed the monthly financial closing and cost auditing for the remote site's independent food service budget of $700K+ for 200 personnel, operating within a lean, four-person Logistics and Supply section.
- Maintained 100% operational accountability for over $3.5M in non-food tactical supplies and durable property, conducting periodic physical audits as one of two enlisted specialists in the unit.
- Managed the emergency conservation of fuel and rations when severe weather prevented supply trucks from reaching the remote base, maintaining daily operations for 200 personnel.

VOLUNTEER EXPERIENCE

Educational Volunteering – North Korean Refugees Foundation Sep 2025–Jan 2026

- Provided tutoring and mentorship to North Korean refugee children, teaching basic mathematics and English to strengthen their foundational academic skills and learning confidence.
- Designed personalized learning materials to bridge individual academic gaps, adapting lessons to match each student's specific learning pace and style.
- Supported students' adaptation to South Korean society and guided them in discovering their goals and aspirations through continuous mentoring and encouragement.

ADDITIONAL INFORMATION

Languages	Korean (Native), English (IELTS 7.5)
Hobbies	Alpine skiing and weight training

PROGRAMMING SKILLS

Python, R, LaTeX