

Chong-Yu Zhang

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EDUCATION

- **Shandong University** Jinan, Shandong
• *Master of Engineering - Artificial Intelligence; Top 3; GPA: 89.65/100* Sep 2022 - Present
- **University of Jinan** Jinan, Shandong
• *Bachelor of Engineering - Network Engineering; Top 3; GPA: 90.61/100* Sep 2018 - June 2022

RESEARCH INTERESTS

- **Multimedia Analysis**
• *Learning to hash, Hashing-based online image/cross-modal retrieval*
- **Incremental Learning**
• *Class incremental learning, Learning to prompt, Federated learning*
- **Vision-Language Model**
• *Prompt tuning, Test-time adaptation, Large vision-language model*

SELECTED PUBLICATIONS

- **Chong-Yu Zhang**, Xin Luo, Yu-Wei Zhan, Peng-Fei Zhang, Zhen-Duo Chen, Yongxin Wang, Xun Yang, Xin-Shun Xu. Self-Distillation Dual-Memory Online Hashing with Hash Centers for Streaming Data Retrieval. In proceedings of the ACM International Conference on Multimedia (**ACM MM**), 2023. (CCF-A)
- Ting Fu, Yu-Wei Zhan, **Chong-Yu Zhang**, Xin Luo, Zhen-Duo Chen, Yongxin Wang, Xun Yang, Xin-Shun Xu. FedCAFE: Federated Cross-Modal Hashing with Adaptive Feature Enhancement. In proceedings of the ACM International Conference on Multimedia (**ACM MM**), 2024. (CCF-A)
- **Chong-Yu Zhang**, Yu-Wei Zhan, Qian Zhang, Kun Wang, Zhen-Duo Chen, Xin Luo, Xin-Shun Xu. Self-Paced Weighting Online Hashing for Image Retrieval. submitted to **IEEE Transactions on Knowledge and Data Engineering**, 2024. Under Review.
- **Chong-Yu Zhang**, Xin Luo, Yu-Wei Zhan, Zhen-Duo Chen, Xin-Shun Xu. Gleaning Wisdom from the Past: Towards Label Incremental Learning for Online Hashing with a Plug-and-Play Framework. submitted to **IEEE Transactions on Multimedia**, 2024. Under Review.
- Jun-Jie Peng, **Chong-Yu Zhang**, Na Wang, Yu-Wei Zhan, Zhen-Duo Chen, Yongxin Wang, Xin Luo, Xin-Shun Xu. OH-CMH: Towards Cross-Modal Hashing for Streaming Data with Hierarchical Labels and Label Incremental Scenario. submitted to **AAAI**, 2025. Under Review.
- Na Wang, **Chong-Yu Zhang**, Yu-Wei Zhan, Zhen-Duo Chen, Xin Luo, Xin-Shun Xu. Dynamic Clustering-Driven Weakly-Supervised Online Hashing with Enhanced Similarity. submitted to **Expert Systems with Applications**, 2024. Under Review.
- Jia-Le Liu, Yu-Wei Zhan, **Chong-Yu Zhang**, Xin Luo, Zhen-Duo Chen, Yinwei Wei, Xin-Shun Xu. Federated Class-Incremental Learning with Prompting. Arxiv.

SELECTED PROJECTS

- **Efficient Online Hashing Retrieval for Large-Scale Streaming Data** Sep 2022 - April 2023
 - Developed a novel Self-Distillation Dual-Memory Online Hashing with Hash Centers (**SDOH-HC**) method to mitigate **catastrophic forgetting** introduced by data distribution change or concept drifts occurred in online scenario as models may inevitably lose or disrupt the previously obtained knowledge.
 - Introduced a **dual-memory mechanism**: the first one is **hash centers**, which will be updated to adapt to changing environment in online scenario; the other is **exemplars** selected and dynamically updated by a novel replay strategy from data chunks.
 - Crafted a **self-distillation** module, which utilizes former hash centers as teachers to guide the learning of that of current round (students), **strongly** preserving previous learned knowledge.
 - Proposed a **discrete optimization algorithm** with linear complexity to data size and adopted the **two-step hashing** strategy, ensuring accurate and efficient hash learning. Experiments conducted on CIFAR-10, MIRFlickr, NUS-WIDE datasets demonstrate its superiority on mitigate catastrophic forgetting.
- **Privacy-Preserving Federated Cross-Modal Hashing in Non-IID Scenarios** Oct 2023 - April 2024
 - Addressed the challenge of handling multi-modal data **in distributed environments**, ensuring privacy, managing training with **non-IID data**, and enabling low storage and efficient retrieval **without data transfer**.
 - Developed **FedCAFE**, a federated framework for cross-modal hashing retrieval. FedCAFE introduced a **memory mechanism** using K-means to generate class centers both locally and globally, which is then used to construct enhanced features. FedCAFE incorporates a novel **adaptive feature enhancement** module and a **weighted aggregation strategy**, enabling effective utilization of global information to guide local training.

