Jianzhu Yao

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Research Interest

My primary research interests are in the fields of **Natural Language Processing and Machine Learning**, including conversational systems, multimodal machine learning, and the inter-discipline of biomedical + NLP.

Education

Tsinghua University **Sep 2019 – Present**

Bachelor of 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

- **A Benchmark for Understanding and Generating Dialogue between Characters in Stories**
  Jianzhu Yao, Ziqi Liu, Jian Guan, Minlie Huang
  AAAI 2023, under review

- **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
  arXiv:2203.09313

Research Experience

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

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

- **(Undergraduate Thesis, on progress)**Planned to submit the article to ACL Rolling Review in December 2022.
- Developed multimodal fusion networks to perform the helpfulness prediction of reviews and designed detection models for fake reviews written by Internet water armies through the interaction between cross-modality attention.
- Constructed and proposed multimodal e-commerce and social media review datasets including text, images, and videos together with commodities' text and images
- Conducted a literature survey and gave a presentation on the inter-discipline of multimodal machine learning and sparsely-activated models like mixture of experts.

Biomedical QA Dataset Construction and Recursive Retrieval Recommendation **June 2022 – Oct. 2022**

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

- Ready to submit the article to ACL Rolling Review in November 2022.
- Proposed to use PLM (OPT) for knowledge-enhanced in-context question generation, and constructed a biomedical QA dataset for downstream application.
- Proposed to perform a recursive retrieval approach with Unified Medical Language System(UMLS), and implemented GCN for the retrieval tree embedding to incorporate more domain information into the recommendation process.

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

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

- Designed a benchmark for dialogue understanding and generation between characters in stories, which put forth a higher requirement for understanding character relationships and storylines. The paper is submitted to AAAI 2023.
- 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 ability in dialogue understanding and generation.
- Proposed to learn explicit character representation to guide the generation and understanding. The automatic and manual evaluation reveals that our approach outperforms the strong baselines by 30% and can generate more coherent and informative dialogue.

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

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

- Collaborated with team members on the development of the Open-Domain Chinese Dialogue System EVA1.0 and EVA2.0, and was responsible for decoding strategies.
- Trained and implemented a contradiction detection classifier (RoBERTa) for Chinese Dialogue Systems, designed the regeneration pipeline to avoid inconsistent generation, and proved the effectiveness using case studies. The detector is also used in other emotional chatbots.

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

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

- Observed insightful patterns of computing cost trend of all2all communication by conducting profiling experiments of Mixture of Experts models with different numbers of experts on each device.
- Explored expert pruning algorithms on the Mixture of Experts language models to accelerate computation, lower computation latency, and reduce GPU memory usage.

Selected Projects

- **Ensemble Learning on Spam Classification(Python, SVM, Decision-Tree, Bagging, AdaBoost)**: Incorporated SVM and Decision-Tree with ensemble learning method Bagging and AdaBoost for spam classification. (May 2022)
- **K-Means Clustering on MNIST(Python, K-Means, NumPy, Matplotlib, sklearn)**: Implemented K-Means Clustering Algorithm on MNIST dataset. (Apr. 2022)
- **KD-Tree Based Stochastic Progressive Photon Mapping Image Rendering Framework(C++)**: Implemented the SPPM algorithm, KD-Tree based Bounding Box for intersection acceleration, 3-d scene construction, anti-aliasing, motion blur, etc. (May 2021)
- **Gym Reservation Script(Python, Selenium, PhantomJS, Shell, Wireshark)**: Developed a script using Python and PhantomJS to register for a timeslot at the gym with captured cookies by Wireshark. (May 2021)
- **Four-in-a-row AI Bot(C++, Monte Carlo Tree Search, Upper Confidence Bound Apply to Tree)**: Designed an AI bot with MCTS and UCB algorithm to compete with other AI bots of the Four-in-a-row game. (Apr. 2021)
- **Enterprise Personnel Permissions Management System(Vue, JavaScript, Front-end)**: Developed a front-end service for the management of personnel permissions in an enterprise(Kuaishou). (Nov. 2021)
- **Education Platform APP Based on Knowledge Graph(Java, SpringBoot, Android Studio, Full-stack)**: Developed the Front-end and Back-end educational application IntelEdu based on knowledge graph with a semantic similarity classifier(BERT). (Aug. 2021)

Services and Membership

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

Technical Skills

Programming Languages: Python, Latex, Java, C, C++, C#, Shell, HTML/CSS, MATLAB, 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, CoreNLP, NumPy, Matplotlib, Jupyter Notebook, Scikit, Keras, 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
- 37th National Physics Competition for College Students in Beijing, China, First Prize, Beijing Physical Society, 2021
- The first prize of the Engineering Technology Challenge, Tsinghua University, 2019
- The first prize of the Province Degree in the national Physic competition (senior group), Chinese Physical Society, 2018