# Yoonhyuk Choi (Last update: Mar. 2025)

Samsung SDS
AI Preceding Study Lab
Research Scientist

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## RESEARCH INTEREST

My research interest lies in *Machine Learning* and *Data Mining*, especially in **Large Language Models**, **Retrieval Augmented Generation**, **Recommender Systems**, and **Graph Neural Networks**.

## EDUCATION

•**Seoul National University**                                          Mar. 2019 - Aug. 2023
*Ph.D. & M.S.*, Computer Engineering                          Advisor: Dr. Chong-Kwon Kim

•**University of Seoul**                                              Mar. 2013 - Feb. 2019
*B.S.*, Computer Science                                     Advisor: Dr. Eui-Kyeong Hong

## WORK EXPERIENCE

•**Research scientist**                                               Oct. 2024 - Current
**Samsung SDS**, Seoul, South Korea
RAG on knowledge graph, low-rank optimization

•**Postdoc. associate**                                             Nov. 2023 - Sep. 2024
**Arizona State University**, Tempe, United States (PI: Dr. Selcuk Candan, co-PI: Dr. Huan Liu)
Participating in solving water-related problems (e.g., water quality, storage, and so on)

•**Postdoc. associate**                                             Sep. 2023 - Nov. 2023
**Korea Institute of Energy Technology**, Naju, South Korea (PI: Dr. Dr. Chong-Kwon Kim)
Applying machine learning to solve energy-related problems

•**Backend engineer**                                               Jun. 2018 - Sep. 2018
**nTOPAZ**, Seoul, South Korea
Front & Back-end development for blockchain service, Tech: 1) Django & jQuery, 2) Node js, 3) JS & CSS

## PUBLICATIONS (GOOGLE SCHOLAR) - C: CONFERENCE, J: JOURNAL, P: PREPRINT

- (C8) Review-Based Hyperbolic Cross-Domain Recommendation
  **Yoonhyuk Choi**, Jiho Choi, Taewook Ko, Chong-Kwon Kim
  **ACM International Conference on Web Search and Data Mining (WSDM), 2025**

- (C7) Mitigating Overfitting in Graph Neural Networks Through Simple Feature and Hyperplane Shifting
  **Yoonhyuk Choi**, Jiho Choi, Taewook Ko, Chong-Kwon Kim
  **ACM International Conference on Web Search and Data Mining (WSDM), 2025**

- (C6) Improving the Text Convolution Mechanism with Large Language Model for Review-Based Recommendation
  **Yoonhyuk Choi**, Fahim Tasneema Azad
  **IEEE Big Data Conference, 2024 (short)**

- (C5) Prioritizing Potential Wetland Areas via Region-to-Region Knowledge Transfer and Adaptive Propagation
  **Yoonhyuk Choi**, Reepal Shah, John Sabo, Selcuk Candan, Huan Liu
  **IEEE Big Data Conference, 2024**

- (C4) Introducing CausalBench: A Flexible Benchmark Framework for Causal Analysis and Machine Learning
  Ahmet Kapkiç, Pratanu Mandal, Shu Wan, Paras Sheth, Abhinav Gorantla, **Yoonhyuk Choi**, Huan Liu, K Selçuk Candan
  **ACM Conference on Information and Knowledge Management (CIKM), Benchmark Track, 2024**

- (C3) Universal Graph Contrastive Learning with a Novel Laplacian Perturbation
  Taewook Ko, **Yoonhyuk Choi**, Chong-Kwon Kim
  **Uncertainty in AI (UAI), 2023**

- (C2) Review-Based Domain Disentanglement without Duplicate Users or Contexts for Cross-Domain ...
  **Yoonhyuk Choi**, Jiho Choi, Taewook Ko, Hyungho Byun, Chong-Kwon Kim
  **ACM Conference on Information and Knowledge Management (CIKM), 2022**

- (C1) Finding Heterophilic Neighbors via Confidence-based Subgraph Matching for Semi-supervised Node ...
  **Yoonhyuk Choi**, Jiho Choi, Taewook Ko, Hyungho Byun, Chong-Kwon Kim
  **ACM Conference on Information and Knowledge Management (CIKM), 2022**

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- (J5) Beyond Binary: Improving Signed Message Passing in Graph Neural Networks for Multi-Class Graphs
  **Yoonhyuk Choi**, Taewook Ko, Jiho Choi, Chong-Kwon Kim
  **IEEE TPAMI (IF: 20.8), 2025**

- (J4) Beyond Message-Passing: Generalization of Graph Neural Networks via Feature Perturbation for ...
  **Yoonhyuk Choi**, Jiho Choi, Taewook Ko, Chong-Kwon Kim
  **IEEE TNNLS (IF: 14.25), 2024**

- (J3) A spectral graph convolution for signed directed graphs via magnetic laplacian
  Taewook Ko, **Yoonhyuk Choi**, Chong-Kwon Kim
  **Neural Networks (IF: 7.8), 2023**

- (J2) Aspect-oriented unsupervised social link inference on user trajectory data
  Hyungho Byun, **Yoonhyuk Choi**, Chong-Kwon Kim
  **Information Sciences (IF: 8.2), 2023**

