

Keyu Wang

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EDUCATION

University of Tuebingen

M.Sc. in Machine Learning

Southeast University

B.Eng. in Artificial Intelligence

Tuebingen, Germany

Oct. 2024 – Present

Nanjing, China

Sep. 2020 – Jun. 2024

GPA: 3.79/4.00

Relevant coursework: Optimization Method (96/100, rank 1/97), Probability Statistics & Stochastic Processes (92/100, rank 2/95), Data Structures (93/100), Machine Learning (89/100), Deep Learning and Its Application (93/100), Natural Language Processing (87/100), Multi-agent System (94/100), etc.

INTERNSHIP

BSH Home Appliances Holding (China) Co., Ltd

Research intern

Nanjing, China

Jul. 2023 – Jun. 2024

- **AI enabled efficient R&D in Wash Machine/Dryer:** Proposed a data-driven approach to bridge the complicated relationship among hardware platform, program design, test standard, all intermediate data (state parameters and sensor data) and performances of Bosch and Siemens wash machines, especially, on the specified hardware platform, within one specific test standard, built a predictive model using deep learning techniques to predict washing performances.

PUBLICATIONS & PREPRINTS

Keyu Wang, Guilin Qi, Jiaqi Li and Songlin Zhai. Can Large Language Models Understand DL-Lite Ontologies? An Empirical Study. Accepted by Findings of the 2024 Conference on Empirical Methods in Natural Language Processing (EMNLP 2024). [ArXiv] [Data]

Keyu Wang, Guilin Qi, Jiaoyan Chen, Yi Huang and Tianxing Wu. Embedding Ontologies via Incorporating Extensional and Intensional Knowledge. Under Minor Revision at Data Intelligence, 2024. [ArXiv] [Code]

Keyu Wang, Site Li, Jiaye Li, Guilin Qi and Qiu Ji. An Embedding-based Approach to Inconsistency-tolerancy Reasoning with Inconsistent Ontologies. Proceedings of The 12th International Joint Conference on Knowledge Graphs (IJCKG 2023). [ArXiv] [Code]

RESEARCH EXPERIENCE

Evaluating Large Language Models for Understanding DL-Lite Ontologies

[ArXiv] [Data]

Supervisor: Prof. Dr. Guilin Qi

Jan. 2024 – Jul. 2024

- Designed an evaluation framework for analyzing the LLMs' capability of understanding DL-Lite ontologies from 2 aspects (syntax and semantics) covering 6 representative tasks: syntax checking, instance checking, subsumption of concepts or roles, property characteristics probing, ontology satisfiability checking and query answering.
- Conducted comprehensive experiments and showed that LLMs could understand formal syntax and model-theoretic semantics of concepts and roles but still struggle with understanding TBox Negative Inclusion transitivity and handling ontologies with large ABoxes.

Embedding Ontologies with Extensional and Intensional Knowledge

[ArXiv] [Code]

Supervisor: Prof. Dr. Guilin Qi and Dr. Jiaoyan Chen

Jun. 2023 – Dec. 2023

- Introduced a dual-space framework concurrently embedding ontologies in extensional and intensional spaces, facilitating the joint learning of both types of knowledge.
- Employed a geometric approach to model concept extensions and a pretrained language model to encode concept intensions, fully capturing knowledge in concepts and preserving IsA transitivity.
- Improved triple classification and link prediction on YAGO39K, M-YAGO39K, and DB99K-242 datasets, with significant F1-score and Hit@1 gains.

Embedding-based Inconsistency-tolerancy Ontology Reasoning

[ArXiv] [Code]

Supervisor: Prof. Dr. Guilin Qi and Dr. Qiu Ji

Nov. 2021 – Nov. 2022

- Proposed an embedding-based approach to extend inconsistency-tolerant reasoning with inconsistent ontologies from propositional logic to description logics by considering the semantics of the axioms.
- Implemented two embedding techniques, sentence-based and knowledge-graph-based, to establish approaches for selecting maximal consistent sub-ontologies and defining novel inference relations.
- Proved several logical properties of our proposed inference relation and conducted empirical experiments on four inconsistent ontologies to evaluate the effectiveness and efficiency, which showed a more than 10% growth of reasoning ability without excessive time consumption.

EXTRACURRICULAR

Study advisor for freshman undergraduates	Sep. 2022 – Jun. 2023
Group engineering leader & co-founder of Artificial Intelligence Association of Southeast University (SEU-131AIClub)	
[Link]	May 2022 – Jun. 2023
Student lecturer for the course <i>An Entertaining Introduction to AI</i> at <i>Second Class</i> held jointly by SEU-131AIClub and the School of Computer Science & Engineering of Southeast University	Sep. 2022 – Dec. 2023

SKILLS

Programming: Python (PyTorch), C/C++, Java, etc.

Tools: VS Code, Jupyter Notebook, Shell, MATLAB, HTML/CSS/JavaScript, L^AT_EX, Markdown, etc.

Languages: Chinese (Native), English (Fluent), German (Beginning).