YINDA CHEN

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EDUCATION

University of Science and Technology of China & Shanghai AI Lab — Hefei & Shanghai

Information and Communication Engineering, Ph.D. Candidate **2024.7 ~ 2027.6 (Expected)**

- **Research Focus:**Representation learning theory, self-supervised pretraining, multimodal large models, image encoding and compression
- **Advisors:**Prof. Feng Wu, Prof. Zhiwei Xiong
- **Core Courses:**Algorithm Design and Analysis, Statistical Learning, Deep Learning, Reinforcement Learning
- **Honors:**Principal Investigator of National Natural Science Foundation Ph.D. Project (2024)

University of Science and Technology of China — Hefei

Computer Technology, M.S. **2022.9 ~ 2024.7**

- **Honors:**National Graduate Scholarship (2022)

Xiamen University — Xiamen

Remote Sensing & Economics (Dual Degree), B.S. **2018.9 ~ 2022.7**

- **Major Ranking: 16/31** **Overall Ranking: 1/31**
- **Honors:**Xiamen University Academic Star (2021), CDA Level 1 Certification (2022), Kaggle Expert
- **Advisor:**Prof. Yuanye Zhang

RESEARCH PROJECTS

National Natural Science Foundation Ph.D. Project 2025.1 ~ 2027.12

NSF Project *Principal Investigator (Funding: 300k RMB, Only recipient in Information field, Anhui Province, 2024)*

[1] Foundation **10-billion-scale** brain neural **foundation model** training
- Neuron underlying visual feature **token construction**
- Neural architecture search, **autoregressive visual model** training

[2] **Fine-grained** neuron **segmentation**
- **Skeleton features**, attention decomposition mechanisms
- Complementary masking, segmentation **robustness enhancement**

[3] Neural **circuit reconstruction**
- Point cloud morphological features and image feature **alignment**
- Candidate competition strategy, **progressive reasoning**, long-range tracking

Large-scale Self-supervised Pretraining 2022.5 ~ 2023.12

Conference&Journal *First Author*

[1] 【LONG ORAL】**Self-supervised neuron segmentation with multi-agent reinforcement learning**, **IJCAI 23** [CCF-A]
- Improved MAE masking strategy using reinforcement learning, automatically selecting mask ratios and schemes.
- Introduced multi-agent framework for more efficient self-supervised feature learning, improving segmentation accuracy by 12%.

[2] **MaskTwins: Dual-form Complementary Masking for Domain-Adaptive Image Segmentation**, **ICML 25** [CCF-A]
- Proposed new complementary masking theory from sparse signal reconstruction perspective, rigorously proving theoretical advantages of dual-form complementary masking in extracting domain-invariant features.
- Designed simple and efficient unsupervised domain adaptation framework, achieving cross-domain image segmentation through complementary masking consistency learning, improving natural image segmentation by 2.7% mIoU and biomedical image segmentation by 3.2% IoU.

[3] **TokenUnify: Scalable Autoregressive Visual Pre-training with Mixture Token Prediction**, **ICCV 25** [CCF-A]
- Proposed image autoregressive pretraining combined with Mamba framework, demonstrating advantages of long sequences and low computational cost.
- Demonstrated good scaling laws with corresponding theoretical proof, showing logarithmic-linear relationship between model performance and parameters.

[4] **Learning multiscale consistency for self-supervised electron microscopy instance segmentation**, **ICASSP 24** [CCF-B]
- Achieved high-performance pretraining strategy based on multiscale feature contrastive learning and feature reconstruction.
- Proposed feature consistency loss function, overcoming representation differences caused by scale variations, improving accuracy by 9%.

[5] **[Under Review] Generative Text-Guided 3D Vision-Language Pretraining for Unified Medical Image Segmentation**, Submit to TCSVT

- Generated image descriptions using large language models for multimodal image-text contrastive learning pretraining.
- Innovatively introduced generative text guidance mechanism, solving medical image annotation scarcity problem, achieving zero-shot segmentation.

Large-scale Data Generation and Encoding Compression **2023.8 ~ Present**

Conference&Journal *First Author & Co-first Author*

[1] 【ORAL】Conditional Latent Coding with Learnable Synthesized Reference for Deep Image Compression, **AAAI 25** **[CCF-A]**

- Built image similarity dictionary for retrieving similar images to improve entropy model probability estimation.
- Proposed learnable synthetic reference framework, improving PSNR by 0.6dB at the same bit rate with leading compression performance.

[2] MaskFactory: Towards High-quality Synthetic Data Generation For Dichotomous Image Segmentation, **NeurIPS 24** **[CCF-A]**

- Generated corresponding mask-image pairs using ControlNet through rigid and non-rigid deformation editing of masks.
- Synthetic data performance approached real data in downstream segmentation tasks with only 2% performance gap, significantly reducing annotation costs.

