Byungkook Oh

AI Research Scientist · Staff Engineer

Samsung Research, 56, Seongchon-gil, Seocho-gu, Seoul, Republic of Korea

in byungkook-oh-1b0b981a3 | 🏠 bkoh509.github.io | ✉ bkoh509@gmail.com | 📞 (+82)10-3742-3516

"I pursue AI that thinks similar to humans based on knowledge
because it is vital to the future of AGI."

Research Interests

- Knowledge Representation
- Knowledge-enhanced NLP Applications
- Information Retrieval & Recommendation

Education & Experience

Samsung Research, Seoul, Republic of Korea   *Jan. 2021 - Current*
AI Research Scientist (Staff Engineer)

Yonsei University, Seoul, Republic of Korea   *Oct. 2020 - Dec. 2020*
Postdoctoral Researcher

Yonsei University, Seoul, Republic of Korea   *Mar. 2015 - Aug. 2020*
Ph.D. in Computer Science, GPA: 4.15/4.3
- Dissertation: Context-Aware Relational Learning for Knowledge Graph Completion
- Advisor: Prof. Kyong-Ho Lee

Yonsei University, Seoul, Republic of Korea   *Mar. 2011 - Feb. 2015*
B.S. in Computer Science, Major GPA: 3.72/4.3

Publications

[23] Gayeon Park, Hyeongjun Yang, Kyuhwan Yeom, Myeongheon Jeon, Yunjeong Ko, **Byungkook Oh**, and Kyong-Ho Lee, "**Knowledge-constrained Interest-aware Multi-Behavior Recommendation with Behavior Pattern Identification**." In AAAI 2024 *(Under Review)*

[22] Yerim Lee, Hyeongjun Yang, Gayeon Park, Taeyoung Kim, Kyong-Ho Lee, and **Byungkook Oh**, "**Granular Intents Learning via Mutual Information Maximization for Knowledge-aware Recommendation**." Information Sciences *(IF: 8.1) (Under Review)*

[21] Xiongnan Jin, Zhilin Wang, Manni Duan, Yan Shao, Xingyun Hong, Yongheng Wang, Zemin Xu, Qinqin Long, **Byungkook Oh**, and Kyong-Ho Lee, "**A Survey on Knowledge Graph Evolution: Proliferation, Embedding, and Versioning**." In ICTAI 2023 *(Under Review)*

[20] Heesoo Won, **Byungkook Oh**, Hyeongjun Yang, and Kyong-Ho Lee, "**Cross-modal contrastive learning for aspect-based recommendation**." Information Fusion, 99, 2023.11 *(IF: 18.6)*

[19] **Byungkook Oh**, Yul Kim, and Bumki Min, "**Dual-Oriented Contrast for Recommendation with A Stop-Gradient Operation**." In CIKM 2023 *(full)*

[18] Seungmin Seo, **Byungkook Oh**, Jeongbeom Jeoung, Donghyun Kim, Kyong-Ho Lee, Dong-Hoon Shin, and Yeonsoo Lee, "**Active learning for cross-sentence n-ary relation extraction**." Information Sciences, 645, 2023.10 *(IF: 8.1)*

[17] **Byungkook Oh**, Ilhyun Suh, Kihoon Cha, Junbeom Kim, Goeon Park, and Sihyun Jeong, "**Pre-training local and non-local geographical influences with contrastive learning**." Knowledge-Based Systems, 259, 2023.01 *(IF: 8.8)*

[16] Seungmin Seo, **Byungkook Oh**, Eunju Jo, Sanghak Lee; Dongho Lee; Kyong-Ho Lee; Donghoon Shin, and Yeonsoo Lee, "**Active Learning for Knowledge Graph Schema Expansion**." IEEE Transactions on Knowledge and Data Engineering, 34(12), 2022.12 *(IF: 8.9)*

[15] Byungkook Oh, Seungmin Seo, Jimin Hwang, Dongho Lee, and Kyong-Ho Lee, "**Open-world knowledge graph completion for unseen entities and relations via attentive feature aggregation**." Information Sciences, 586, 2022.03 *(IF: 8.1)*

[14] Junbeom Kim, Sihyun Jeong, Goeon Park, Kihoon Cha, Ilhyun Suh, and **Byungkook Oh**, "**DynaPosGNN: Dynamic-Positional GNN for Next POI Recommendation**." In ICDM Workshops 2021 *(eight pages)*

[13] Sungkwang Eom, **Byungkook Oh**, Sangjin Shin, and Kyong-Ho Lee, "**Multi-task learning for spatial events prediction from social data**." Information Sciences, 581, 2021.12 *(IF: 8.1)*

[12] **Byungkook Oh**, Jimin Hwang, Seungmin Seo, Sejin Chun, and Kyong-Ho Lee, "**Inductive Gaussian representation of user-specific information for personalized stress-level prediction**." Expert Systems with Applications, 178, 2021.09 *(IF: 8.5)*

