

SHU ZHAO

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RESEARCH INTERESTS

My research interests lie at the intersection of multimodal large language models and retrieval, with a particular focus on developing advanced Multimodal Retrieval-Augmented Generation (MM-RAG) systems. I am passionate about designing intelligent systems that can effectively retrieve and reason across different modalities to create robust, adaptable, and efficient AI systems.

EDUCATION

The Pennsylvania State University–University Park Ph.D. in Computer Science	<i>Aug. 2022 - May. 2026 (Expected)</i> <i>Pennsylvania, USA</i>
University of Chinese Academy of Sciences M.E. in Computer Technology	<i>Sep. 2018 - Jun. 2021</i> <i>Beijing, China</i>
Anhui University B.E. in Information Security	<i>Sep. 2013 - Jun. 2017</i> <i>Anhui, China</i>

PUBLICATIONS

1. **KALAHASH: Knowledge-Anchored Low-Resource Adaptation for Deep Hashing.**
Association for the Advancement of Artificial Intelligence (AAAI), 2025.
Shu Zhao, Tan Yu, Xiaoshuai Hao, Wenchao Ma, Vijaykrishnan Narayanan.
2. **On-demand Multimodal Retrieval-Augmented Generation.**
2024. In Preparation.
Shu Zhao, Nilesch Ahuja, Omesh Tickoo, Tianyi Shen, Vijaykrishnan Narayanan.
3. **Reconstruct before Query: Continual Missing Modality Learning with Decomposed Prompt Collaboration.**
2024. In Submission.
Shu Zhao, Xiaohan Zou, Tan Yu.
4. **SafeMap: Towards Reliable HD Map Construction from Incomplete Observations.**
2024. In Submission.
Xiaoshuai Hao, Mengchuan Wei, Yunfeng Diao, Lingdong Kong, **Shu Zhao**.
5. **Learning Conditional Space-Time Prompt Distributions for Video Class-Incremental Learning.**
2024. In Submission.
Xiaohan Zou, Wenchao Ma, **Shu Zhao**.
6. **MapFusion: A Novel BEV Feature Fusion Network for Multi-modal Map Construction.**
2024. In Submission.
Xiaoshuai Hao, Yunfeng Diao, Mengchuan Wei, Yifan Yang, Peng Hao, Rong Yin, Hui Zhang, Weiming Li, **Shu Zhao**, Yu Liu.
7. **Less is More: Toward Zero-Shot Local Scene Graph Generation via Foundation Models.**
arXiv:2310.01358. 2023.
Shu Zhao, Huijuan Xu.
8. **NEUCORE: Neural Concept Reasoning for Composed Image Retrieval.**
UniReps Workshop @ Neural Information Processing Systems (NeurIPS Workshop), 2023.
Shu Zhao, Huijuan Xu.
9. **Rescuing Deep Hashing from Dead Bits Problem.**
International Joint Conference on Artificial Intelligence (IJCAI), 2021.
Shu Zhao, Dayan Wu, Yucan Zhou, Bo Li, Weiping Wang.

10. **Asymmetric Deep Hashing for Efficient Hash Code Compression.**
ACM International Conference on Multimedia (ACM MM, Oral), 2020.
Shu Zhao, Dayan Wu, Wanqian Zhang, Yu Zhou, Bo Li, Weiping Wang.
11. **Technical Report for EPIC-KITCHENS-100 2021 Multi-Instance Retrieval Challenge.**
EPIC-Kitchens Challenges @ Computer Vision and Pattern Recognition (CVPR Workshop, Ranked 1st), 2021.
Xiaoshuai Hao, Wanqian Zhang, Dejie Yang, **Shu Zhao**, Dayan Wu, Bo Li, Weiping Wang.

RESEARCH EXPERIENCE

- Research Intern. Baidu Research, Beijing** Apr. 2022 - Jul. 2022
Advised by Dr. Tan Yu
Topic: Large Multimodal Models for Image Retrieval
- Research Assistant. IIE, Chinese Academy of Sciences, Beijing** Mar. 2019 - Jun. 2021
Advised by Prof. Dayan Wu and Prof. Bo Li
Topic: Deep Image Hashing

INTERDISCIPLINARITY

- InsectEye** 2024
Collaboration with Entomology Department, Penn State
Description: we are developing an AI system for automated insect recognition and classification as part of the InsectEye project, a non-lethal biodiversity monitoring initiative at Penn State's Arboretum. We are working on engineering robust computer vision algorithms to overcome challenging environmental conditions, including variable lighting and background noise while achieving accurate identification of small insects with subtle morphological differences.
- Textural Threshold: Dreadlock** 2023
Collaboration with Architecture Department, Penn State
Description: a user's hair texture is acquired through a camera, and similar and dissimilar images are retrieved through deep retrieval techniques and stitched together to form an art painting. Our work was presented at the Central Pavilion Exhibition, the 18th Architectural Venice Biennale.

HONORS & AWARDS

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| 1st in Multi-Instance Retrieval Track of EPIC-KITCHENS Challenges, CVPR Workshop | 2021 |
| Pacemaker to Merit Student, University of Chinese Academy of Sciences | 2021 |
| IIE Presidential Scholarship, Institute of Information Engineering | 2020 |
| Merit Student, University of Chinese Academy of Sciences | 2019 |

REVIEW SERVICES

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| Computer Vision and Pattern Recognition (CVPR) | 2024-2025 |
| Annual Conference on Neural Information Processing Systems (NeurIPS) | 2023 |
| ACM International Conference on Multimedia (ACM MM) | 2022-2024 |

TEACHING ASSISTANT

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| Deep Learning for Computer Vision, Undergraduate | 2024 |
| Vision and Language, Graduate | 2023 |

SKILLS

Python, PyTorch, L^AT_EX, Linux, MATLAB, C++