Jianzhu Yao

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Research Interest

My primary research interests lie in the fields of natural language processing and machine learning, including conversational systems, mixture of experts, multimodal machine learning, and interdisciplinary topics of biomedical science and NLP.

Education

Tsinghua University **Sep 2019 – Present**

Bachelor of Engineering in Computer Science and Technology; GPA: 3.86/4.00 *Beijing, China*

Courses: Linear Algebra(4.0), Object-Oriented Programming(4.0), Calculus(4.0), Discrete Mathematics(4.0), Introduction to Artificial Intelligence(4.0), Computer Graphics(4.0), Operating Systems(4.0), Compiler(4.0), Organization(4.0), Software Engineering

Papers

- **SciData: Dataset and Method for Scientific Dataset Recommendation**
  Jianzhu Yao*, Zichun Yu*(equal contribution), Haihong Tang, Jinxiong Xia, Zequn Liu, Sheng Wang
  Submitted to The 61st Annual Meeting of the Association for Computational Linguistics. ***ACL 2023.***

- **A Benchmark for Understanding and Generating Dialogue between Characters in Stories**
  Jianzhu Yao, Ziqi Liu, Jian Guan, Minlie Huang
  Submitted to The 61st Annual Meeting of the Association for Computational Linguistics. ***ACL 2023.***

- **EVA2.0: Investigating Open-Domain Chinese Dialogue Systems with Large-Scale Pre-Training**
  Yuxian Gu, Jiaxin Wen, Hao Sun, Yi Song, Pei Ke, Chujie Zheng, Zheng Zhang, **Jianzhu Yao**, Xiaoyan Zhu, Jie Tang, Minlie Huang
  Machine Intelligence Research 2022

Research Experience

Helpfulness Prediction and Fake Detection of Multimodal Reviews **Oct. 2022 – Present**

Advisor: Prof. Bowen Zhou, Zhou Group, Tsinghua University *Beijing, China*

- Developed multimodal fusion networks to perform the helpfulness prediction on reviews; designed detection models for fake reviews written by internet water armies according to the interaction between cross-modality attention.
- Built multimodal e-commerce and social media review datasets including text, images, and videos as well as commodities' text and images
- Participated in a multimodal workshop and gave a presentation on the interdisciplinary of multimodal machine learning and sparsely-activated models like mixture of experts.

SciData: Dataset and Method for Scientific Dataset Recommendation **June 2022 – Oct. 2022**

Advisor: Prof. Sheng Wang, Wang Lab, University of Washington, Seattle *Beijing, China(Remote)*

- Proposed the utilization of Open Pre-trained Transformer Language Models (OPT) for knowledge-enhanced in-context question generation and constructed a biomedical material recommendation dataset for downstream applications.
- Proposed a recursive retrieval approach with Unified Medical Language System(UMLS) and implemented GCN for retrieval tree embedding to incorporate more domain information into the recommendation process.
- Validated the quality of the dataset with manual annotation, citation prediction, and various downstream tasks.
- Submitted the article to ACL 2023 as the first author.

A Benchmark for Dialogue Understanding and Generation in Stories **July 2021 – Mar. 2022**

Advisor: Prof. Minlie Huang, Conversational AI Group, Tsinghua University *Beijing, China*

- Designed a benchmark for dialogue understanding and generation between characters in stories, which required a higher standard for understanding character relationships and storylines.
- Built a new story dataset with marked dialogue and speakers and tested the performance of existing baselines on the benchmark to investigate the machine's dialogue understanding and generation abilities.
- Proposed learning explicit character representation to guide generation and understanding. Automatic and manual evaluation revealed that our approach outperforms strong baselines by 30% and can generate more coherent and informative dialogue.
- Submitted the article to ACL 2023 as the first author.

