

# Junhyung Ahn

## SUMMARY

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I am a machine learning researcher with a strong academic foundation and industrial experience, focusing on causal inference and recommender systems. My work focuses on developing solutions to complex data challenges, particularly mitigating data bias and scarcity, with a commitment to advancing fairness and robustness in AI. Leading and collaborating on large-scale machine learning projects has strengthened both my technical expertise and interdisciplinary teamwork skills. Through my Ph.D., I aim to design fair and robust machine learning methodologies for high-stakes applications, bridging theory and practice to foster socially beneficial AI.

## EDUCATION

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

*M.S. in Electrical Engineering*

Feb. 2019 – Feb. 2022

*Daejeon, Republic of Korea*

- GPA: 3.91 / 4.3
- Advisor: Professor Changho Suh
- Thesis: “Leveraging Hierarchical Similarity Graphs for Matrix Completion”

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

*B.S. in Electrical Engineering*

Mar. 2015 – Feb. 2019

*Daejeon, Republic of Korea*

- GPA: 3.93 / 4.3
- Graduated Magna Cum Laude

## RESEARCH INTERESTS

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- Causal Inference
- Recommender Systems
- Fair and Robust Machine Learning

## PUBLICATIONS

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1. **Junhyung Ahn** and Sanghack Lee, “On Predicting Post-Click Conversion Rate via Counterfactual Inference,” *IEEE International Conference on Data Mining (ICDM)*, 2025. (**Best Paper Award Finalist**)
2. **Junhyung Ahn**, Adel Elmahdy, Soheil Mohajer, and Changho Suh, “On the Fundamental Limits of Matrix Completion: Leveraging Hierarchical Similarity Graphs,” *IEEE Transactions on Information Theory*, vol. 70, no. 3, pp. 2039–2075, 2024.
3. Adel Elmahdy\*, **Junhyung Ahn**\*, Soheil Mohajer, and Changho Suh, “The Optimal Sample Complexity of Matrix Completion with Hierarchical Similarity Graphs,” *IEEE International Symposium on Information Theory (ISIT)*, pp. 2409–2414, 2022. (\* Equal contribution)
4. Adel Elmahdy\*, **Junhyung Ahn**\*, Changho Suh, and Soheil Mohajer, “Matrix Completion with Hierarchical Graph Side Information,” *Conference on Neural Information Processing Systems (NeurIPS)*, pp. 9061–9074, 2020. (\* Equal contribution)

**AI Engineer, Causal Inference Team**

Aug. 2025 – Present  
*Seongnam, Republic of Korea*

*NAVER*

1. Research on Off-Policy Evaluation under Deterministic Online Ad Auctions
  - \* Exploring kernel-based relaxation methods to reduce variance in importance sampling for deterministic eCPM-based ranking policies.
  - \* Designing large-scale training and evaluation pipelines leveraging NAVER's ad logs to enable more reliable offline policy evaluation of production models.

**Machine Learning Engineer, AI Team**

Mar. 2022 – May 2025  
*Seoul, Republic of Korea*

*Dable*

- Served as technical research personnel (alternative military service).
  - Led a team to develop machine learning models for conversion rate (CVR) prediction, addressing data bias and scarcity in e-commerce settings.
1. Resolving Data Bias with Causal Inference
    - \* Developed a novel causal inference-based methodology for CVR prediction, specifically imputing conversion labels for non-clicked samples using counterfactual inference.
    - \* Achieved a 2% improvement in offline CVR estimation—a substantial gain given the dataset's large scale and low conversion rates—along with a 17% boost in online CVR over state-of-the-art algorithms.
    - \* Published a paper in *IEEE ICDM*.
  2. Addressing Data Scarcity with Multi-Task and Self-Supervised Learning
    - \* Employed multi-task learning and self-supervised learning approaches by augmenting embedding vectors of features and implementing contrastive loss functions.
    - \* Achieved a 14% improvement in online CVR estimation, showcasing the effectiveness of these techniques in enhancing machine learning models under data-limited conditions.

