Sejin Chun

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DESIRED POSITION

- Development of knowledge construction techniques: knowledge graph construction, knowledge representation and distribution, ontology modeling, knowledge management
- Development of knowledge reasoning techniques: stream reasoning, incremental reasoning over knowledge stream. incremental computation of materialized graph, semantic reasoners(OWL, OWL 2, RDF/S)

RESEARCH OUTCOMES

- Published 28 academic papers including 12 first author papers and possessed professional programming skills in developing research prototypes
- Experience in promising research projects, including IoT/WoT and stream reasoning researches. Led research proposals, planning and implementations for 10 projects
- Experience in developing proposals, presentations, and preparing all of the reports and be good at the excellent command of spoken and written English

RECENT PROJECTS

Building knowledge graph for collaborative discovery in scientific articles on COVID19 Mar. 2020 - present
Sponsor: NIST

- The knowledge graph helps domain experts navigate answers to research questions at a brief summary level. The core schema of research approaches consist of background, objective, method, results, and conclusion. To classify the approaches from unstructured abstract, I developed a hierarchy neural network model that translates unstructured text into structured abstract with 92% accuracy. This knowledge graph utilizes COVID19 Open Research Datasets(CORD19).

Developing benchmark framework for incremental reasoning over knowledge stream Jul. 2019 - present
Sponsor: NIST

- This framework aims to measure changes of inferred statements in time and space caused by an increment/decrement of explicit ones. The reasoners with different OWL profiles can be assigned into different levels of entailment. We developed this framework based on an open-source stream processing engine(as Apache Flink) and supports high-level knowledge representation languages such as RDF/S, RDF Stream, and OWL2. In particular, stratified views allow deploying different reasoners at graph, window, and stream-level of inferences.

Applying stream reasoning framework to bibliographic database and social data stream Oct. 2018 - Jun. 2019
Sponsor: NIST

- This implementation provides up-to-the-minute insights of the online conversations surrounding published AI research. we've extracted meaningful research contents from textual abstracts using a deductive reasoner. For the construction

of knowledge graphs, we've implemented inductive logic methods, ie., sampling, clustering, multi-label text classification, and similarity. Besides, deductive logic methods are utilized, ie., rule-based natural language processing parser and rule-based reasoner.

EDUCATION

Ph.D September 2013 - August 2018
Dept. Computer Science, Yonsei University, Republic of Korea
Theis: *Efficient Updates of Linked Data Views in Stream Processing.*
(Thesis Advisor: Prof. Kyong-Ho Lee)

M.S September 2011 - August 2013
Dept. Computer Science, Yonsei University, Republic of Korea

B.S March 2003 - September 2009
Dept. Computer Science, University of Seoul, Republic of Korea

PUBLICATIONS

- **Sejin Chun**, Jooik Jung, and Kyong-Ho Lee, 'Proactive Policy for Efficiently Updating Join Views on Continuous Queries over Data Streams and Linked Data', IEEE Access, Vol. 7, pp. 86226-86241, 2019. (IF: 3.557)
- Xiongnan Jin, Jooik Jung, **Sejin Chun**, Seungjun Yoon and Kyong-Ho Lee, 'SECoG: Semantically Enhanced Mashup of CoAP-based IoT Services', Service Oriented Computing and Applications, Vol. 13, No. 1, 2019
- **Sejin Chun**, Jooik Jung, Xiongnan Xin, Seungmin Seo, and Kyong-Ho Lee, 'Designing An Integrated Knowledge Graph for Smart Energy Services', Journal of Super Computing, 2019 (IF: 1.532)
- Jooik Jung, **Sejin Chun**, Xiongnan Jin, Kyong-Ho Lee, 'Quantitative Computation of Social Strength in Social Internet of Things', IEEE Internet of Things Journal, vol. 5, no. 5, pp. 4066-4075, 2018. (IF: 5.863)
- **Sejin Chun**, Seungjun Yoon, Jooik Jung, and Kyong-Ho Lee, 'Planning Operators of Concurrent RDF Stream Processing Queries," International Journal of Web and Grid Services (IJWGS), Vol. 15. No. 1, 2019 (IF: 1.071)
- Jooik Jung, **Sejin Chun**, Xiongnan Jin, and Kyong-Ho Lee, 'Enabling Smart Objects Discovery via Constructing Hypergraphs of Heterogeneous IoT Interactions', Journal of Information Science, Vol. 44, No. 1, pp. 110-124, 2018. (IF: 1.939)
- **Sejin Chun**, Jooik Jung, Seungmin Seo, Wonwoo Ro, and Kyong-Ho Lee, 'An Adaptive Plan-Based Approach to Integrating Semantic Streams with Remote RDF Data', Journal of Information Science, Vol. 43, No. 6, pp. 852-865, 2017.. (IF: 1.939)
- Xiongnan Jin, **Sejin Chun**, Jooik Jung, and Kyong-Ho Lee, 'A Fast and Scalable Approach for IoT Service Selection based on a Physical Service Model', Information Systems Frontiers, Vol. 19, pp. 1357–1372, 2016. (IF: 3.232)
- Jooik Jung, Kyung-Ryul Kim, **Sejin Chun**, Gunhee Cho and Kyong-Ho Lee, 'IS2NM: Integrated social service network model for computing web service reputation', International Journal of Web and Grid Services, Vol 11. No. 4, pp. 390-409, 2015. (IF: 1.071)

