AHJEONG SEO

RESEARCH INTEREST

My primary research goal is to **develop robustly reasoning AI to act like humans** through hierarchically combining structured and disentangled representations. I'm especially interested in developing logical and consistent reasoning structures in NLP or multi-modal fields, especially injecting knowledge with graph or neuro-symbolic approaches. Currently, I am working on applying hyper-scale models to services and improving their reasoning limitations in Samsung Research.

EDUCATION

Seoul National University Sep. 2019 - Aug. 2021
Master of Science in Neuroscience *Seoul, Korea*
Interdisciplinary Program in Neuroscience *(Adviser: Byoung-Tak Zhang)*
Thesis: Motion-Appearance Synergistic Networks for Video Question Answering

Hanyang University Mar. 2014 - Aug. 2019
Bachelor of Engineering in Computer Engineering, Minoring in Industrial Engineering *Seoul, Korea*
Department of Computer Engineering

RESEARCH PUBLICATIONS

Attend What You Need: Motion-Appearance Synergistic Networks for Video Question Answering
Ahjeong Seo, Gi-Cheon Kang, Junhan Park, Byoung-Tak Zhang, *The Joint Conference of the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing (ACL-IJCNLP 2021)* August 2021

DramaQA: Character-Centered Video Story Understanding with Hierarchical QA
Seongho Choi, Kyoung-Woon On, Yu-Jung Heo, Ahjeong Seo, Youwon Jang, Minsu Lee, Byoung-Tak Zhang, *Proceedings of the Thirty-Fifth AAAI Conference on Artificial Intelligence (AAAI 2021)* February 2021

Sparse Self-Attention Mechanism for Learning Sequential Video Data
Ahjeong Seo, Kyoung-Woon On, Byoung-Tak Zhang, *Korea Software Congress 2019 (KSC 2019)* December 2019

Neuro-Symbolic Graph Reasoning for Robust Inference in Neural Sequence Models (stopped due to lack of results) Ahjeong Seo, Joohyung Lee Jun. - Aug. 2022

WORK EXPERIENCE

Samsung Electronics, Samsung Research Aug. 2021 - Present
AI Methods Team
Researcher (Adviser: Joohyung Lee) *Seoul, Korea*

- Created service demos for Samsung products based on hyper-scale Transformers: developed a humanoid specialized for answering questions on the Samsung TV products, a user interactive movie search engine for Samsung TV, and planned the robot's action with LLM for the Samsung's IoT platform.
- Wrote research proposals to overcome the reasoning limitations of hyper-scale Transformer models: *Neuro-Symbolic Graph Reasoning for Robust Inference in Neural Sequence Models.*

Naver Corp., Clova Biz AI Nov. 2018 - Feb. 2019
Naver Corp., Apollo Backend Jul. 2018 - Aug. 2018
Intern *Seongnam-si, Korea*

- Discovered and created service demos requiring AI by collaborating with other departments; services including automatic placement of photos and text in ads, detection of inappropriate photo comments, keyword recommendation for food blogs.
- Conducted research engineering for creating service demos: generated and pre-processed data, built docker environment and APIs, and developed website with Spring Framework, jQuery Ajax, HTML, and CSS.

RESEARCH PROJECTS

Hyper-Scale AI Improvement Jun. 2022 - Aug. 2022
Samsung Research (Adviser: Joohyung Lee)

- Proposed research *Neuro-Symbolic Graph Reasoning for Robust Inference in Neural Sequence Models* to overcome reasoning limitations of GPT-3, such as giving incoherent answers despite given document knowledge.
- Conducted experiments with query-based graph traversing after constructing neuro-symbolic graph via semantic parsing, but stopped due to limitations in methodologies and ability to thoroughly apply research results to the service.

Video Turing Test Sep. 2019 - Aug. 2021
Seoul National University (Adviser: Byoung-Tak Zhang)

- In order to build an AI with human-level intelligence for video understanding and based on interdisciplinary knowledge, conducted research to allow the AI to robustly and explicitly reason via information structuring.
- To improve multi-modal reasoning ability in VideoQA, proposed a model combining divided visual signals depending on query contexts based on human visual processing for ACL 2021.
- Recommended the DramaQA dataset and its baseline model for hierarchical video understanding based on human cognitive development stages for AAAI 2021.

AI-Based Process Analysis Mar. 2020 - Aug. 2021
Seoul National University (Adviser: Sanghwa Lee, Byoung-Tak Zhang)

- As requested by Samsung Electronics, predicted the accuracy of semiconductor manufacturing process. To predict degrees of etching depending on wavelengths of light, analyzed manufacturing simulation data such as temperature and humidity and experimented with reinforcement learning algorithms ranging from DQN to DDPG.

