Yoonhyuk Choi (Last update: Jun. 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

- (J14) Beyond Binary: Improving Signed Message Passing in Graph Neural Networks for Multi-Class Graphs (link)
  Yoonhyuk Choi, Taewook Ko, Jiho Choi, Chong-Kwon Kim
  IEEE TPAMI, 2025 (IF: 20.8)

- (C13) Selective Blocking for Message-Passing Neural Networks on Heterophilic Graphs (link)
  Yoonhyuk Choi, Taewook Ko, Jiho Choi, Chong-Kwon Kim
  UAI, 2025

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

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

- (J10) Beyond Message-Passing: Generalization of Graph Neural Networks via Feature Perturbation for ... (link)
  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 ... (link)
  Yoonhyuk Choi, Fahim Tasneema Azad
  IEEE Big Data, 2024 (short)

- (C8) Prioritizing Potential Wetland Areas via Region-to-Region Knowledge Transfer and Adaptive Propagation (link)
  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 (link)
  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 (link)
  Taewook Ko, **Yoonhyuk Choi**, Chong-Kwon Kim
  UAI, 2023

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

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

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

- (C2) Finding Heterophilic Neighbors via Confidence-based Subgraph Matching for ... (link)
  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 (link)
  Jiho Choi, Taewook Ko, **Yoonhyuk Choi**, Hyungho Byun, Chong-Kwon Kim
  PLOS ONE, 2021 (IF: 2.9)

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- (arXiv) SpecSphere: Dual-Pass Spectral–Spatial Graph Neural Networks with Certified Robustness (link)
  Yoonhyuk Choi, Chong-Kwon Kim
  Under Review (NeurIPS), 2025

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

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

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

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

•**U Kang**: ukang@snu.ac.kr