PRESENTATIONS /PAPERS PRESENTED

- **Sejin Chun**, Xiongnan Jin, Seungmin Seo, Kyong-Ho Lee, Youngmee Shin and Ilwoo Lee, 'Knowledge Graph Modeling for Semantic Integration of Energy Services', Proc. of the Int'l Workshop on Big Data Analysis for Smart Energy (BigData4SmartEnergy2018), Jan. 5, 2018.
- **Sejin Chun**, Sangjin Shin, Seungmin Seo, Sungkwang Eom, Jooik Jung, and Kyong-Ho Lee, 'A Pub/Sub Fog Architecture for Internet of Vehicles', Proc. of 8th IEEE International Conference on Cloud Computing Technology and Science(CloudCom 2016). (Cited: 18)
- Sejin Chun, Jooik Jung, Xiongnan Jin, Seungjun Yoon and Kyong-Ho Lee, 'Proactive Replication of Dynamic Linked Data for Scalable RDF Stream Processing', Proc. of the Int'l Semantic Web Conference (ISWC 2016) , Oct. 17-21, 2016.
- Seungjun Yoon, **Sejin Chun**, Xiongnan Jin and Kyong-Ho Lee, 'A Unified Interface for Optimizing Continuous Query in Heterogeneous RDF Stream Processing Systems', Proc. of the Int'l Semantic Web Conference (ISWC 2016) , Oct. 17-21, 2016.
- Xiongnan Jin, Kangho Hur, **Sejin Chun**, Minjung Kim and Kyong-Ho Lee, "Autonomous Mashup of CoAP Services on the Internet of Things', Proc. of the IEEE World Forum on Internet of Things (WF-IoT 2015) , Dec. 14-16, 2015.
- Jooik Jung, **Sejin Chun**, and Kyong-Ho Lee, 'Hypergraph-based Overlay Network Model for the Internet of Things', Proc. of the IEEE World Forum on Internet of Things (WF-IoT 2015) , Dec. 14-16, 2015.
- **Sejin Chun**, Seungmin Seo, Wonwoo Ro, and Kyong-Ho Lee, 'Proactive Plan-based Semantic Data Acquisition Across SPARQL Endpoints', Proc. of the IEEE/WIC/ACM Web Intelligence conference (WI 2015), pp.161-164, 2015.
- Hyunsuk Oh, **Sejin Chun**, Sungkwang Eom, and Kyong-Ho Lee, 'Job-Optimized Map-Side Processing using MapReduce and Hbase with Abstract RDF data', Proc. of the IEEE/WIC/ACM Web Intelligence conference (WI 2015) , pp.425-432, 2015.
- Gunhee Cho, Xiongnan Jin, **Sejin Chun**, and Kyong-Ho Lee, 'Enhancing CoAP Proxy for Semantic Composition and Multicast Communication', Proc. of the ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp 2015), Sep. 7-11, 2015. ACM Web Intelligence conference (WI 2015) , Dec. 6-9, 2015. (*Poster*)
- Wonwoo Ro, Giyong Park,**Sejin Chun**, and Kyong-Ho Lee, 'Complex Sensor Mashups for Linking Sensors and Formula-based Knowledge Bases', Proc. of the IEEE Int'l Conference on Information Reuse and Integration (IRI 2015), Aug. 13-15, 2015.
- Seungmin Seo, **Sejin Chun**, Byungkook Oh, and Kyong-Ho Lee, 'SDPA : Sensor Data Processing Architecture for Modelling Semantic Data from Sensor Streams', Proc. of the IEEE Int'l Conference on Information Reuse and Integration (IRI 2015), Aug. 13-15, 2015.
- Kangho Hur, **Sejin Chun**, Xiongnan Jin, and Kyong-Ho Lee, 'Towards A Semantic Model for Automated Deployment of IoT Services Across Platforms', Proc. of the IEEE World Congress on Services (SERVICES 2015), June 27-July 2, 2015.
- **Sejin Chun**, Seungmin Seo, Byungkook Oh, and Kyong-Ho Lee, 'Semantic Description, Discovery and Integration for the Internet of Things', Proc. of the

