# Keyu Wang

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## Education

**University of Tuebingen** — Tuebingen, Germany
*M.Sc. in Machine Learning* — *Oct. 2024 – Present*

**Current GPA**: 1.47/1.0 (Germany System: 1.0 is the best, 5.0 is the lowest)
**Relevant coursework:** Non-convex Optimization of Deep Learning, Efficient Machine Learning in Hardware, Understanding LLMs, Statistical Machine Learning, Probabilistic Machine Learning, etc.

**Southeast University** — Nanjing, China
*B.Eng. in Artificial Intelligence* — *Sep. 2020 – Jun. 2024*

**Cumulative GPA**: 3.79/4.0, Top 10% (Chinese System: 4.0 is the best, 0 is the lowest)
**Relevant coursework:** Linear Algebra, Calculus, Optimization, Probability Statistics & Stochastic Processes, Data Structures, Database, Distributed Systems, Machine Learning, Deep Learning, Natural Language Processing, etc.

## Research Interests

I am passionate about the emerging challenges in scaling pretraining, post-training, and test-time with compute, models, and data — spanning efficiency, robustness, generalization, and alignment, etc.:

- **Efficiency:** Efficient and scalable model design, training, fine-tuning, deployment and inference & system co-design.
- **Optimization:** Randomized algorithm optimization in large-scale ML for acceleration, robustness and generalization.
- **Alignment:** Effective and efficient alignment algorithms for keeping AI safe, reliable, and aligned with human values.

## Publications

Google Scholar: https://scholar.google.com/citations?user=IvXDjWUAAAAJ&hl=zh-CN

[1] **Keyu Wang**, Guilin Qi, Jiaqi Li and Songlin Zhai. "Can Large Language Models Understand DL-Lite Ontologies? An Empirical Study." *Findings of the Association for Computational Linguistics: EMNLP 2024, pages 2503–2519.*

[2] **Keyu Wang**, Guilin Qi, Jiaoyan Chen, Yi Huang and Tianxing Wu. "Embedding Ontologies via Incorporating Extensional and Intensional Knowledge." *Data Intelligence, Vol. 7, Issue 4, 1222-1241, 2024.*

[3] **Keyu Wang**, Site Li, Jiaye Li, Guilin Qi and Qiu Ji. "An Embedding-based Approach to Inconsistency-toleranct Reasoning with Inconsistent Ontologies." *The 12th International Joint Conference on Knowledge Graphs, 2023.*

## Research Experience

**Wild, Efficient, and Innovation AI Lab | ELLIS Tuebingen & MPI-IS** — Tuebingen, Germany
*Research intern | Supervisor: Dr. Shiwei Liu* — *Mar. 2025 – Present*

**Reasoning-aware Pruning:**

- Investigating how layer pruning and layer merging degrade inference scaling, and how to restore it.

**Demystifying different roles of LLMs' layers in retrieval, knowledge, and reasoning:**

- Contributed to demonstrate how evaluation metrics, e.g., multiple-choice-loglikelihood & generate-until, affect per-layer pruning performance drops, and conduct experiments in the reasoning part.

**Knowlegde Science & Engineering Lab | Southeast University** — Nanjing, China
*Research intern | Supervisor: Prof. Dr. Guilin Qi* — *Feb. 2022 – Jun. 2024*

**Evaluating LLMs' Reasoning and Understanding with Description Logic Ontologies:** [paper]

- Evaluated LLMs' capacity of understanding DL-Lite ontologies by syntax checking, instance checking, subsumption checking, functionality checking, query answering and satisfiability checking.
- Demonstrated that LLMs excel at understanding formal syntax and model-theoretic semantics of concepts and roles, yet struggle with negative inclusion and deductive reasoning with many instances.

**Embedding Ontologies via Incorporating Extensional and Intensional Knowledge:** [paper]

- Designed a dual-space embedding framework combining geometry-based extensional modeling with language-based intensional embeddings, achieving SOTA triple classification and link prediction.

**Embedding-based Rational Inconsistency-tolerant Reasoning in Description Logics:** [paper]

- Proposed a monotonic selection relation for comparing maximal consistent subsets in an inconsistent belief base, extending from propositional logic to description logics by leveraging semantic embeddings.
- Proved 7 key logical properties to show that the proposed method leads to a rational inference and empirically shown over 10% reasoning boosting with negligible runtime.

## Industrial Internship

**BSH Home Appliances Holding (China) Co., Ltd** Nanjing, China

*Intern | Head: Rick Du; Mentor: Huilong An* *Jul. 2023 – Jun. 2024*

**AI-enabled efficient R&D in Wash Machine/Dryer:**

- Developed LSTM-based models to predict washing performances with different program sequences to reduce product testing costs, outperforming prior regression and decision-tree baselines.
- Built a graph knowledge base linking hardware configurations, program design, test standards, sensor data and performance metrics for Bosch & Siemens washing machines, enabling better R&D pipelines.

## Awards

**Selected Grants**

- **Provincial Innovation and Entrepreneurship Project Fund for University Students** ($< 5\%$)
  Role: Lead | Value: 8000 CNY ($\approx$ 1067 EUR) Jul. 2022 – May. 2023

**Selected Awards**

- **Huawei Scholarship** Dec. 2022
- **First Prize in China Undergraduate Mathematical Contest in Modeling** Oct. 2021
- **First Prize in Advanced Mathematics Competition of Jiangsu Province** Jun. 2021
- **First Prize in Advanced Mathematics Competition of Southeast University** (rank 8, $< 0.5\%$) Apr. 2021
- **First Prize in Programming Contest of Southeast University** (rank 5, $< 5\%$) Dec. 2020
- **Silver Medal in China Southeast Mathematical Olympiad** Jul. 2019

## Extracurricular

Student lecturer for *An Entertaining Introduction to AI at the Second Class for Students* Sep. 2023 – Dec. 2023

Engineering leader & co-founder of AI Association of Southeast University [SEU-131AIClub] May 2022 – Jun. 2023

Study advisor for freshman undergraduates Sep. 2022 – Jun. 2023

## Skills

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

**Tools:** VS Code, Jupyter Notebook, Shell, Linux, Git, LaTeX, MarkDown, etc.

**Languages:** Chinese (Native), English (C1, IELTS 7.5).