Yoonhyuk Choi (Last update: May 2025)

Samsung SDS
Preceding AI 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: Chong-Kwon Kim

•University of Seoul Mar. 2013 - Feb. 2019
B.S., Computer Science Advisor: 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: Selcuk Candan and 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: 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

- (J13) 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, To be published (IF: 20.8)

- (C12) Review-Based Hyperbolic Cross-Domain Recommendation
  Yoonhyuk Choi, Jiho Choi, Taewook Ko, Chong-Kwon Kim
  WSDM, 2025

- (C11) Mitigating Overfitting in Graph Neural Networks via Feature and Hyperplane Perturbation
  Yoonhyuk Choi, Jiho Choi, Taewook Ko, Chong-Kwon Kim
  WSDM, 2025

- (J10) Beyond Message-Passing: Generalization of Graph Neural Networks via Feature Perturbation for ...
  Yoonhyuk Choi, Jiho Choi, Taewook Ko, Chong-Kwon Kim
  IEEE TNNLS, 2024 (IF: 14.25)

- (C9) Improving the Text Convolution Mechanism with Large Language Model for Review-Based Recommendation
  Yoonhyuk Choi, Fahim Tasneema Azad
  IEEE Big Data, 2024 (short)

- (C8) 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, 2024

- (C7) 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
  CIKM, 2024 (benchmark)

- (C6) Universal Graph Contrastive Learning with a Novel Laplacian Perturbation
  Taewook Ko, **Yoonhyuk Choi**, Chong-Kwon Kim
  UAI, 2023

- (J5) A spectral graph convolution for signed directed graphs via magnetic laplacian
  Taewook Ko, **Yoonhyuk Choi**, Chong-Kwon Kim
  Neural Networks, 2023 (IF: 7.8)

- (J4) Aspect-oriented unsupervised social link inference on user trajectory data
  Hyungho Byun, **Yoonhyuk Choi**, Chong-Kwon Kim
  Information Sciences, 2023 (IF: 8.2)

- (C3) Review-Based Domain Disentanglement without Duplicate Users or Contexts for Cross-Domain ...
  Yoonhyuk Choi, Jiho Choi, Taewook Ko, Hyungho Byun, Chong-Kwon Kim
  CIKM, 2022

- (C2) Finding Heterophilic Neighbors via Confidence-based Subgraph Matching for Semi-supervised Node ...
  Yoonhyuk Choi, Jiho Choi, Taewook Ko, Hyungho Byun, Chong-Kwon Kim
  CIKM, 2022

- (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, 2021 (IF: 2.9)

- (arXiv) Hierarchical Uncertainty-Aware Graph Neural Networks
  Yoonhyuk Choi, Chong-Kwon Kim
  Under Review (CIKM), 2025

- (arXiv) Better Not to Propagate: Understanding Edge Uncertainty and Over-smoothing in Signed GNNs
  Yoonhyuk Choi, Jiho Choi, Taewook Ko, Chong-Kwon Kim
  Under Review (UAI), 2024

Projects

•Enhancing Large Language Model with RAG 2025

Research project, Samsung SDS

– Knowledge graph construction and RAG for chunk retrieval
– Tiny-LLM (e.g., Llama 3B) distillation with huge-LLM (e.g., Llama 70B)

•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 2025

ICLR / IJCAI / ICML / KDD (Feb. track) / TheWebConf / WSDM / CIKM

•Reviewer 2024

LoG / CIKM / MM / Soft Computing (journal)

•Invited Talk (N-EWN Partner Symposium) 2024

Titled Identifying Potential Sites for Wetlands, St. Augustine in Florida

•Reviewer 2023

Journal of IEEE Multimedia / Plos one

•Research Assistant (RA), Graduate Mar. 2019 - Jun. 2021

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), 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