9th IEEE Int'l Conference on Semantic Computing (ICSC 2015), pp. 272-275, 2015. (Cited: 37)

- Xiongnan Jin, **Sejin Chun**, Jooik Jung, and Kyong-Ho Lee, 'IoT Service Selection based on Physical Service Model and Absolute Dominance Relationship', Proc. of the 7th IEEE Int'l Conf. on Service Oriented Computing and Applications (SOCA 2014), pp. 65-72, 2014. (Cited: 27)
- **Sejin Chun**, Jooik Jung, Xiongnan Jin, Gunhee Cho, and Kyong-Ho Lee, 'Semantically Enriched Object Identification for Internet of Things', Proc. the 10th IEEE Int'l Conf. Distributed Computing in Sensor Systems (DCOSS2014), May. 26-28, 2014. (*Poster*)
- **Sejin Chun**, Jooik Jung, Xiongnan Jin, Gunhee Cho, Jinho Shin, and Kyong-Ho Lee, 'Semantic URI-based Event-driven Physical Mashup," Proc. IEEE World Forum on Internet of Things (WF-IOT), Mar. 6-8, 2014. 2012-2013
- Kyung-Ryul Kim, Jooik Jung, **Sejin Chun**, Gunhee Cho, and Kyong-Ho Lee, 'Estimating Web Service Reputation from Integrated Social Service Network Model', Proc. International Workshop on Crowd and Cloud Computing, Dec. 15, 2013.
- **Sejin Chun**, Jooik Jung, Yoonji Hwang, Kyong-Ho Lee, and YoungHoon Lee 'CMMS-K: The Conceptual Modeling Framework of Military Misson Spaces', Proc. International Conference on Management, Manufacturing and Materials Engineering, Oct. 25, 2013.
- **Sejin Chun**, Hyun-Bae Jeon, Jooik Jung, Beom-Jun Kim, and Kyong-Ho Lee, 'Context-Aware Mashup for Smart Mobile Devices', Proc. IEEE Asia-Pacific Services Computing Conf. (APSCC), Dec 6-10, 2012.

INVITED TALKS

- "*Knowledge Reasoning at the Tactical Edges*", In: Naviworks, South Korea, Date: Sep. 29th 2018.
- "*Knowledge Reasoning in a Big Data World*", In: University of Seoul, South Korea, Date: Sep. 13th 2018.

PATENTS

- Method and Apparatus for Scheduling Join View between Stream Data and Linked Data (1020824110000, 2020.02.21, South Korea)
- Apparatus and method for generating complex sensor using mathematical knowledge, and complex sensor (1018068650000, 2017.12.04, South Korea)
- Apparatus and Method of identifying object using semantic URL (1015841760000, 2016.01.05, South Korea)
- Apparatus and Method for Mediation of Web Cartoon Advertisement (1020150063254, 2015.05.06, South Korea)

PROJECTS

Development of XAI-based Technology for Smart Energy Platform Mar. 2018 - Aug. 2018
Sponsor: Korea Electric Power Corporation(KEPCO)

- Prepared a group of an energy knowledge modeling. Created a research proposal and presentations. Investigated research fields on ontology modeling for smart energy platform

A Personalized Context-aware Recommendation System Jun. 2016 - Aug. 2018
Sponsor: National Research Foundation of Korea (Ministry of Science , ICT and Future Planning)

- Investigated research fields on RDF stream processing. Developed a prototype of RSP engine based on C-SPARQL

