Seongmin Lee

Ph.D. student in Computer Science at Georgia Institute of Technology

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Summary

I'm a Ph.D. student in Computer Science at Georgia Tech, advised by Professor Polo Chau. My research aims to provide explanations and interpretations for various machine learning techniques based on visualization. I received my B.S. in Electrical and Computer Engineering from Seoul National University in February 2021. I have collaborated with researchers and developers of Cisco Systems, Inc. and AVAST Software.

Education

Georgia Institute of Technology — *Georgia, USA*
Ph.D. in Computer Science — *Aug. 2021 - Present*
Advisor: Prof. Duen Horng (Polo) Chau

Seoul National University — *Seoul, South Korea*
B.S. in Electrical and Computer Engineering — *Mar. 2016 - Feb. 2021*
Graduated with Summa Cum Laude. Overall GPA: 3.91/4.0, Major GPA: 3.94/4.0

Korea Science Academy of KAIST — *Busan, South Korea*
Math and Science Specialized High School — *Feb. 2013 - Feb. 2016*
One year early entrance, Graduated with distinction in GPA

Research Experience

Cisco Systems, Inc. — *California, USA (Remote)*
PhD Intern — *May. 2022 - Jul. 2022*
Mentor: Ali Payani
- Added machine learning explanation and visualization features to RAI, a (to be) open-sourced project for responsible AI.
- Improved disentangled representation learning algorithms and visualized the results for better interpretability.
- Investigated CNNs by visualizing how the concepts in the input images affect the feature representations from the neural networks using synthetic data.

Polo Club of Data Science, Georgia Institute of Technology — *Georgia, USA*
Graduate Research Assistant — *Aug. 2021 - Present*
Advisor: Duen Horng (Polo) Chau
- Led a project to help people assess website reliability by providing visual explanations of how each website engages in spreading false information.
- Developed an interactive visualization tool to detect biases in CNN classifiers.
- Participating in a project to investigate how a concept evolves while training neural networks.

Data Mining Lab, Seoul National University — *Seoul, South Korea*
Undergraduate Research Internship — *Jan. 2020 - Feb. 2021*
Advisor: Prof. U Kang
- Investigated multi-source domain adaptation under various constraints and settings.
- Resolved the limitation of BERT that the tasks with few training data are hard to fine-tune by pruning proper attention heads based on reinforcement learning.

Communication and Machine Learning Laboratory, Seoul National University — *Seoul, South Korea*
Undergraduate Research Internship and Bachelor's Thesis — *Sep. 2019 - Apr. 2020*
Advisor: Prof. Jungwoo Lee
- Studied the problem of class imbalance and uncertainty in semantic segmentation.

Biomedical Precision Laboratory, The University of Tokyo — *Tokyo, Japan*
Undergraduate Research Internship — *Jul. 2018 - Aug. 2018*
Advisor: Dr. Keiichi Nakagawa, Dr. Ayumu Ishijima
- Collaborated with 3 students majoring in biology and physics to observe interaction between human cells and acoustic waves.
- Constructed a microscopic motion-picture camera with sub-nano spatial/temporal resolution using optical equipments and laser.
- Processed the microscopic images using Matlab for better analysis.

Publications, Preprints, Demos

Diffusion Explainer: Visual Explanation for Text-to-image Stable Diffusion
Seongmin Lee, Benjamin Hoover, Hendrik Strobelt, Zijie J. Wang, ShengYun Peng, Austin Wright, Kevin Li, Haekyu Park, Haoyang Yang, Duen Horng Chau
arXiv Preprints (arXiv), 2023

SuperNOVA: Design Strategies and Opportunities for Interactive Visualization in Computational Notebooks
Zijie J. Wang, David Munechika, **Seongmin Lee**, Duen Horng Chau
arXiv Preprints (arXiv), 2023

Diffusion Explainer: Interactive Visual Learning for Stable Diffusion
Seongmin Lee, Benjamin Hoover, Hendrik Strobelt, Zijie J. Wang, ShengYun Peng, Austin Wright, Kevin Li, Haekyu Park, Haoyang Yang, Duen Horng (Polo) Chau
Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Demo Track, 2023

Explaining Website Reliability by Visualizing Hyperlink Connectivity
Seongmin Lee, Sadia Afroz, Haekyu Park, Zijie J. Wang, Omar Shaikh, Vibhor Sehgal, Ankit Peshin, Duen Horng (Polo) Chau
IEEE Visualization and Visual Analytics (VIS), 2022

ConceptEvo: Interpreting Concept Evolution in Deep Learning Training
Haekyu Park, **Seongmin Lee**, Benjamin Hoover, Austin Wright, Omar Shaikh, Rahul Duggal, Nilaksh Das, Judy Hoffman, Duen Horng (Polo) Chau
arXiv Preprints (arXiv), 2022

