KANGDA WEI

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RESEARCH INTEREST

Natural Language Processing, Large Language Model, Multi-Modal, Multi-Agent Systems, Video Understanding

EDUCATION

Texas A&M University — College Station, TX
Doctor of Philosophy in Computer Science — Aug 2023 - Present

- **Graduate Research Assistant**: Advised by Professor Ruihong Huang.

The University of North Carolina at Chapel-Hill — Chapel-Hill, NC
Master of Science in Computer Science — Aug 2022 - May 2023

- **Graduate Research Assistant**: Advised by Professor Shank Srivastava.
- **Graduate Teaching Assistant**: COMP431 Internet Service and Protocol, COMP211 System Fundamentals

The University of North Carolina at Chapel-Hill — Chapel-Hill, NC
B.S. in Computer Science, B.S. in Statistics and Operational Research, GPA: 3.812/4.0 — Aug 2019 - May 2022

INDUSTRY EXPERIENCE

Applied Scientist Intern
Robert Bosch LLC, USA — Sunnyvale, CA
NLP & LLMs Intern, Mentor: Zhengyu Zhou — May 2024 - Aug 2024

RESEARCH EXPERIENCE

Multi-Agent Video Understanding for Advanced Indexing of Lecture Videos
Robert Bosch Research and Technology Center North America — Sunnyvale, CA
NLP & LLMs Intern, Mentor: Zhengyu Zhou — May 2024 - Sep 2024

- Proposed a novel end-to-end multi-agent multi-modal framework that leverages various large models for advanced understanding/indexing of presentation-style videos.
- The framework first segments each video into slide-presentation segments, leveraging vision-language model (VLM) to assist modern shot-detection approach.
- The framework then proceeds to understand each detected segment, generating multi-modal understanding results as indexes incorporating multiple agents, which capture rich and reliable multi-modal information to be used for downstream tasks in a salable way.
- Conducted systematic evaluations (intrinsic evaluation through Amazon Mechanical Turk, and extrinsic evaluation on open-ended QA) on the public LPM dataset as well as an internal enterprise video dataset, demonstrating the effectiveness of the proposed framework.
- Paper in submission to AAAI 2025. Patent submitted to the United States Patent and Trademark Office.

Are LLMs Good Annotators for Discourse-level Event Relation Extraction?
Texas A&M University — College Station, TX
Research Assistant, Mentor: Prof.Ruihong Huang — Aug 2023 - Apr 2024

- Assessed the effectiveness of different close-source and open-source LLMs, including GPT-3.5, GPT-4, and LLaMA-2, in addressing discourse-level ERE tasks characterized by lengthy documents and intricate relations encompassing coreference, temporal, causal, and subevent types.
- Revealed a notable underperformance of GPT models compared to the baseline established through supervised learning.
- Conducted quantitative and qualitative analysis to show that GPT model benefits from dividing intricate tasks into smaller components, however, still encounters challenges in avoiding hallucinations, satisfying transitivity rules among predictions, and capturing dependencies over long distances.
- Paper in submission to EMNLP 2024.

When Do Decompositions Help for Machine Reading?
Johns Hopkins University Baltimore, MD
Visiting Research Assistant, Mentor: Prof.Benjamin van Durme May 2022 - May 2023

- Explored the effect of decomposition on machine reading with an exhaustive set of variants across a range of models over the high-level Question Decomposition Meaning Representation (QDMR) BREAK dataset using various LLMs, including T-5, Alpaca, and LLaMA.
- Discovered that question decomposition is not helpful for machine reading but rather harmful.
- Conducted a qualitative error analysis, showing that machine reading using question decomposition struggle due to compound error and question decomposition in bad formats.
- Published paper at *Proceedings of the Empirical Methods in Natural Language Processing 2023.*

Leveraging Multiple Teachers for Test-Time Adaptation of Language-Guided Classifiers
The University of North Carolina at Chapel Hill Chapel Hill, NC
Research Assistant, Mentor: Prof.Shashank Srivastava Apr 2022 - May 2023

- Present a framework for test-time adaptation of language explanation-guided classifiers towards a specific task during inference.
- Achieved 8% higher classification accuracy by utilizing label aggregation with language models, including RoBERTa, T0, OPT, and Flan-T5, for test-time adaptation, and three times better accuracy comparing to baselines with zero-shot learning.
- Further improved the accuracy by 20% by incorporating self-learning by fine-tuning pre-trained LM on noisy labeled data.
- Conducted qualitative analysis for framework's interpretability.
- Simplify and improve the label aggregation technique by replacing hand-written labeling functions with LM.
- Published paper at *Findings of the Empirical Methods in Natural Language Processing 2023.*