Cloud-based Service Platform
for IoV Data Storage and Analysis Jun. 2016 – Dec. 2016
Sponsor: National Research Foundation of Korea (Ministry of Science , ICT and Future Planning)

- Created a research proposal, presentations, and technical reports. Developed a system prototype of analyzing streaming vehicle data based on cloud

Semantic Services and Technologies
for Realizing Zero-Energy Community Aug. 2015 – Nov. 2015
Sponsor: Electronics and Telecommunications Research Institute(ETRI)

- Created a research proposal and presentations. Investigated research fields on semantic services and technologies for micro grid domain. Implemented a prototype of a smart grid application.

Access Network Control Technique for Various IoT Service Apr. 2013 - Mar. 2018
Sponsor: Korea communications agency (Ministry of science, ICT and Future Planning)

- Created a research proposal, presentation and technical reports. Investigated research fields on IoT service discovery and composition. Developed a smart home demo-box and a physical mashup tool.

A Cloud Computing Framework
for Semantic Mashup of Big Data in the Web of Things Jun. 2013 - May. 2016
Sponsor: National Research Foundation of Korea (Ministry of Science , ICT and Future Planning)

- Created a research proposal and technical reports. Investigated a research field on Semantic Data Stream Processing.

Wisdom-Aware Mashup Framework
for Discovering and Composing Web based Services Jun. 2013 - May. 2016
Sponsor: National Research Foundation of Korea (Ministry of Science , ICT and Future Planning)

- Created a research proposal and technical reports. Investigated research field on IoT service discovery and composition.

A Study of Functional Model of Mission Space
for LVC Interoperability Environment Nov. 2012 - Oct. 2013
Sponsor: Agency for Defense Development (Ministry of national defense)

- Created a research proposal, presentation and technical reports. Investigated a research field on Web service composition. Developed an ontology engineering tool for mounting weapons of Korea air force fighter

Social-based Adaptive Mobile Mashups for Smartphones Sep. 2010 - Aug. 2012
Sponsor: National Research Foundation of Korea (Ministry of Education and Technology)

- Created a research proposal and technical reports. Investigated a research field on Web service composition.

Developing the Conceptual Model
of Mission Space Feb. 2011 - Dec. 2013
Sponsor: Agency for Defense Development (Ministry of national defense)

- Created presentations and technical reports. Developed an ontology engineering tool for integrated military strategies

TEACHING ASSISTANT

Internet Computing 2011
Capstone Project 2016

AWARDS AND GRANTS

Brain Korea+ 21 Research Competency Scholarship 2014, 2016, 2017
Yonsei Graduate Scholarship 2011, 2015, 2016
Capstone Project(Grand Prize) (Teaching assistant) 2016

LANGUAGES

English
Fluent in reading and writing documents in English and average oral English

Japanese
Basic in written and spoken Japanese

Korean
Mother tongue

WORK EXPERIENCE

Guest Researcher October 2018 - Present
Information Technology Laboratory, National Institute of Standards and Technology(NIST), United States

Assistant Manager October 2009 - September 2011
Dept. Business Strategy, Highway management corporation, Republic of Korea

PROGRAMMING SKILLS

- Experience in developing ML/DL projects with related tools ie., Pytorch, scikit-learn, and tensorflow
- Professional skills in developing software using Kotlin, Java, PHP, Python, and nodeJS.
- Implemented research prototypes based on development frameworks such as CodeIgniter and Django.
- Experience in developing front-end developments using Bootstrap and CSS.
- Provisioned application demonstrations using IoT/WoT-related products, i.e., Arduino, RapsberryPI, and OBD-II.
- Experience in developing research prototypes using open-source-based query processing engine(i.e., Jena, Fuseki), reasoning engines(Hermit, Fact++, Pagoda), and stream reasoning engines(C-SPARQL and CQELS)
- Experience in managing and designing Oracle DBMS, Jena TDB(Ontological DB) and Neo4j(Labeled property graph DB).

RESEARCH KEYWORDS

Knowledge stream reasoning with AI/ML based inferences, Deductive reasoning: Ontology-based text classification, Inductive: DL-based text classification. Scalable Stream Processing, Ontology modeling (Smart grid and Military application domain), Fog Computing, Semantic Web services, Internet-of-Things, Web-of-Things