WORK PROJECTS

Action Planning with LLM for SmartThings Sep. 2022 - Present
Samsung Research (Adviser: Joohyung Lee)

- Using our simulator, researched an action planning model combining reinforcement learning and large-language models in order to apply the results to Samsung's IoT platform, SmartThings.

Digital Human for Samsung TV products May 2022 - Jun. 2022
Samsung Research (Adviser: Joohyung Lee)

- Developed Digital Human which is a humanoid that can hold conversations on various topics including answering questions on Samsung TV products through an avatar.
- To build this humanoid, utilized hyper-scale language models like GPT-3, especially participated in developing a dialogue system via prompt engineering, answer generation with retrieved documents, and pre-processed data.

Neuro-Symbolic Contents Search Feb. 2022 - May. 2022
Samsung Research (Adviser: Joohyung Lee)

- Developed a movie content search engine by considering both lexical and semantic clues in queries. In particular, experimented with neural models for semantic search, contributed to a lexical search module with Elastic Search, and collected and cleaned content data.

DramaQA Challenges and Workshops (ECCV 2020, ICCV 2019) Sep. 2019 - Aug. 2021
Seoul National University (Adviser: Byoung-Tak Zhang)

- Participated in organizing DramaQA dataset challenges and workshops. Specifically, took charge of managing EvalAI challenge server and building DramaQA homepage: `https://dramaqa.snu.ac.kr/`

ATTENDED CONFERENCES

The Joint Conference of the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing (ACL-IJCNLP 2021)	Aug. 2021
AAAI-21: 35th AAAI Conference on Artificial Intelligence	Feb. 2021
Thirty-fourth Conference on Neural Information Processing Systems (NeurIPS 2020)	Dec. 2020
16th European Conference on Computer Vision (ECCV 2020)	Aug. 2020
AAAI-19: 33th AAAI Conference on Artificial Intelligence	Jan. - Feb. 2019

HONORS AND AWARDS

International Short-Term Dispatch Program Scholarship, Hanyang University — Jun. 2016
Dean's Encouragement Award, Hanyang University — Nov. 2014
Honors Scholarships, Hanyang University — Sep. 2014

EXTRA-CURRICULAR

Algorithm Club at Hanyang University — Mar. 2014 - Aug. 2019
· Participated in algorithm study groups, and received Dean's Encouragement Award in an in-school competition.

Biz-AI Project in Faculty of Business Administration — Mar. 2018 - Jun. 2018
· Conducted research for improving e-commerce search engine performance. Identified product categories from user query based on Named Entity Recognition, cultivated color words dictionary to handle color synonyms, and evaluated positive and negative customer comments via sentiment analysis.
· Produced two papers for the undergraduate student track of domestic journals, which were titled *Korea Intelligent Information Systems Society*

Hanyang University Buddy Assistants — Jan. - Feb. 2018
· Organized and participated in many activities and helped foreign students adapt to Korean culture and life.

Short-term Overseas Dispatch Program, University of Indonesia — Jul. - Aug. 2016
Exchange Student, Nanyang Technological University — Jan. - May 2016
· Developed cultural competence via activities such as field-trips, hip-hop libral arts class, and wakeboarding club.

Hanyang University Financial Engineering Club — Mar. 2017 - Feb. 2018
· Involved in studying quant investment and data analysis to apply computer technology to financial engineering.

TEACHING & ADVISING EXPERIENCE

Assistant Instructor in Computer Private Institute — Aug. 2017 - May 2018
Algorithm Club at Hanyang University — Mar. 2015 - Dec. 2016
· Taught C programming and algorithms to elementary and university students and prepared them to take the coding tests prior to employment.

Private Tutoring for High School Students — Mar. - Dec. 2015
· Taught math and physics to high school students and helped them prepare for the Korean S.A.T. exam.

REFERENCES

Byoung-Tak Zhang
Professor

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College of Engineering, Seoul National University — E-mail: btzhang@bi.snu.ac.kr
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Joohyung Lee
Vice President at Samsung Research / Associate Professor

AI Methods Team, Samsung Research, Samsung Electronics
School of Computing, Informatics, and Decision Systems Engineering (CIDSE)
Fulton Schools of Engineering, Arizona State University — E-mail: j00hyung.lee@samsung.com
`http://peace.eas.asu.edu/joolee/index.html` — Phone: +82 2-6147-3280

Sanghwa Lee
Research Professor

Institute of New Media and Communications — E-mail: lsh529@snu.ac.kr
College of Engineering, Seoul National University — Phone: +82 10-6238-9198

SKILLS AND LANGUAGE

Technical Skills — Pytorch, Tensorflow, Python, C++, C, HTML, R, Java
Language Proficiency — Fluent in English and Native in Korean