



# Woojin Chae (Arthur)

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## RESEARCH INTERESTS

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# Theory: Machine Learning, Causal Inference, Statistics, Optimization, Game Theory

# Applications: Operations Research (Data-driven Decision-making, Social Networks, Online Advertisement, AI-Fairness)

## EDUCATION

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### Korea Advanced Institute of Science and Technology (KAIST)

B.S. in Transdisciplinary Studies (Data and Operational Analytics) & Mathematical Sciences

Minor in Computer Science

Advisor: Kyoungkuk Kim

Daejeon, Korea

Mar. 2020 — Jun. 2025

(Expected)

GPA: (TS) 4.0/4.3, (MAS) 3.83/4.3

### Chungbuk Science High School (CSHS)

High School Diploma for Gifted, Early Graduation in 2 years

Cheongju, Korea

Mar. 2018 — Feb. 2020

## ACADEMIC EXPERIENCE

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### OptALab, KAIST

Advisor: Dabeen Lee (KAIST, Industrial and Systems Engineering)

Undergraduate Research Program (URP)

Daejeon, Korea

Jan. 2024 — Current

- Designed reinforcement learning algorithms [1]  $\gamma$ -LSCVI-UCB (linear MDP) and [2]  $\gamma$ -UCRL-CVTR (linear mixture MDP) for learning weakly-communicating MDPs in an infinite-horizon, average-reward setting, achieving sublinear regret and tractability through clipping oracle [1,2] and Hoeffding-type exploration [2]
- Computationally Efficient Reinforcement Learning for Infinite-Horizon Average-Reward MDPs with Linear Function Approximation*, Woojin Chae (1), Dabeen Lee (Corresponding Author), [Preparing submission for AISTATS 2025]

### ISPLab, KAIST

Advisor: Wonjoon Kim (KAIST, School of Business and Technology Management)

Undergraduate Research Assistant

Daejeon, Korea

Dec. 2022 — May. 2024

- Participated in project analyzing organizational changes' impact on researcher performance using multi-source data
- Developed a web crawler to collect and process extensive data from multiple sources (KRI, Clarivate and Scopus)
- Designed and implemented a disambiguation module to correct researcher data errors using heuristic approach

### Risk Lab, KAIST

Advisor: Kyoungkuk Kim (KAIST, College of Business)

Individual Study

Daejeon, Korea

Mar. 2022 — Jun. 2022

- Led a project on creating quantitative investment strategies using APIs (marcap, pykrx, and FinanceDataReader)
- Backtested and compared performance of capital-based, momentum-based, and fundamental indicator-based models

### Risk Lab, KAIST

Advisor: Kyoungkuk Kim (KAIST, College of Business)

Undergraduate Research Assistant

Daejeon, Korea

Jul. 2021 — Aug. 2021

- Participated in project developing indicators to detect the regime of the Korean stock market
- Researched and analyzed the construction of market indicators, such as the Fear and Greed Index and the Buffett Index
- Presented anomalies affecting stock prices based on statistics

## INDUSTRIAL EXPERIENCES

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### i.Divine

Software Developer

Remote

Jun. 2022 — Aug. 2023

- Served as full-stack developer in charge of database management, web development, and data analysis
- Developed data migration module from MongoDB to PostgreSQL and designed indexes to optimize database performance
- Implemented a search engine (GUI) for extensive patent and research data, using multiprocessing for real-time requests
- Implemented a Levenshtein-based algorithm to improve search functionality, linking related patents and research papers by authorship and content

## PROJECTS

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### Online Learning in Music Recommendations [pdf, code]

Daejeon, Korea

*Individual Project on IE437 Data-Driven Decision Making and Control*

Mar. 2024 — Jun. 2024

*Keyword: Human Feedback Reinforcement Learning, Contextual Bandits, Regret Analysis*

- Conducted a comparative study of online learning algorithms for music recommendations using Spotify data
- Implemented and tested contextual bandit algorithms (Linear UCB, SGD, Deep Learning) to learn user music preferences
- Conducted EDA on Spotify data, identifying features that drive user preferences and improving recommendation accuracy