NOVA: A Practical Method for Creating Notebook-Ready Visual Analytics
Zijie J. Wang, David Munechika, **Seongmin Lee**, Duen Horng (Polo) Chau
IEEE Visualization and Visual Analytics (VIS) Poster, 2022

VisCUIT: Visual Auditor for Bias in CNN Image Classifier
Seongmin Lee, Zijie J. Wang, Judy Hoffman, Duen Horng Chau
Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Demo Track, 2022

MisVis: Explaining Web Misinformation Connections via Visual Summary
Seongmin Lee, Sadia Afroz, Haekyu Park, Zijie J. Wang, Omar Shaikh, Vibhor Sehgal, Ankit Peshin, Duen Horng (Polo) Chau
CHI Conference on Human Factors in Computing Systems Extended Abstracts, 2022

Multi-EPL: Accurate Multi-Source Domain Adaptation
Seongmin Lee, Hyunsik Jeon, U Kang
PLOS ONE, 2021

AUBER: Automated BERT Regularization
Hyun Dong Lee*, **Seongmin Lee***, U Kang (* These authors contributed equally to this work)
PLOS ONE, 2021

Unsupervised Multi-Source Domain Adaptation with No Observable Source Data
Hyunsik Jeon, **Seongmin Lee**, U Kang
PLOS ONE, 2021

Patent

Pruning Method for Attention Head in Transformer Neural Networks for Regularization and Apparatus Thereof
Seongmin Lee, Hyun Dong Lee, and U Kang
10-2020-0162397, 2020

Honors & Awards

The Presidential Science Scholarship *Mar. 2016 - Dec. 2019*
Korea Science Aid Foundation

SNU Engineering Honor Society (STEM) *Mar. 2018 - Dec. 2019*
College of Engineering, SNU

Voluntary Service Award *Dec. 2018, Dec. 2017*
Department of Electrical and Computer Engineering, SNU

Talks

"STEM Global Engineer Seminar", Seoul National University, SNU Engineering Honor Society (STEM) *May. 2023*
"MisVis: Explaining Web Misinformation Connections via Visual Summary", Georgia Tech, School of CSE Recruiting Event *Nov. 2022*
"Explaining Website Reliability by Visualizing Hyperlink Connectivity", AVAST Software, Fake News Monthly Sync Up *Spring 2022*
"Multi-Source Domain Adaptation with Pseudo-labels", Seoul National University, AIIS Retreat *Jun. 2020*

Teaching

Data and Visual Analytics (CSE 6242), Graduate Teaching Assistant *Fall 2022*
Deep Learning Course for LG Chem, Lab session lecturer *Jan. 2021*
Deep Learning Course for SK Hynix, Lab session lecturer *Nov. 2020*
Introduction to Algorithm, SNU, Undergraduate student tutor *Fall 2020, Fall 2019*
Introduction to Physics I, SNU, Undergraduate student tutor *Spring 2017*

Grants and Funding

Meta Research Funding ($50k) *2022*
PIs: Polo Chau
Co-authored proposal on developing novel visualization to curb and quantify misinformation consumption.

Cisco Research Funding ($150k) *2022*
PIs: Polo Chau
Co-authored proposal.

Skills

Programming C/C++, Python, Java, Verilog, HTML/CSS/Javascript
Frameworks Tensorflow, PyTorch
Languages Korean (Native), English (iBT: 109 (R28/L28/S26/W27), GRE: Verbal 163, Writing 4.5)

Extracurricular Activity

GTKSA (Georgia Tech Korean Student Association) *Aug. 2021 - Present*
Serving as a secretary and web administrator.

SNU Buddy *Sep. 2020 - Dec. 2020*
Buddy program for the international exchange students. Used to be a group leader.

SNU Engineering Honor Society (STEM) *Mar. 2018 - Dec. 2019*
Organized academic seminars, international round table, and mentoring programs as a vice president.

Vision Mentoring, Seoul National University *Jul. 2019*
Lectured high school students on engineering (More than 700 students attended)

Dream Camp Mentoring, Seoul National University *Feb. 2019, Feb. 2018*
Educated high school students in the countryside by designing a mentoring program

Student Vice President *Nov. 2017 - Oct. 2018*
Elected as a vice president of the Department of Electrical and Computer Engineering, SNU

Student Reporter *Sep. 2017 - Feb. 2021*
Published brochures about the Department of Electrical and Computer Engineering every semester

Talent Sharing Volunteer Camp, KOSAF *Jan. 2017, Aug. 2016*
Conducted self-planned mentoring for elementary school students in underprivileged areas in Korea