Keyu Wang

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EDUCATION

Southeast University **Sep. 2020 – Jul. 2024**
Bachelor of Artificial Intelligence **GPA:** 88.48/100 (3.76/4.00)

Core Courses: Calculus, Linear Algebra, Discrete Mathematics, Probability Statistics & Stochastic Processes, Computer Programming, Data Structures, Operation Systems, Database Principle & Application, Distributed System, Machine Learning, Deep Learning and Its Application, Computer Vision, Natural Language Processing, etc.

Bachelor Thesis: Research on Ontology Embedding Method Based on Language Models

PUBLICATION

Keyu Wang, Site Li, Jiaye Li, Guilin Qi*, Qiu Ji. An Embedding-based Approach to Inconsistency-tolerant Reasoning with Inconsistent Ontologies. Accepted by *International Joint Conference on Knowledge Graphs* **2023** (conference proceeding). https://arxiv.org/abs/2304.01664.

RESEARCH EXPERIENCE

Evaluation of Large Language Models for Inconsistency Checking | *Member* **Sep. 2023 – Nov. 2023**

- Collected existing inconsistent ontologies and incoherent ontologies, and constructed 38 datasets containing conflicts with various expressivity like OWL Lite, OWL EL and OWL DL.
- Analyzed the capability of large language models like GPT4 and LLaMA2 to detect different kinds of conflicts such as inverse role, disjointness and functionality in inconsistent ontologies with different expressivity.
- Designed prompts for the large language models to check conflicts, give explanations and revise inconsistency step by step applying Chain-of-Thought methodology.

Embedding Ontologies via Modeling Extensional and Intensional Knowledge | *Individual* **Nov. 2022 – Jul. 2023**

- Proposed a novel framework to represent the concepts and instances of an ontology in two spaces called extensional space and intensional space respectively, which can comprehensively capture the intensional knowledge and extensional knowledge within the ontological knowledge base.
- Utilized pre-trained models to represent conceptual intensions and introduced a method that maps instances between these two spaces for jointly learning the extensional and intensional knowledge of the ontology.
- Conducted empirical experiments that showed better performances in triple classification (more than 5% increase in F1-score) and link prediction (more than 6% increase in Hit@1, etc.).

An Embedding-based Approach to Reasoning with Inconsistent Ontologies | *Leader* **Jan. 2022 – Sept. 2022**

- Proposed an embedding based method to extend inconsistent ontology reasoning based on maximal consistent subsets from propositional logic to description logics, considering the semantics of the axioms.
- Applied Sentence Embedding models such as Sentence-BERT and Knowledge Graph Embedding models such as TransE which capture textual information and structural information respectively.
- Proved several logical properties of our proposed inference relation and conducted extensive experiments to evaluate the effectiveness and efficiency, which showed a more than 10% growth of reasoning ability.

COVID-19 Encyclopedia Knowledge Graph Construction from Multi-sources | *Member* **Nov. 2021 – Feb. 2022**

- Designed an ontology based on the encyclopedia pages about COVID-19 and extracted high-quality knowledge about COVID-19 by applying techniques of type inference, property extraction and relation mining.
- Integrated knowledge extracted from different sources by applying property matching and entity matching, and completed the knowledge by applying type completion, property completion and relation refinement.
- Conducted some experiments to show the quality of the COVID-19 Knowledge Graph and implemented some potential applications including semantic search and question answering.

INRERNSHIP

BSH Home Appliances Holding (China) Co., Ltd | *Intern of CN/TE Department* **Jul. 2023 – Present**

- **AI-enabled Efficient Program Design in WM/D:** Employed a data-driven approach and leveraged a seq2seq model to build a predictive model for washing performances metrics, which is enlightening to optimize the design of product platform and program design of a washing machine.
- **Washing Machine Domain Ontology Construction:** Constructed an ontological knowledge base of Bosch and Siemens washing machine domain, with the capability to serve downstream applications like information retrieval, staff training and project handover.

COURSE PROJECTS (SELECTED)

Reinforcement Learning Course Project: Play BlackJack | *Member* | Report **May 2023 – Jun. 2023**

- Implemented various methodologies for achieving higher scores in the game of BlackJack using Reinforcement Learning algorithms such as DQN, Monte-Carlo simulation and actor-critic algorithm.
- Chose DQN to participate in the BlackJack competition in the class and ranked 2/9.

Multi-agent Course Projects: Simulation of Swarm Motion Models | *Individual* **May 2023 – Jun. 2023**

- **Boids Model:** Simulated Boids model through the control of keeping close, keeping consistent and avoiding collision, so that the group can form various complex forms and actions.
- **Pedestrian Model:** Simulated pedestrian movement, considering the expression of visual information, the formulation of cognitive heuristic and the influence of body collision.
- **Multi-robot Pursuit Model:** Simulated the pursuit of predators and predators, setting *Catch Rule*, *Escape Rule*, *Eat Rule* and *Random Walk Rule*.

Diabetic Knowledge Graph Construction & Prescription Prediction | *Leader* **Mar. 2023 – Apr. 2023**

- Designed the ontology, and implemented entity and relation extraction from documents and database.
- Used KNN algorithm to recommend medication for diabetic patients.

Column Type Annotation via Pre-trained Language Models | *Individual* | Report **Nov. 2022 – Dec. 2022**

- Proposed an approach to combine two transformer blocks, one for capturing overall content semantics and every entity-pair relation semantics, the other for row-column structure for column type annotation.

Deep Learning Course Project: Video Captioning Challenge | *Leader* **Sep. 2022 – Dec. 2022**

- Participated in dataset construction for video captioning competition held in the class.
- Applied S2VT model to video captioning challenge and ranked 3/17.

Machine Learning Course Project: Face Recognition of Classmates | *Individual* | Report **May. 2022 – Jun. 2022**

- Applied pretrained DL architectures using CNN and ResNet which performed 63.4% accuracy in valid datasets and 80% accuracy in site acceptance.

Programming Language Course Project: Scientific Calculator for Electric | *Individual* **Jul. 2021 – Aug. 2021**

- Implemented an ad hoc scientific calculator for electric, which provides a convenient interface and is especially suitable for various circuit calculations such as AC steady-state circuits.

ACTIVITIES

Study advisor for freshman undergraduates Sep. 2022 – Present
Engineering team leader & co-founder of Artificial Intelligence Association of Southeast University (SEU-131AIClub)
Github Organization Link May 2022 – Present
Student lecturer at *Second Class* held jointly by School of Computer Science and Engineering and SEU-131AIClub
Sep. 2022 – Dec. 2022

SKILLS

Programming: C/C++, Python (PyTorch), Java.
Software & Tools: VS Code, Eclipse, MATLAB, Mathematica, MySQL, MarkDown, LaTeX, etc.
Languages: Chinese Mandarin (native speaker), English (fluent, IELTS score 7.5).