- Conducted extensive experiments on four datasets with both IID and non-IID scenarios. The results demonstrate FedCAFE improves the capability to process massive data effectively in isolated environments.
- **Test-Time Generalization of Vision-Language Models with Prompt (In Progress)** *June 2024 - Present*
 - Developed **DGPT**, a novel method with a **dual-guidance strategy** to address the challenges in adapting large-scale vision-language models like CLIP for downstream tasks, particularly **weak visual and textual modalities interaction and alignment** and feature space broken when fine-tuning all parameters.
 - Introduced a **retention module** to prevent the model from forgetting general knowledge during fine-tuning, ensuring **better generalization** performance on unseen classes.
 - For normal ways of adaptation, we outperformed SOTA methods **across 11 datasets**, particularly excelling in base-to-new generalization and few-shot learning tasks. Work for test-time scenario is in progress.
- **Efficient Hashing Retrieval with Vision-Language Models (In Progress)** *May 2024 - Present*
 - Existing hashing methods predominantly rely on basic backbone networks for feature extraction or employ traditional discrete optimization techniques to generate hash codes. **None** have explored harnessing the rich, condensed knowledge embedded in **large vision-language models (LVLMs)** for hash code generation.
 - We are designing an unsupervised hashing method that leverages language models to mine high-level semantic concepts and construct a language-driven similarity matrix to guide hash learning process.
 - We are developing an instruction-tuned LVLM-based hashing method, where carefully crafted instructions enable LVLMs (e.g. **LLaMA 3.2-Vision** and **LLaVA**) to be flexibly fine-tuned and smoothly transfer the knowledge for hashing tasks. A hashing layer integrated with the model output efficiently generate hash codes for retrieval.
- **Prototype-based Layer-wised Personalized Federated Cross-Modal Hashing** *Sep 2022 - April 2023*
 - Designed a novel Prototype-based Layer-wised Personalized Federated Cross-Modal Hashing (**PLFedCMH**) method. Specifically, the prototype is introduced to learn the similarity between instances and classes on server, reducing the impact of statistical heterogeneity (**non-IID**) on different clients. Moreover, the distance between local and global prototypes are monitored to further improve the performance.
 - Deployed a personalized federated strategy. Through the hyper-network introduced by the server, the weights of different layers on the client are dynamically updated, which can realize personalized parameter customization.
 - Comprehensively validate the model on two benchmark datasets under IID and Non-IID scenarios. The experimental results indicate that PLFedCMH achieves the best performance.
- **Class-Incremental Online Hashing Retrieval with Plug-and-Play Framework** *June 2023 - Jan 2024*
 - Identified the challenge of **emerging new labels in real-world streaming data**, where most prevailing online hashing methods struggle to update hash models or even fail entirely, assuming a constant label space.
 - Developed **IPOH**, a **Plug-and-Play** Online hashing framework, enabling existing methods to adapt to evolving label space rather than designing an entirely new model tailored specifically for class incremental problem.
 - Introduced two core components, i.e., **incremental hash learning** which extracts patterns of old classes using previous hash codes and learns hash codes for newly coming data by modeling correlations between old and new labels and further learn the patterns for the unseen new classes, and **adaptive hashing fusion**, which fuses these new hash codes with those from the original method to boost overall performance.
 - Thoroughly assessed IPOH on two datasets, showcasing significant profit in handling class-incremental scenarios.

WORKING EXPERIENCE

- **Bilibili Inc. - Business Algorithms Department** Onsite
 - Ad Traffic Strategy Algorithm Engineer Intern* *June 2024 - Sep 2024*
 - **Multi-path Recall system. Learning to Rank** recall, **LLM-based** & tags recall, Search Ads optimization
- **Institute of Electrics, Chinese Academy of Sciences** Remote
 - Research Assistant* *Jan 2021 - May 2021*
 - **Satellite remote sensing image semantic segmentation.** Multi-level features from optical remote sensing images branch and DSM elevation branch are extracted through a pyramid attention mechanism to achieve precise segmentation.

SELECTED HONORS AND AWARDS

- Weichai Power Scholarship, 2024
- Outstanding Undergraduate Thesis Award, 2022
- Graduate First-Class Scholarship, Shandong University (2023, 2024)
- Undergraduate First-Class Scholarship, University of Jinan (2019-2022)

SERVICES

- Conference Reviewer: ACM MM(2024), ICME(2023), PAKDD(2023), ECML-PKDD(2023), etc.

SKILLS SUMMARY

- **Programming Languages** Python, Matlab
- **Tools and Softwares** Bash, **ChatGPT**, Git, LaTeX, Vim, Draw.io, Matplotlib, Packet Tracer, Wireshark