[3] BIMCV-R: A Landmark Dataset for 3D CT Text-Image Retrieval, **MICCAI 24** **[CCF-B]**

- Built the first open-source 3D CT image-text pair dataset containing 10,000 high-quality medical image-description pairs.
- Achieved efficient image-text information retrieval and keyword search, improving recall rate by 25% over traditional methods.

[4] [Under Review] Learned Image Coding with Generative Reference of Conditional Latents, Submit to TPAMI

- Extension work of AAAI 25 oral paper, further exploring benefits of reference images for image coding.
- Obtained reference images through local dictionary, network retrieval, and image generation, improving compression performance by 15%.
- Proposed conditional latent generation framework, effectively solving performance degradation when reference images are unavailable.

[5] [Under Review] UniCompress: Enhancing Multi-Data Medical Image Compression with Knowledge Distillation, Submit to NeurIPS 25

- Achieved implicit neural network compression of multiple data through multimodal knowledge priors, improving compression rate by 40%.
- Extracted common features of various medical images through knowledge distillation, reducing storage space by 20% while maintaining diagnostic quality.

Large Model Engineering **2023.9 ~ Present**

Projects *Core Member*

[1] Image coding and intra-frame prediction large models

- Led design of billion-parameter-scale coding architecture, improving compression rate by 30% over traditional coding standards.

[2] Medical image segmentation and neuron segmentation large models

- Mainly responsible for pretraining in the team, with experience in large-scale cluster pretraining using 64 A40 GPUs.
- Proficient in large model frameworks like DDP and DeepSpeed, achieving efficient training and optimization of 30-billion parameter models.

Research Experience

Imperial College London **London (Remote)** **2022.11 ~ 2023.8**

Data Science Institute *Research Intern*

- Collaborated with Associate Professor Rossella Arcucci on multimodal pretraining research, submitting one journal paper.
- Developed image-text contrastive learning framework, achieving 93.5% accuracy on medical diagnosis tasks.

Xiamen University WISER Club **Xiamen** **2021.8 ~ 2022.7**

Data Mining Group *Insider*

- Responsible for designing and discussing data mining courses, teaching clustering and Transformer sections.
- Mentored 20 undergraduate students to complete machine learning projects, organized 2 campus competition activities.

Wang Yanan Institute for Studies in Economics, Xiamen University **Xiamen** **2020.8 ~ 2021.12**

Econometrics *Research Assistant*

- Assisted Associate Professor Jiong Zhu in completing territorial economic statistics, conducting visual feature extraction of homestead information.
- Developed satellite image analysis tools for automatic land use change identification with 85% accuracy.

Honors and Awards

- **National Natural Science Foundation Ph.D. Project** **2024.12**
  - Principal Investigator, Only recipient in Information field, Anhui Province
- **National Graduate Scholarship** **2022.12**
  - Award rate 1%
- **Xiamen University Academic Star** **2021.12**
  - Only undergraduate recipient

- **'Jingrun Cup' Mathematics Competition Professional Group** **2021.09**
  - First Place, Xiamen University
- **'Internet+' Competition** **2021.08**
  - Gold Award, Fujian Province
- **National College Student Mathematics Competition Non-major Group Finals** **2021.05**
  - National Second Prize
- **'Challenge Cup' National College Student Extracurricular Academic Science and Technology Competition** **2021.05**
  - First Prize, Fujian Province
- **National College Student Mathematics Competition Non-major Group** **2020.11**
  - First Place, Fujian Province

Technical Skills

- **Programming**: Python, MATLAB, LaTeX, C, C++, Java
- **Deep Learning**: PyTorch, TensorFlow, DeepSpeed, DDP
- **Languages**: English (TOEFL 110, GRE 328), Chinese (Native)
- **Tools**: Git, Docker, CUDA, HPC

Professional Service

- **Reviewer**: CVPR 2025, NeurIPS 2024, ICML 2025, ICLR 2024, MICCAI 2025, ACM MM 2024, AISTATS 2024, IJCV

Recent News

- One paper was accepted by ICCV 2025 **2025.06.26**
- One paper was accepted by ACL 2025 findings **2025.05.15**
- One paper was accepted by ICML 2025 **2025.05.01**
- One paper was selected as oral by AAAI 2025 **2025.01.18**
- Two papers were accepted by AAAI 2025 **2024.12.11**
- Successfully selected as principal investigator of Ph.D. Natural Science Foundation Project **2024.12.06**
- One paper was accepted by NeurIPS 2024 **2024.10.10**
- Two papers were accepted by MICCAI 2024 **2024.06.18**