Seungyeon Lee

CONTACT INFORMATION

1620 N High Street, Columbus, Ohio 43201
United States

Tel: (614)906-3672
E-mail: lee.10029@osu.edu

RESEARCH INTERESTS

1) Machine learning
Deep Learning, Ensemble Learning, Semi-Supervised Learning
2) Data mining
Graph Mining, Recommender Systems
3) Trustworthy AI
Explainability, Uncertainty quantification
4) Quality Management
Virtual Metrology, Outlier Detection

EDUCATION

The Ohio State University, United States   Fall 2021 -
PhD student in Computer Science and Engineering

Myongji University, Rep. of Korea   2018 - 2020
M.S. in Industrial and Management Engineering
Thesis: *Deep Learning based Recommender System using Cross Convolutional Filters*
Advisor: Dr. Dohyun Kim, Myongji University

Myongji University, Rep. of Korea   2014 - 2018
B.S. in Industrial and Management Engineering

PUBLICATIONS

Published paper

1. **Lee, S.**, Pham, H., & Zhang, P. (2022) DREAM: Domain Invariant and Contrastive Representation for Sleep Dynamics, *IEEE International Conference on Data Mining* (**ICDM 2022**)

   - Developed a deep learning-based model for automatic sleep staging
   - Developed a VAE and Contrastive learning based representation model to effectively extract class-relevant and subject-invariant information across diverse subjects
   - Introduced a sleep stage classification network composed of Transformer and CRF models to explicitly captures the dependencies between sleep stages in the sleep signal sequence

2. **Lee, S.**, & Kim, D. (2022) Deep Learning based Recommender System using Cross Convolutional Filters. *Information Science.*

   - Developed a deep learning-based recommender system to consider interactions between user and item variables
   - Captured meaningful higher-order interactions between users and items, giving greater weight to pivotal features

3. Park, M.*, **Lee, S.***, Hwang, S., & Kim, D. (2020). Additive Ensemble Neural Networks. *IEEE Access, 8*, 113192-113199. (*co-first authors)

   - Developed a deep learning-based model using the boosting mechanism from an ensemble methodology
   - Solved the problem of model complexity and degradation of generalization performance

4. **Lee, S.***, Jo, E.*, & Kim, D. (2021). Similarity based Deep Neural Networks. *IJFIS*. (*co-first authors)

- Developed a similarity-based DNN to effectively reduce the dimensionality of data
- Solved the problems of model complexity and overfitting that occur when training a neural network with a small number of high-dimensional data

Submitted Manuscript

1. **Lee, S.**, Park, M., & Kim, D. Analysis of Tabular Data based on Graph Neural Network, submitted to *Neurocomputing*

   - Developed a Graph Neural Network (GNN) based model to consider relationships between observations and between variables simultaneously in tabular data
   - The proposed method is trained with Supervised contrastive learning to increase noise robustness and find generalized representation from data

RESEARCH EXPERIENCE

Artificial Intelligence in Medicine (AIMed) Lab, The Ohio State Univ.   Jan. - Jun. 2022
- Developed a deep learning-based model for automatic sleep staging
- Developed a VAE and Contrastive learning based representation model to effectively extract class-relevant and subject-invariant information across diverse subjects
- Introduced a sleep stage classification network composed of Transformer and CRF models to explicitly captures the dependencies between sleep stages in the sleep signal sequence

Korea Institute of Science and Technology Information (KISTI)   Jun. - Oct. 2020
- Developed a deep learning-based medical diagnosis solution for laryngeal cancer and periodontal disease
- Predicted areas and conditions of laryngeal and periodontal diseases from endoscopic and X-ray images
- Analyzed the areas that affected disease prediction using the Grad-CAM algorithm

Korea Institute of Science and Technology Information (KISTI)   Jul. - Oct. 2020
- Devised a model based on meta-knowledge of research papers (i.e., citations, abstracts, and area codes) for prediction of future growth of technologies using deep learning
- Investigated the applicability of the various forms of meta-knowledge to prediction of future growth

National Research Foundation of Korea (NRF)   Mar. 2018 - Feb. 2020
- Developed a core nodes detection algorithm
- Devised a node clustering algorithm based on deep learning

Korea Technology Finance Corporation   Jul. - Dec. 2019
- Generated 1-dimensional fake financial data for technology valuation using StyleGAN (Style-based Generative Adversarial Networks)
- Developed a deep learning-based model to analyze the importance of variables in the regression problem

Korea Institute of Science and Technology Information (KISTI)   May - Oct. 2018
- Developed a GAN-based model to generate fake data with a large number of classes
- Devised two GAN models to alleviate the performance degradation that occurs when generating fake data with many classes: a model with multiple generators and a model with multiple discriminators

CONFERENCE PRESENTATIONS

1. Park, M., **Lee, S.**, & Kim, D. (2019). Semiconductor Wafer Allocation Based on Deep Neural Network. *2019 Informs Annual Meeting.*

- Developed a semiconductor wafer allocation model to consider both product quality and productivity in the manufacturing process
- Generated the optimal facility paths using the modified semi-supervised GAN which performs prediction of yield and real/fake data discrimination

2. **Lee, S.**, Park, M., & Kim, D. (2019). Analysis of Tabular Data based on Graph Neural Network. *2019 EURO 30th European Conference.*

- Developed a GNN based model to consider relationships between observations and between variables simultaneously in tabular data
- Combined feature-based and similarity-based approaches

3. **Lee, S.**, Jo, E., & Kim, D. (2018). Similarity based Deep Neural Networks. *2018 Informs International Conference Poster Session.*

- **INFORMS International Conference Poster Competition**, *First Place Winner*
- Developed a similarity-based DNN to effectively reduce the dimensionality of data
- Solved the problems of model complexity and overfitting that occur when training DNN with a small number of high-dimensional data

WORK EXPERIENCE		
	The Ohio State University, United States	2022 -

Graduate Research Assistant, Dept. of Computer Science and Engineering
Advisor: Dr. Ping Zhang

Myongji University, Rep. of Korea — May - Oct. 2020
Researcher, Industry-Academic Cooperation Foundation

Myongji University, Rep. of Korea — Mar. - Dec. 2018
Teaching Assistant, Dept. of Industrial and Management Engineering
- Taught the modules Data Analytics, Capstone Design, Data Mining, and Information System Analysis and Design
- Led weekly laboratory sessions on Data Analytics, Data Mining, and Information System Analysis and Design

YoungPoong Electronics Co., Rep. of Korea — Aug. - Dec. 2017
Intern, Dept. of Quality Control
- Performed quality assurance for mass-produced products and control of non-conforming products

Samsung Electronics Service Co., Rep. of Korea — Apr. - Aug. 2016
Intern, Dept. of Customer Service
- Provided technical advice for Samsung Electronics products

AWARDS

Student Travel Awards, ICDM 2022.
Poster Competition First Place Winne, INFORMS International Conference 2018.

REFERENCES

Dr. Ping Zhang
Assistant Professor
Department of Computer Science and Engineering
The Ohio State University
E-mali: zhang.10631@osu.edu

Dr. Dohyun Kim
Associate Professor
Department of Industrial and Management Engineering
Myongji University
E-mali: ftgog@mju.ac.kr