[11] Dongho Lee, **Byungkook Oh**, Seungmin Seo, and Kyong-Ho Lee, "**News Recommendation with Topic-Enriched Knowledge Graphs**." In CIKM 2020 *(full)*

[10] Sanghak Lee, Seungmin Seo, **Byungkook Oh**, Kyong-Ho Lee, Donghoon Shin, and Yeonsoo Lee, "**Cross-sentence N-ary Relation Extraction using Entity Link and Discourse Relation**." In CIKM 2020 *(full)*

[9] Seungmin Seo, **Byungkook Oh**, and Kyong-Ho Lee, "**Reliable Knowledge Graph Path Representation Learning**." IEEE Access, 8, 2020.02 *(IF: 3.9)*

[8] Xiongnan Jin, **Byungkook Oh**, Sanghak Lee, Dongho Lee, Kyong-Ho Lee, and Liang Chen, "**Learning Region Similarity over Spatial Knowledge Graphs with Hierarchical Types and Semantic Relations**." In CIKM 2019 *(full)*

[7] **Byungkook Oh**, Seungmin Seo, Cheolheon Shin, Eunju Jo, and Kyong-Ho Lee, "**Topic-Guided Coherence Modeling for Sentence Ordering by Preserving Global and Local Information**." In EMNLP 2019 *(oral)*

[6] **Byungkook Oh**, Sangjin Shin, Sungkwang Eom, Jooik Jung, Minjae Song, Seungmin Seo, and Kyong-Ho Lee, "**Reliable TF-based recommender system for capturing complex correlations among contexts**." Journal of Intelligent Information Systems, 52(2), 2019.04 *(IF: 3.4)*

[5] **Byungkook Oh**, Seungmin Seo, and Kyong-Ho Lee, "**Knowledge Graph Completion by Context-Aware Convolutional Learning with Multi-Hop Neighborhoods**." In CIKM 2018 *(full)*

[4] Minjung Kim, **Byungkook Oh**, Jooik Jung, and Kyong-Ho Lee, "**Outlier-robust web service selection based on a probabilistic QoS model**." International Journal of Web and Grid Services, 12(2), 2016.05 *(IF: 1.0)*

[3] Minjung Kim, Xiongnan Jin, Jooik Jung, **Byungkook Oh**, and Kyong-Ho Lee, "**Web Service Selection based on a Probabilistic QoS Model**." In KCC 2015 *(domestic)*

[2] Seungmin Seo, Sejin Chun, **Byungkook Oh**, and Kyong-Ho Lee "**SDPA: Sensor Data Processing Architecture for Modeling Semantic Data from Sensor Steams**." In IRI 2015

[1] Sejin Chun, Seungmin Seo, **Byungkook Oh**, and Kyong-Ho Lee, "**Semantic description, discovery and integration for the Internet of Things**." In ICSC 2015

Patents

[7] **Byungkook Oh** and XXX, "**Electronic Device and Controlling Method of Electronic Device.**" *(Explainable User Intent Learning based on Multi-Level Concepts)*, KR Patent, filed October 28, 2022

[6] XXX, XXX, XXX, **Byungkook Oh**, and XXX, "**Server and Control Method Thereof.**" *(Pre-training Multi-Modal Geolocation Influence with Contrastive Learning, Dynamic-Positional Graph Neural Network for Next PoI Prediction)* KR Patent, filed February 23, 2022

[5] Kyung-Ho Lee, Sanghak Lee, Seungmin Seo, and **Byungkook Oh**, "**Method and Apparatus for Relation Extraction between Entities.**" KR Patent No. 10-2382914, filed June 17, 2020. and issued March 31, 2022

[4] **Byungkook Oh** and Kyong-Ho Lee, "**Method and Apparatus for Completing Zero-Shot Knowledge Graph Using Multi-Hop Neighborhoods.**" KR Patent No. 10-2273136, filed October 17, 2019. and issued June 29, 2021

[3] **Byungkook Oh** and Kyong-Ho Lee, "**Method and Apparatus for Reconstructing Sentence Order through Topic-Guided Coherence Modeling.**" KR Patent No. 10-2329738, filed October 30, 2019. and issued November 17, 2021

[2] **Byungkook Oh** and Kyong-Ho Lee, "**Method and Apparatus for Completing Knowledge Graph Based on Convolutional Learning Using Multi-Hop Neighborhoods.**" KR Patent No. 10-2189811, filed April 5, 2019 and issued December 04, 2020

[1] **Byungkook Oh** and Kyong-Ho Lee, "**Recommender System and Method Considering Correlations among Contexts.**" KR Patent No. 10-1997222, filed January 03, 2018. and issued July 01, 2019

