Yiyang Feng

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Education

École Polytechnique Fédérale de Lausanne (EPFL) **Sep. 2022 – Present**
Master's Student in Computer Science; 5.64/6.00 *Lausanne, Switzerland*

Xi'an Jiaotong University (XJTU) **Aug. 2018 – July 2022**
Bachelor in Automation Science & Technology; 3.99/4.30 (top 5% among 197 students) *Xi'an, China*

Publications

- Cui, S., Milikic, L., **Feng, Y.**, Ismayilzada, M., Paul, D., Bosselut, A., & Faltings, B. (2024). δ-CAUSAL: Exploring Defeasibility in Causal Reasoning. arXiv preprint at arXiv:2401.03183. (Accepted to ACL 2024 Findings)

Research Interest

I'm interested in various areas in Natural Language Processing (NLP), with a special focus on:

- **Controllable Text Generation**: generating headings for targeted human needs, crafting natural and aligned sentences for closed information extraction data, producing related dual outputs for conditional dual generation, and creating accurate SQL codes for text-to-SQL systems
- **Reasoning Capabilities of NLP systems**: causal reasoning, commonsense reasoning, defeasible reasoning, and temporal reasoning
- **Alignment**: fine-tuning, instruction-tuning, reinforcement learning (with human feedback), prompt tuning, and in-context alignment

Selected Research Experience

Unveiling the Art of Heading Design with Large Language Models (LLMs) **Sep. 2023 – May 2024**
Research Assistant advised by Prof. Boi Faltings *Artificial Intelligence Laboratory, EPFL*

- Contributed a valuable benchmark for controllable text generation of headings consisting of an acronym and a description
- Formulated three unique controllable elements and proposed corresponding novel metrics for the heading generation task
- Highlighted our task's challenge under supervised fine-tuning, reinforcement learning, and in-context learning with LLMs
- Submitted one paper as the co-first author, which is accepted to ACL 2024 Findings with the best paper nomination

Expectation-Maximization Powered Conditional Dual Inference with Simulated Annealing **Feb. 2023 – May 2024**
Semester Project advised by Prof. Boi Faltings and Shaobo Cui *Artificial Intelligence Laboratory, EPFL*

- Introduced conditional dual generation, a task requiring two closely related outputs given the same input text
- Devised a novel inference method combining simulated annealing within an Expectation-Maximization framework
- Applied our method to both fine-tuning and in-context learning with LLMs, showing its superiority across four distinct scenarios
- Submitted one paper as the second author to NeurIPS 2024

Exploring Defeasibility in Commonsense Causal Reasoning **Dec. 2022 – May 2024**
Research Assistant advised by Prof. Boi Faltings and Shaobo Cui *Artificial Intelligence Laboratory, EPFL*

- Contributed a pioneering benchmark emphasizing defeasibility that strengthens or weakens the commonsense causal relationship
- Evaluated BART, T5, GPT-2, and GPT-3.5 on their comprehension of defeasibility in commonsense causal reasoning
- Uncovered the inadequacy of existing metrics in measuring causal strength when defeasibility is involved
- Submitted one paper as the third author, which is accepted to ACL 2024 Findings

A System for Curating High-Quality Closed Information-Extraction Dataset **Sep. 2023 – Feb. 2024**
Semester Project advised by Prof. Robert West and Marija Šakota *Data Science Lab, EPFL*

- Curated a high-quality closed information-extraction dataset featuring natural sentences, aligned triplets, and negative examples
- Synthesized positive examples by prompting LLMs and collected negative examples from Wikipedia by the WebIE framework
- Implemented a weighted training algorithm based on scores from a RoBERTa classifier to enhance downstream model fine-tuning

Cross Domain Chinese Speech-to-SQL System Design **Dec. 2021 – June 2022**
Bachelor Thesis advised by Prof. Zhongmin Cai *The Department of Information and Communications Engineering, XJTU*

- Proposed several optimization methods for applying current Text-to-SQL systems on Chinese datasets: translation-model-based schema-linking and meta-learning for domain generalization; improved the validation accuracy at most by 6.6%
- Applied the optimization methods to TypeSQL, SyntaxSQLNet, and IRNet on CSpider and compared their performance
- Combined Chinese speech-to-text model with text-to-SQL systems to build a Chinese speech-to-SQL platform

SELECTED COURSE PROJECTS

Distilled ChatGPT Teaching Assistant for EPFL Courses **May 2023 – June 2023**

Project for CS-552 Modern Natural Language Processing *EPFL*

- Created a rich educational dialogue dataset by prompting ChatGPT on EPFL course content and external data augmentation
- Distilled ChatGPT (175B) to GPT-2 (355M) through instruction-tuning and reinforcement learning from human feedback
- Developed Mini-GPTA, an educational chatbot leveraging the distilled GPT-2 model for teaching assistance

Fine-tuning and In-context Learning on Commonsense Causal Reasoning (CCR) **Nov. 2022 – Dec. 2022**

Project for CS-433 Machine Learning *EPFL*

- Derived a new cause/effect generation task from the original real/fake causal classification task in the COPA dataset
- Conducted experiments on both tasks using fine-tuning (BART, RoBERTa, ALBERT) and in-context learning models (GPT-3.5)
- Compare the performance of two sets of models and analyze the results using BLEU, METEOR, ROUGE-L and CIDEr metrics

SKILLS

- **Programming**: Python, C, C++, MATLAB, JavaScript, CSS, HTML, Shell, LaTeX
- **Machine Learning and NLP Tools**: Pytorch, Pytorch Lightning, Huggingface Transformers, OpenAI, Hydra, wandb, scikit-learn
- **Language**: Chinese (Native), English (C1, TOEFL 108/120)

TEACHING ASSISTANT

CS-552 Modern Natural Language Processing (EPFL) **Spring 2024 – 2025**

CS-433 Machine Learning (EPFL) **Fall 2023 – 2024**

SELECTED HONORS AND AWARDS

Chiang Chen Overseas Fellowship (0.2‰), Chiang Chen Industrial Charity Foundation **June 2022**

First Prize Scholarship (3%), Xi'an Jiaotong University **Sep. 2019**