Zhizhang (Kevin) Hu

Contact Information

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Google Scholar
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Education

University of California, Merced, Merced, California USA **2020 - 2024** *(Expected Nov.)*

Ph.D. Candidate, Electrical Engineering and Computer Science

Research Interests:

- Multimodal Deep Learning, Causal Learning, Foundation Models for Science

Academic Service:

- Reviewer: WACV 2024, ICCV 2023, IEEE Transactions on Parallel and Distributed Systems

Carnegie Mellon University, Pittsburgh, Pennsylvania USA **2018 - 2020**

M.S., Building Science

- Thesis: Uncertainty Analysis of Electricity Load Prediction based on Bayesian Deep Learning

Southwest Jiaotong University, Chengdu, China **2014 - 2018**

B.E., Mechanical Engineering

Selected Publications

Hu, Zhizhang, Shasha Li, Ming Du, Arnab Dhua, and Doug Gray. "De-noised Vision-language Fusion Guided by Visual Cues for E-commerce Product Search." In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshop, 2024.

Hu, Zhizhang, Xinliang Zhu, Son Tran, Rene Vidal, and Arnab Dhua. "ProVLA: Compositional Image Search with Progressive Vision-Language Alignment and Multimodal Fusion." In Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV) Workshop, 2023.

Hu, Zhizhang*, Amirmohammad Radmehr*, Yue Zhang, Shijia Pan, and Phuc Nguyen. "IOTeeth: Intra-Oral Teeth Sensing System for Dental Occlusal Diseases Recognition." In Proceedings of the ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp), 2024.

Hu, Zhizhang, Yue Zhang, Tong Yu, and Shijia Pan. "VMA: Domain Variance- and Modality-Aware Model Transfer for Fine-Grained Occupant Activity Recognition." In Proceedings of the ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN), 2022.

Professional Experience

Amazon.com Inc.

Applied Scientist Intern (**2022:** Visual Search & AR Team; **2023:** Search Science and AI Group)

- Work on large vision-language foundation models for visual-grounded multimodal retrieval.
- Propose a token pruning-based algorithm for improving the multimodal embedding alignment given noisy image-text pairs.
- Propose a vision-language dual-attention encoder for compositional multimodal retrieval.
- Implement a Ray-based distributed training pipeline for efficient large-model training.
- Curate a foundation model fine-tuning dataset consisting of over 710,000 image-text pairs.
- Achieve the SOTA product visual search's recall rate on the internal evaluation set (compared with in-production models) and external (Fashion 200K and Shoes) datasets.
- Launched one model into real-world A/B testing.

Selected Academic Projects

Multimodal Deep Learning for Ubiquitous Computing

University of California, Merced **2020 - 2023**

- Propose a multi-view, multi-task deep learning model to embed and fuse the knowledge from wearable and infrastructure sensing modalities for fine-grained human activity recognition.
- Introduce a multimodal transfer learning framework that injects the physical knowledge to guide the model transfer to reduce the labeling cost and improve the model generalizability.
- Propose a causal intervention method to mitigate the negative impact caused by confounding bias in the dataset on the downstream inference tasks.

Large Language Models for Tabular and Sensing Data Reasoning

University of California, Merced **2024 -** *Present*

- Propose the " Order-of-Thought " evaluation framework to evaluate the independence and guidance needed for large language models (LLMs) to conduct causal data reasoning.
- *On-going*: Propose a knowledge injection-based prompting framework to enhance LLMs' capability in data reasoning for complex causal question answering.

Technical Skills

Data science: PyTorch, TensorFlow, Transformers, TIMM, Ray, Sci-Kit Learn, SciPy, XGBoost, Prophet, LibROSA, NLTK, DASK, Bokeh, Holoviews

Programming Languages: Python, MATLAB, C, Shell, SQL, LaTeX