Open-Domain Chinese Dialogue System EVA1.0 and EVA2.0 **July 2021 – Mar. 2022**

Advisor: Prof. Minlie Huang, Conversational AI Group, Tsinghua University *Beijing, China*

- Collaborated with team members to develop the Open-Domain Chinese Dialogue System EVA1.0 and EVA2.0, and was responsible for designing decoding strategies.
- Trained and implemented a contradiction detection classifier for Chinese dialogue systems, designed the regeneration pipeline to avoid inconsistent generation, and validated strategy effectiveness using case studies. Implemented the detector in other emotional chatbots as well.
- Accepted by Machine Intelligence Research 2022.

Mixture of Experts Model and Expert Pruning Technique **Mar. 2022 – June 2022**

Advisor: Dr. Tao Ge, Natural Language Computing Group, Microsoft Research Asia *Beijing, China*

- Researched computing cost trend patterns in all2all communication by conducting profiling experiments using mixture of experts models with different numbers of experts on each device.
- Explored using expert pruning algorithms on the mixture of experts language models to accelerate computation, lower computation latency, and reduce the GPU memory usage by 20% at a given speed with very little performance loss.

Research on Rotation Invariance of Image Local Features in Object Reconstruction **2021**

Advisor: Prof. Shimin Hu, at Graphics & Geometric Computing Group, Tsinghua University *Beijing China*

- Researched rotation invariance of image local features in object reconstruction based on deep learning methods and traditional algorithms, which shows existing neural networks suffer from serious data bias and cannot outperform traditional algorithms on some data with rotation invariance.
- Observed the influence of image transformation (like rotation, style transformation, affine transformation, streching) on feature extraction and matching in SuperPoint, D2-Net, SuperGlue, and SIFT.

Open-Source Projects

- **KD-Tree Based Stochastic Progressive Photon Mapping Image Rendering Framework(C++)**: Implemented the SPPM algorithm, KD-Tree based Bounding Box for intersection acceleration, 3D scene construction, anti-aliasing, and motion blur.
- **Enterprise Personnel Permissions Management System(Vue, JavaScript, Front-end)**: Developed a front-end service for the management of personnel permissions in an enterprise(Kuaishou).
- **Education Platform APP Based on Knowledge Graph(Java, SpringBoot, Android Studio, Full-stack)**: Developed the front-end and back-end of the educational app IntelEdu based on knowledge graphs with a semantic similarity classifier(BERT).

Services and Membership

- Reviewer, EMNLP 2022: Dialogue and Interactive Systems
- Member, Bodybuilding Team of Tsinghua University, 2022 – Present
- Vice President, Winter Swimming Association of Tsinghua University, 2021 – Present
- Member, Tsinghua University Admission Group in Heilongjiang Province, June 2020
- Member, Student Association for Science and Technology, Dept. CST of Tsinghua University, 2020 – Present
- Member, Swimming Team of CST in Tsinghua University, 2019

Technical Skills

Programming Languages: Python, LaTeX, Java, C, C++, Shell, HTML/CSS, Assembly(RISC-V, x86)
Developer Tools: VS Code, PyCharm, Git, Docker, Linux, Xcode, Unity Hub, Vim, Android Studio, Vivado, Quartus
Libraries/Frameworks: PyTorch, Transformers, Fairseq, pytorch-lightning, spaCy, NumPy, Matplotlib, Django, SpringBoot, Vue
TOEFL iBT: 105 (Reading 28, Listening 28, Speaking 23, Writing 26)
GRE: Verbal 155 (66%), Quantitative 170 (96%), Analytical Writing 4.5 (79%)

Honors & Awards

- Sports Excellence Award, Tsinghua University, 2022
- Winter Swimming Star, Tsinghua University, 2022
- Academic Excellence Award, Tsinghua University, 2020
- First Prize, 37^{th} National Physics Competition for College Students in Beijing, China, Beijing Physical Society, 2021
- First prize, Engineering Technology Challenge, Tsinghua University, 2019
- First prize, Province Degree in the National Physics Competition (senior group), Chinese Physical Society, 2018