Compositional Generalization for Kinship Prediction through Data Augmentation
The University of North Carolina at Chapel Hill Chapel Hill, NC
Research Assistant, Mentor: Prof.Shashank Srivastava Feb 2021 - Mar 2022

- Evaluated empirically the utility of data augmentation and intermediate structured representations towards compositional generalization for the task of kinship prediction from a story.
- Tested the impact of incorporating data augmentation and intermediate structured data on model's performance. Data augmentation boosted generalization performance by around 20% on average relative to a baseline model from prior work.
- Found that predicting and using intermediate kinship graphs led to a deterioration in the generalization of kinship prediction.
- Published paper at *Proceedings of the 4th Workshop of Narrative Understanding (WNU2022).*

PUBLICATIONS

- **Kangda Wei**, Zhengyu Zhou, Bingqing Wang, Jun Araki, Lukas Lange, Zhe Feng. Multi-Agent Video Understanding for Advanced Indexing of Lecture Videos. *In submission.*
- **Kangda Wei**, Aayush Guatam, Ruihong Huang. Are LLMs Good Annotators for Discourse-level Event Relation Extraction? *In submission.*
- **Kangda Wei**, Dawn Lawrie, Benjamin Van Durme, Yunmo Chen, Orion Weller. When Do Decompositions Help for Machine Reading? *Proceedings of the Empirical Methods in Natural Language Processing 2023*
- **Kangda Wei**, Sayan Ghosh, Rakesh Menon, and Shashank Srivastava. Leveraging Multiple Teachers for Test-Time Adaptation of Language-Guided Classifiers. *Findings of the Empirical Methods in Natural Language Processing 2023*
- **Kangda Wei**, Sayan Ghosh, and Shashank Srivastava. 2022. Compositional Generalization for Kinship Prediction through Data Augmentation. *In Proceedings of the 4th Workshop of Narrative Understanding (WNU2022)*, pages 1319, Seattle, United States. Association for Computational Linguistics.
- *Songhe Wang, ***Kangda Wei**, Lei Lin, Weizi Li. Spatial-temporal Analysis of COVID-19's Impact on Human Mobility: the Case of the United States, in the *20th and 21st Joint COTA International Conference of Transportation Professionals.* *Co-author: equal contribution

- Hasnat Md Abdullah, Tian Liu, **Kangda Wei**, Shu Kong, Ruihong Huang. UALBench: The First Comprephensive Unusual Activity Localization Benchmark. *In submission.*
- Jiangshu Du, Yibo Wang, Wenting Zhao, Zhongfen Deng, Shuaiqi LIU, Renze Lou, Henry Peng Zou, Pranav Narayanan Venkit, Nan Zhang, Mukund Srinath, Haoran Ranran Zhang, Vipul Gupta, Yinghui Li, Tao Li, Fei Wang, Qin Liu, Tianlin Liu, Pengzhi Gao, Congying Xia, Chen Xing, Cheng Jiayang, Zhaowei Wang, Ying Su, Raj Sanjay Shah, Ruohao Guo, Jing Gu, Haoran Li, **Kangda Wei**, Zihao Wang, Lu Cheng, Surangika Ranathunga, Meng Fang, Jie Fu, Fei Liu, Ruihong Huang, Eduardo Blanco, Yixin Cao, Rui Zhang, Philip S. Yu, Wenpeng Yin. LLMs Assist NLP Researchers: Critique Paper (Meta-)Reviewing. *In submission.*

NOTABLE PORJECTS

Email Plug-in Startup Jan 2022 - May 2022

- Built a classification model from scratch for email classification using PyTorch and Huggingface Transformer.
- Increased the model accuracy from 0.32 to 0.84 with limited amount of annotated data.

Cyber-infrastructure: Web-based Application for Sharing Neural Imaging Data Sep 2020 - Jan 2021

- Built a website where users can register and login to access the neural imaging data of patients.
- Practiced the basis of front-end and back-end engineering using Python Flask and Firebase.

SKILLS

- **Programming Languages/Frameworks:** Python, Java, JavaScript, C, HTML, CSS, MATLAB, R, PyTorch, Linux
- **Software & Tools:** PyCharm, VS Code, Spyder, Jupter Notebook, Tableau, Latex, Anaconda, RStudio
- **Language:** Chinese (native), English (proficient)
- **Other:** AWS, Amazon Mechanical Turk, Microsoft Azure