WANG YUPEI

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Research Interest: Neural Model Interpretability, Computational Linguistics, AI for Education

EDUCATION

Department of Digital Humanities, Beijing Normal University **Sep 2022 – Jun 2025**
Computational Linguistics (Advised by Renfen Hu)   ***GPA: 3.7/4***

School of Mathematics and Statistics, Beijing Jiaotong University **Sep 2018 – Jun 2022**
Information and Computation Science   ***GPA: 3.72/4***

SELECTED COURSEWORK [U] denotes undergraduate courses, [G] denotes graduate courses.

- Mathematical Statistics ([U])
- Information Theory ([U])
- Theory & Algorithms for Optimization ([U])
- Foundations of Natural Language Processing ([G])
- Frontier of Cognitive Neuroscience in Linguistic Research ([G])
- Big Data Driven Artificial Intelligence ([G])
- Lexical Semantics ([G])

PUBLICATIONS

1. **Yupei, W.**, & Renfen, H., & Zhe, Z. (2024). Beyond agreement: Diagnosing the rationale alignment of automated essay scoring methods based on linguistically-informed counterfactuals. In *Findings of the Association for Computational Linguistics: EMNLP 2024.*

2. **Yupei, W.**, & Renfen, H. (2021). A Prompt-independent and Interpretable Automated Essay Scoring Method for Chinese Second Language Writing. In *Proceedings of the 20th Chinese National Conference on Computational Linguistics* (CCL 2021 Oral, *cited by 13*).

3. Kaijie, M., & Ziliang, Q., & **Yupei, W.**, & Renfen, H. (2024). Construction and Application of Ancient Chinese Allusion Resource Database. Accepted by *Journal of Chinese Information Processing* (In Chinese, Accepted).

RESEARCH EXPERIENCE

*Projects marked with * were completed collaboratively with peers and advisor; others were completed solely with advisor.*

Interpretability of Neural Language Models in Automated Essay Scoring (AES) **Mar 2023 – Present**
- Investigated the decision-making processes of neural language models in AES by developing a counterfactual method that intervenes on linguistic elements in essays.
- Discovered that fine-tuned pre-trained models align better with human graders but focus primarily on sentence-level features, while LLMs demonstrate sensitivity to both sentence-level and overall essay structure. [paper] [code]

A Few-Shot Comparative Learning Approach to Enhance LLMs' Performance in AES **Mar 2024 – Present**
- Developed an iterative comparison mechanism for LLMs to assess essay quality through sequential pair-wise evaluations.
- Initial experiments indicate superior performance over fine-tuned BERT in low-resource scenarios. [arxiv soon]

***Construction and Application of Ancient Chinese Allusion Resource Database** **Oct 2022 – Mar 2024**
- Developed a knowledge base of 23,000 allusions and an annotated corpus with over 30,000 entries.
- Designed two tasks—allusion detection and allusion recognition—with corresponding evaluation baselines.
- Used this resource to evaluate Chinese language capabilities in LLMs and to enhance Chinese language education. [To be published in December 2024]

Automated Essay Prompt Adherence Assessment via Semantic Matching **Sep 2021 – Apr 2022**
- Developed a semantic matching-based approach for essay prompt-adherence assessment using composite reference texts derived from prompts and exemplar essays.
- Integrated this method into the previous AES system to improve prompt adherence assessment and overall scoring accuracy. [Beijing Jiaotong University Outstanding Bachelor's Thesis Award]

Interpretable AES System Based on Linguistic Features **Mar 2020 – Jun 2021**
- Developed an AES model for Chinese L2 essays using ordinal logistic regression, incorporating 90 linguistic complexity features, 5 writing error features, and n-gram TF-IDF features.
- The model outperforms several LSTM-based neural models and enhances score interpretability with a prompt-independent feature set.
- Developed and open-sourced L2C-Rater, a tool for Chinese L2 AES. [paper] [code] [demo]

INDUSTRY EXPERIENCE

Du Xiaoman Technology (Baidu Financial) | NLP Intern   **Dec 2023 - Mar 2024**
- Reproduced experiments from research papers on LLM technologies, delivering weekly team presentations on pre-training, fine-tuning, and human preference learning algorithms.
- Participated in an LLM-driven game project, focusing on fine-tuning models to emulate specific animated and literary characters. Developed methods to assess knowledge boundaries and control model responses.

Cummins China | NLP Intern   **Mar 2022 – Jun 2022**
- Developed a system allowing users to customize engineering datasets using natural language inputs.
- Created a domain-specific knowledge corpus from scratch and developed a hybrid retrieval algorithm combining rule-based methods and vector similarity.

TEACHING EXPERIENCE

Python Programming and Data Analysis | Undergraduate & Graduate   **Spring & Fall 2023–2024**
- Responsible for 4 tutorial sessions each semester, providing supplementary explanations on machine learning and natural language processing theory and practice.
- Organized 5 competitions on Kaggle ([23S], [23F], [24S1], [24S2], [24F]) to help students learn from practice.

Natural Language Processing | Graduate   **Spring 2024**
- Awarded Outstanding Teaching Assistant for Graduate Courses at Beijing Normal University.
- Drafted a basic manual on linear algebra, and based on this manual, conducted four supplementary classes totaling 12 hours. These classes introduced fundamental linear algebra knowledge required for NLP research from a geometric intuition perspective to students with no prior background.
- Conducted 4 tutorial sessions, demonstrating the code implementation of common NLP tasks. During this process, I maintained a practical tutorial repository. This library covers model training and fine-tuning based on PyTorch and 🤗Transformers, including models such as TextCNN, LSTM, BERT, T5, Qwen, and others, for tasks like text classification and machine translation, as well as asynchronous API calls for LLMs.

COMPETITIONS

Led a three-member team in both competitions as the team leader.

The Interdisciplinary Contest in Modeling (ICM) | Finalist   **Feb 5 − 9, 2021**
- Developed an influence network and similarity model to assess artists' impact and music relationships.
- Identified "infectious" musical traits and tracked shifts in artistic influence, highlighting pivotal moments in music history.

Contemporary Undergrad Math Contest in Modeling (CUMCM) | First Prize of Beijing Division   **Sep 10 − 13, 2020**
- Designed a quadratic programming model to optimize bank lending to SMEs by balancing profit and risk.
- Developed strategies for businesses with and without credit history, leveraging invoice data for risk evaluation.
- Accounted for strategy adaptations during unexpected events, such as pandemics.

SKILLS

- Python
- PyTorch
- CMD & Shell

- R
- 🤗Transformers
- Git
- LaTeX