Yoonhyuk Choi (Last update: Oct. 2024)

AI Research Lab
Dept. of Computer Science

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Research Interest

My research interest lies in *Machine Learning* and *Data Mining*, especially in **Large Language Models** (text summarization), **Recommender Systems** (cross-domain recommendation, social network analysis), and **Graph Theory** (spectral analysis, graph heterophily, node embedding, message-passing).

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
AI Research Scientist

•Postdoc Researcher 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 Researcher 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) - P: preprint, C: conference, J: journal

- (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

- (P2) Improving the Text Convolution Mechanism with Large Language Model for Review-Based Recommendation
  Yoonhyuk Choi, Tasneema Azad
  arXiv '24

- (P3) Prioritizing Potential Wetland Areas via Region-to-Region Knowledge Transfer and Adaptive Propagation
  Yoonhyuk Choi, Reepal Shah, John Sabo, Selcuk Candan, Huan Liu
  arXiv '24

- (P4) Review-Based Hyperbolic Cross-Domain Recommendation
  Yoonhyuk Choi, Jiho Choi, Taewook Ko, Chong-Kwon Kim
  arXiv '24

- (P5) Revisiting Signed Propagation of Graph Neural Networks for Multi-Class Datasets
  Yoonhyuk Choi, Jiho Choi, Taewook Ko, Chong-Kwon Kim
  arXiv '23

- (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

- (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

Projects

•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 (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