Research Projects

온톨로지 기반 멀티타입 상호작용 모델링 기술　　　　　　　　　*Yonsei University (Prof. Kyong-Ho Lee)*
Ontology-based Multi-type Interaction Modeling　　　　　　　　　　　　　　　*Dec. 2022 - Dec. 2023*
- **Project Manager**: R&D Supervision (planning, advice, verification, etc.)
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지식그래프 기반 사용자 의도 및 커뮤니티 탐색 기술　　　　　　　*Yonsei University (Prof. Kyong-Ho Lee)*
Knowledge Graph based Intent-Community Detection　　　　　　　　　　　　*Dec. 2021 - Dec. 2022*
- **Project Manager**: R&D Supervision (planning, advice, verification, etc.)
-

동적으로 진화하는 지식그래프의 정보 품질 개선을 위한 심층 표현학습　　　　　　　한국연구재단
Deep Representation Learning for Improving the Information Quality of　　　　　*Jun. 2019 - Dec. 2020*
Dynamically Evolving Knowledge Graphs
- **Project Leader**: General R&D operation (planning, proposal, development, verification, etc.)
- Text-based zero/few-shot inference model development for KGC
- Learning sophisticated KG representations with neighborhood features aggregated by GCNs

액티브 러닝을 활용한 다항 관계 지식 추출 및 구조화 기술 연구　　　　　　　　*NC소프트 R&D*
Active Learning based N-ary Relation Extraction and Strucuralization　　　　　　*May. 2019 - Dec. 2020*
- Korean dataset construction
- Relation extraction model development based on Tree-LSTM and Transformer
- Active learning algorithm generate a new semantic type from the extracted relationships

XAI (eXplainable AI) 기반 스마트 에너지 플랫폼 기술 개발　　　　　　　　한전 전력연구원
Development of XAI-based Technology for Smart Energy Platform　　　　　　　*Mar. 2018 - Dec. 2020*
- **Project Leader**: General R&D operation (planning, proposal, development, verification, etc.)
- 가상 마이크로그리드 데이터셋 구축
- 에너지 지식 그래프 설계 및 지식 추론 연구
- 수요예측 딥러닝&확률모형 융합 모델 개발

사물인터넷을 위한 복합 이벤트 처리 기반 개인맞춤 상황인지형 추천 시스템

A Personalized Context-aware Recommendation System

한국연구재단
Jun. 2016 - Jun. 2019

- **Project Leader**: General R&D operation (planning, proposal, development, verification, etc.)
- 지식 추론 모델 개발 (CNN, TF, GCN 등 활용)
- 텐서 분해 기반 추천 시스템 개발

사용자 중심 지식그래프 스키마 확장 기술

User-centeric Knowledge Graph Schema Expansion Technology

NC소프트 R&D
Jun. 2018 - Feb. 2019

- 한국어 데이터셋 구축
- 관계 추출 모델 개발 (Transformer 등 활용)
- 액티브 러닝 알고리즘 개발

통합 주소/식별체계에 기반한 IoT 서비스 플랫폼

Service Platform for Internet of Things

미래창조과학부
Apr. 2013 - Apr. 2018

- 기계 학습 기반 스트림 데이터 처리
- 구조적 데이터 생성 모델 개발

IoV 데이터 저장 및 분석을 위한 자동차 클라우드 서비스 플랫폼

Cloud-based Service Platform for IoV Data Storage and Analysis

미래창조과학부
Jun. 2016 - Dec. 2016

- IoV 플랫폼 기술 검증
- 데이터셋 수집 및 구축

사물 웹에서 빅 데이터의 시맨틱 매쉬업을 위한 클라우드 컴퓨팅 프레임워크

A Cloud Computing Framework for Semantic Mashup of Big Data in the Web of Things

한국연구재단
Jun. 2013 - Jun. 2016

- 웹 기반 데이터 매쉬업 프레임워크 개발
- 데이터 매쉬업 시나리오에 기반한 실제 모형 개발

제로에너지 커뮤니티에 적용한 가능한 시맨틱 서비스 및 기술 연구

Semantic Services and Technologies for Realizing Zero-Energy Community

한국전자통신연구원(ETRI)
Aug. 2015 - Dec. 2015

- 프로슈머 기반 에너지 지식 그래프 설계

개인지식그래프에 기반한 시맨틱 검색 및 추천

Semantic Search and Service Recommendation Based on Personal Knowledge Graph

LG전자
Mar. 2015 - Oct. 2015

- 지식그래프 탐색 알고리즘 개발
- 텐서 분해 기반의 개인맞춤 상황인지형 추천 시스템 개발

Honors & Awards

- BK21 PLUS Yonsei Scholarship in 2016-2, 2018-1, 2018-2, 2019-1, 2019-2, and 2020-1
- Yonsei University Research Scholarship in 2019-1 and 2020-1
- Undergraduate, Software Capstone Design (2014 fall semester), 1st prize
- Undergraduate, 2013 Spring semester GPA honors
- Undergraduate, National S&T(Science & Technology) Scholarship (Full Tuition for 2011)