- (J1) Dynamic graph convolutional networks with attention mechanism for rumor detection on social media
  Jiho Choi, Taewook Ko, **Yoonhyuk Choi**, Hyungho Byun, Chong-Kwon Kim
  **PLOS ONE (IF: 2.9), 2021**
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- (P1) Better Not to Propagate: Understanding Edge Uncertainty and Over-smoothing in Signed GNNs
  **Yoonhyuk Choi**, Jiho Choi, Taewook Ko, Chong-Kwon Kim
  **arXiv '24**

## PROJECTS

•**Enhancing Large Language Model with Graph RAG** 2025
*Research project, Samsung SDS*

  – Graph RAG

•**Can Large Language Model Improve the Text Convolution for Review-Based Recommendation?** 2024
*Research project, Emit Lab*

  – Integrated the large language model (e.g., Llama 2, GPT-4) with the text convolution algorithm
  – Investigated whether applying summarization based on large language models first, instead of performing 2D convolution on the entire text, results in performance improvement
  – Used online shopping mall datasets like Amazon and Walmart

•**Selection Criteria and Assigned Weightage for Identifying Potential Locations Wetland** 2024
*Research project funded by NSF (in collaboration with Tulane University)*

  – Suggested knowledge transfer between different regions and adaptive propagation between grids

– Demonstrated the effectiveness of the framework through real-world scenario
– Used Natural Land Cover Dataset (NLCD), Soil Survey Geographic Database (SSURGO) datasets

•**Causal Discovery of Agricultural Mgmt and Reservoir Op. Induced Water Quality Change**     2023
*Research project funded by NSF (in collaboration with University of Arkansas)*

– Developed causal discovery algorithm for water quality improvement and reservoir management
– Considered spatial and temporal variations and validated the causal learning ability
– Used Natural Land Cover Dataset (NLCD), Soil Survey Geographic Database (SSURGO) datasets

•**Tracking footprints with graph neural networks for the reduction of virus spread**     2021 - 2022
*Coursework project, R&D in AI industry*

– Suggested spatial-temporal analysis for the next POI prediction to reduce virus spread
– Selected as social contributing project
– Used datasets are Coronamap of South Korea, Gowalla for POI prediction

•**Personalized recommendation based on the user's purchasing histories and social network**     2020
*Industry project funded by Samsung Research*

– Introduced time series analysis of users' purchasing history for personalized advertising
– Applied graph neural networks with binary recommendation techniques
– Used customer datasets provided by Samsung Research

•**Next POI prediction based on user movements collected through large-scale sensors**     2019
*Research project funded by Samsung Electronics*

– Recommending the next place based on where students visited within Seoul National University
– Developed energy-saving and effective multi-hop transmission technologies for sensor
– Collected datasets by attaching special stickers to participants

## SKILLS

•**Languages**: Python, C, HTML/CSS

•**Tools** / **Frameworks**: PyTorch, torch-geometric, Scikit-learn, Git, Django, AWS, LaTex

## EXTRACURRICULAR ACTIVITIES

•**Reviewer (KDD '25)**     2025
Knowledge Discovery in Database (Feb. track)

•**Reviewer (IJCAI '25)**     2025
International Joint Conferences on Artificial Intelligence

•**Reviewer (ICML '25)**     2025
International Conference on Machine Learning

•**Reviewer (TheWebConf '25)**     2024
International World Wide Web Conference

•**Reviewer (ICLR '25)**     2024
International Conference on Learning Representations

•**Reviewer (WSDM '25)**     2024
International Conference on Web Search and Data Mining

•**Reviewer (LoG '24)**     2024
Learning on Graphs Conference

•**Reviewer (CIKM '24)**     2024
Conference on Information and Knowledge Management

- **Invited Talk (N-EWN Partner Symposium)** 2024
  Titled Identifying Potential Sites for Wetlands, St. Augustine in Florida

- **Reviewer (Soft Computing '24)** 2024
  Soft Computing Journal

- **Reviewer (ACM MM '24)** 2024
  ACM Multimedia Conference

- **Reviewer (IEEE Multimedia '24)** 2023
  Journal of IEEE Multimedia

- **Reviewer (Plos One '23)** 2023
  Journal of Plos One

- **Research Assistant (RA)** Sep. 2020 - Jun. 2021
  Participating in 'Social Network-based Recommendation Project' funded by Samsung Research

- **Teaching Assistant (TA)** Mar. 2020 - Jun. 2020
  Topic: Social Network Analysis and Anomaly Detection (Advisor: Chong-Kwon Kim)

- **Research Assistant (RA)** Mar. 2019 - Dec. 2020
  Participating in 'Smart Campus Project' funded by Samsung

- **Research Assistant (RA), Undergrad** Jun. 2017 - Sep. 2017
  Distributed Computing Lab (Supervisor: Jin-Suk Kim)

## Awards & Grants

- **Best Ph.D. Dissertation Award** 2023
  Seoul National University

- **Overseas Short-term Training Scholarship** 2023
  Chonnam National University

- **BK21 Colloquium Graduate Student Fellowship** 2023
  Seoul National University

- **BK21 Star Student Researcher Fellowship** 2023
  Seoul National University

- **SIGIR Travel Awards** 2022
  For ACM Student Authors with Accepted Long Paper

- **BK21 Scholarship** 2020
  (Graduate) Seoul National University

- **Merit-based Scholarship** 2018 - 2019
  (Undergrad) University of Seoul

## References

- **Selcuk K. Candan**: candan@asu.edu

- **ChongKwon Kim**: ckim@kentech.ac.kr

- **TaeKyung Kwon**: tkkwon98@gmail.com