Xinshuo Wang

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Education

Xidian University, Xi'an, China — Sept 2023 – Jun 2026

M.Eng, New Generation Electronic Information Technology

- GPA: 3.8/4.0 (no-ranking)
- Key Course: Entrepreneurship practice case course, Matrix Theory

Hebei University of Technology, Tianjin, China — Sept 2019 – Jun 2023

B.Eng, Computer Science and Technology

- GPA: 3.86/4.0 (ranking: 8/141)
- Key Course: Advanced Mathematics, Discrete Mathematics, Algorithm Design and Analysis, Data Structure

Publications

*Note: In the papers listed below where I am the **second author** and **co-corresponding author**, I was the primary contributor. I was responsible for the core method design, model implementation, experiments, and manuscript writing. The first author is my advisor, which follows the authorship conventions of the discipline and institution.*

- Yang Liu (advisor), **Xinshuo Wang**, Xinbo Gao, Jungong Han and Ling Shao, "Multi-level Contextual Prototype Modulation for Compositional Zero-shot Learning," in *IEEE Transactions on Image Processing*, vol. 34, pp. 4856-4868, 2025, doi: 10.1109/TIP.2025.3592560.
- Yang Liu (advisor), **Xinshuo Wang**, Xinbo Gao, Jungong Han and Ling Shao, "Concept-Aware Graph Convolutional Network for Compositional Zero-Shot Learning," in *IEEE Transactions on Neural Networks and Learning Systems*, vol. 36, no. 6, pp. 10394-10406, June 2025, doi: 10.1109/TNNLS.2025.3528885.
- Yang Liu (advisor), **Xinshuo Wang**, Xinbo Gao, Jungong Han and Ling Shao, "Semi-Negative Contrastive Subclass Discriminative Network for Compositional Zero-Shot Learning ," in *IEEE Transactions on Image Processing*, vol. 35, pp. 2640-2652, 2026, doi: 10.1109/TIP.2026.3671655.

Submissions

- Yang Liu (advisor), **Xinshuo Wang**, Xinbo Gao, Jungong Han and Ling Shao, "Fusion and Adversarial Multimodal Embedding for Compositional Zero-Shot Learning ," in *IEEE Transactions on Pattern Analysis and Machine Intelligence*. (Major Revision)
- Yang Liu (advisor), **Xinshuo Wang**, Xinbo Gao, Jungong Han and Ling Shao, "Hybrid Discriminative Attribute-Object Embedding Network for Compositional Zero-Shot Learning ," in *IEEE Transactions on Pattern Analysis and Machine Intelligence*. (Major Revision)

Research Experience

Fusion and Adversarial Multimodal Embedding for Compositional Zero-Shot Learning

Principal Investigator | Advisor: *Dr. Liu* — Jan 2025 - Present

- Proposed a novel adversarial learning framework to decouple and recombine visual primitives (attributes and objects) under open-world and closed-world CZSL settings.
- Introduced an adversarial combination loss to enhance compositional reasoning by simulating unrealistic combinations and learning more robust representations.
- Implemented a fixed threshold mechanism to improve model stability across rare and non-canonical compositions, reducing the overfitting risk caused by dynamic decision boundaries.
- Integrated external semantic knowledge from ConceptNet to assess compositional plausibility and filter semantically invalid pairs.

Hybrid Discriminative Attribute-Object Embedding Network for Compositional Zero-Shot Learning

Principal Investigator | Advisor: *Dr. Liu* Sept 2024 - Present

- Proposed a hybrid visual-semantic embedding framework based on Vision Transformer features and GloVe-initialized attribute/object prototypes to address the generalization gap in unseen compositions.
- Designed a multi-branch architecture with disentangled attribute and object encoders trained end-to-end via contrastive loss, incorporating bias calibration to balance seen/unseen performance.
- Implemented bidirectional image-text retrieval by computing cross-modal similarity between learned image and attribute-object textual embeddings.

Semi-Negative Contrastive Subclass Discriminative Network for Compositional Zero-Shot Learning
Principal Investigator | Advisor: *Dr. Liu* Aug 2024 - Present

- Designed a semi-negative sampling strategy that adaptively selects informative contrastive pairs to improve subclass-level visual discrimination.
- Developed a subclass-disentangled embedding module that decouples attribute and object semantics using parallel embedding streams and mutual contrastive loss.
- Implemented bidirectional image-text retrieval by computing cross-modal similarity between learned image and attribute-object textual embeddings without using CLIP pretraining.

Multi-level Contextual Prototype Modulation for Compositional Zero-shot Learning
Principal Investigator | Advisor: *Dr. Liu* Mar 2024 - Jun 2025

- Designed a hierarchical transformer network to extract multi-level contextual features, enabling joint modeling of attributes and objects through layered cross-modal attention and token fusion.
- Developed a subclass-aware prototype modulation module that learns discriminative sub-prototypes by partitioning attribute/object concepts into finer-grained clusters, improving intra-class compactness and inter-class separability.
- Introduced a Minority Attribute Enhancement strategy to synthesize virtual samples by mixing underrepresented attribute features across real images, mitigating the long-tail bias in joint label distribution.

Concept-Aware Graph Convolutional Network for Compositional Zero-Shot Learning
Principal Investigator | Advisor: *Dr. Liu* Mar 2023 - Sept 2024

- Developed a concept-aware graph convolutional network (CA-GCN) that integrates attribute and object embeddings into a joint graph structure to model complex compositional interactions for zero-shot learning.
- Designed a feasibility score estimation module computing cosine similarity between image visual features and compositional embeddings to construct a weighted adjacency matrix guiding graph convolutional message passing.
- Introduced Earth Mover's Distance based regularization on attention maps to constrain concept focus during training and improve generalization to unseen attribute-object pairs.

Honors & Awards

Xidian University

Outstanding Graduate Student	2026
First-Class School Scholarship - 10%	2023 & 2025
National Scholarship - 2%	2025

Hebei University of Technology

Outstanding Graduate - 5%	2023
Third-Class School Scholarship	2023
First-Class School Scholarship	2021 & 2022
Merit Student	2021 & 2022
Encouragement Scholarship	2020 & 2021
Third Prize of National Mathematics Competition	2020
Excellent League Member	2020

Skills

Languages: Mandarin Chinese (native), English (IELTS 6.5)

Technologies: Python, Pytorch, MATLAB, Java, Html, Css, JavaScript