**Master's Student, Information System Lab**

Feb. 2019 – Feb. 2022  
*Daejeon, Republic of Korea*

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

1. Matrix Completion with Hierarchical Graph Side Information
  - \* Researched solutions to address the cold-start problem and mitigate data scarcity in matrix completion using social graphs.
  - \* Theorized the information-theoretic limit for the minimum observed matrix entries needed for perfect recovery of missing data.
  - \* Developed a computationally efficient algorithm leveraging user social similarity graphs as side information, achieving an 18% reduction in prediction error and an 80% decrease in computational time compared to existing methods, while meeting the information-theoretic limit for data recovery.
  - \* Published papers in venues, including *NeurIPS*, *ISIT*, *IEEE Transactions on Information Theory*.
2. Medical Image-Based Patient Search System
  - \* Collaborated with Samsung Medical Center on this project, contributing to AI-driven medical diagnostics.
  - \* Developed a deep learning-based retrieval system for chest disease prediction using PyTorch, extracting semantically meaningful features.
  - \* Achieved 85% accuracy in classifying 14 types of chest diseases and verified the system's ability to retrieve semantically similar images, as confirmed by medical specialists.

**Research Intern, ML Infra Lab**

Mar. 2018 – Aug. 2018  
*Seongnam, Republic of Korea*

*SK Telecom*

- Designed and implemented a dynamic learning rate schedule, accelerating model convergence by a factor of three while preserving prediction accuracy.
- Designed a distributed deep learning training system, reducing computational costs by 30%.

## HONORS & AWARDS

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- Magna Cum Laude** Feb. 2019  
*Korea Advanced Institute of Science and Technology (KAIST)* Daejeon, Republic of Korea
- KAIST Support Scholarship** Mar. 2019 – Dec. 2020  
*Korea Advanced Institute of Science and Technology (KAIST)* Daejeon, Republic of Korea
- National full scholarship awarded by the Korean government during the Master’s Program.
  - Total value: \$24,000.
- National Science & Technology Scholarship** Mar. 2015 – Dec. 2018  
*Korea Advanced Institute of Science and Technology (KAIST)* Daejeon, Republic of Korea
- National full scholarship awarded by the Korean government during the Undergraduate Program.
  - Total value: \$15,000.
- KAIST Support Scholarship** Mar. 2015 – Dec. 2018  
*Korea Advanced Institute of Science and Technology (KAIST)* Daejeon, Republic of Korea
- Scholarship received for 8 semesters during the Undergraduate Program.
  - Total value: \$20,000.

## TEACHING EXPERIENCE

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- AI and Machine Learning Courses** Aug. 2019 – Dec. 2021  
*Korea Advanced Institute of Science and Technology (KAIST)* Daejeon, Republic of Korea
- Taught industry-focused machine learning courses for Samsung, SK-Hynix, Seongnam-KAIST, and Hyundai Motor, contributing to the upskilling of engineers in advanced AI techniques.
- Teaching Assistant (TA)** Sep. 2019 – Aug. 2020  
*Korea Advanced Institute of Science and Technology (KAIST)* Daejeon, Republic of Korea
- Assisted in course design, lecture preparation, and tutorial sessions for “Wireless Communication Systems” (EE321, Instructor: Professor Changho Suh) and “Introduction to Electronics Design Lab” (EE305, Instructor: Professor Junkyun Choi).

## TECHNICAL SKILLS

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**Programming Languages:** Python, MATLAB, JavaScript, TypeScript, C++

**Machine Learning Frameworks:** PyTorch, TensorFlow, Scikit-learn

**Data Analysis & Visualization:** Pandas, NumPy, Matplotlib, Seaborn

**Big Data & Distributed Systems:** Spark, Hadoop, Ray

**Database & Cloud Platform:** SQL, AWS

**DevOps & Tools:** Git, Docker, Kubernetes

**Languages:** English (TOEFL iBT 106), Korean (Native)

## CONTACTS & HOMEPAGES

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