### Analyzing Hiring Discrimination Patterns [pdf, slides, code]

Daejeon, Korea

*Individual Project on MAS456 Statistical Methods with Computer*

Mar. 2024 — Jun. 2024

*Keyword: Cluster Analysis, Principal Component Analysis (PCA), Logistic Regression*

- Led a project on analyzing hiring discrimination using data from the KLIPS survey, focusing on 3,576 wage workers
- Identified key variables and patterns influencing discrimination experiences using Logistic Regression and PCA
- Implemented clustering algorithms (K-means) to examine the impact on self-rated health and employment outcomes

### HOSPOT [slides, code]

Daejeon, Korea

**Advisor: Hyunwook Ka (KAIST, School of Transdisciplinary Studies)**

Mar. 2021 — Dec. 2021

**Advisor: Jaegyun Jung (KAIST, Graduate School of Medical Science and Engineering)**

*Team Leader/Software Developer*

- Led project developing a medical app for KAIST international students, improving access to specialized healthcare
- Served as the team leader, responsible for managing interviews with KISA (Kaist International Students Association), identifying problems and solutions, and designing features for the application
- Implemented the ‘Symptom Checker’ feature, which provides diagnostic recommendations based on Clinical Performance Examination (CPX) guidelines from the Health Insurance Review & Assessment Service

## SELECTED COURSES

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### Mathematics

- Analysis I, II (P, A+)
- Linear Algebra (P)
- Probability and Statistics (A+)
- Discrete Mathematics (P)
- Topology (A-)
- Complex Variables (B0)
- Elementary Probability Theory (B0)
- Lebesgue Integral Theory (A0)
- Advanced Statistics (A0)
- Statistical Methods with Computer (A+)

### Data and Operational Analytics

- Principles of Accounting (A0)
- Microeconomics (A+)
- Programming Structure for Electrical Engineering (A-)
- Artificial Intelligence for Finance (A-)
- Convex Optimization (A+)
- Data-Driven Decision Making and Control (A+)

### Computer Science

- Data Structure
- System Programming
- Computer Organization
- Machine Learning
- Programming Language
- Introduction to Computer Networks

## AWARDS

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### The 1st King of Reading

Daejeon, Korea

Awarded to outstanding individual/group readers in KAIST (Received both of them)

Feb. 2022

### Department Honors Scholarship (Trandisciplinary Studies)

Daejeon, Korea

Awarded to the top three students in department of Trandisciplinary Studies

Aug. 2021

## EXTRACURRICULAR ACTIVITIES

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**Aquilla (KAIST Football Club)**  
*Club Member*

Daejeon, Korea  
Aug. 2022 — Feb. 2023

**KFAC (KAIST Financial Analysis Club)**  
*Club President (Jan. 2022 — Jun. 2022)*

Daejeon, Korea  
Aug. 2020 — Jun. 2022

## ENGLISH & GRE TESTS

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### TOEFL:

Reading: 28 (24) — Listening: 27 (25)  
Speaking: 22 (20) — Writing: 25 (17)  
Test date: August 24th. 2024

### GRE General Test:

Verbal: 159 (155) — Quant: 170  
Analytical writing: 3.5 (3.0)  
Test date: July 29th. 2023

## SKILLS

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- **Programming:** Python, C++, R, MATLAB, Java, Scala
- **Development:** HTML/CSS, JavaScript, Django, FTP
- **Database:** PostgreSQL, MySQL, MongoDB
- **Tools:** Git, Selenium, L<sup>A</sup>T<sub>E</sub>X
- **Language:** Korean (Native), English (Fluent)

## REFERENCES

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### Prof. Kyoungkuk Kim

Professor, College of Business, KAIST, Seoul, Korea  
E-mail: [catenoid@kaist.ac.kr](mailto:catenoid@kaist.ac.kr)  
Personal Page: [Link](#)

### Prof. Wonjoon Kim

Professor, School of Business and Technology Management, KAIST, Daejeon, Korea  
E-mail: [wonjoon.kim@kaist.ac.kr](mailto:wonjoon.kim@kaist.ac.kr)  
Personal Page: [Link](#)

### Prof. Dabeen Lee

Associate Professor, Industrial and Systems Engineering, KAIST, Daejeon, Korea  
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