

# YILAN ZHANG

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## RESEARCH INTERESTS

Biomedical Image Analysis, Multimodal Learning, Image Recognition, Text-to-Image Synthesis, Computational Pathology

## EDUCATION

### Master in Beihang University

Sep 2021 – Dec 2023

Pattern Recognition and Intelligent Systems, **Ranking: 3/140, GPA:3.85(4)**

### Bachelor in Beihang University

Sep 2017 – Jun 2021

Control Science and Engineering, **Ranking: 7/83, GPA:3.76(4)**

## PUBLICATIONS (ONLY FIRST AUTHOR SELECTED)

### ECL: Class-Enhancement Contrastive Learning for Long-tailed Skin Lesion Classification [Paper]

International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2023, **STAR Award**

**Yilan Zhang**, Jianqi Chen, Ke Wang and Fengying Xie

### TFormer: A throughout fusion transformer for multi-modal skin lesion diagnosis [Paper]

Computers in Biology and Medicine (CBM), 2023

**Yilan Zhang**, Fengying Xie and Jianqi Chen

### Dermoscopic image retrieval based on rotation-invariance deep hashing [Paper]

Medical Image Analysis (MedIA), 2022

**Yilan Zhang**, Fengying Xie, Xuedong Song, Yushan Zheng, Jie Liu, and Juncheng Wang

### A rotation meanout network with invariance for dermoscopy image classification and retrieval [Paper]

Computers in Biology and Medicine (CBM), 2022

**Yilan Zhang**, Fengying Xie, Xuedong Song, Hangning Zhou, Yiguang Yang, Haopeng Zhang, and Jie Liu

### Early Diagnosis Model of Mycosis Fungoides Based on Intelligent Analysis of Dermoscopic Images [Paper]

Medical Journal Of Peking Union Medical College Hospital (Rhhz Test), 2021

Zhaorui Liu, **Yilan Zhang (Co-first author)**, Fengying Xie, and Jie Liu

## PROJECTS & RESEARCH

### Research Intern in HKUST SMART Lab

May 2023 – Present

Research – Pytorch

- Use information theory to solve the information redundancy problem in genomic and histologic data, and design models to decouple modality-common information and modality-specific information through mutual information theory for survival prediction.

### Algorithm Intern in Biomap

Nov 2022 – May 2023

Project – Algorithm Design – Python & Docker & Perl

- Learned semantic segmentation and instance segmentation algorithms. Designed single-cell analysis algorithms for phagocytosis evaluation to replace traditional FACS experiments that with low throughput, high labor, and time costs.
- Reconstructed and optimized D-I-TASSER algorithm for protein structure prediction.

### Research on Image Harmonization

Jun 2022 – Present

Personal Research – Pytorch

- Proposed a zero-shot image harmonization algorithm based on Diffusion Models, aiming at the problem that the current methods have a heavy demand for large datasets.

## Research on Multi-modal Skin Lesion Diagnosis

Apr 2022 – Mar 2023

Personal Research – Pytorch

- Proposed a pure transformer, TFormer, for multi-modal skin lesion diagnosis. A “divide and conquer” strategy is adopted to tackle fusions between image modalities (clinical image and dermoscopy image) and metadata modality.

## Dermoscopy Image Classification and Retrieval System

Nov 2020 – Mar 2023

Project – Algorithm Design – Pytorch

(Collaborating with Peking Union Medical College)

- Utilized EfficientNet and other networks to implement the early diagnosis of mycosis fungoides and inflammatory dermoscopy images, and explored the clinical auxiliary effect of the model by comparing it with diagnosis results of dermatologists.
- Proposed a rotation-invariance deep hashing network in view of the skin lesion target without the main directions in images. The retrieval results reach SOTA both on the ISIC 2019 dataset and an Asian dermoscopy dataset.
- Proposed a rotation meanout network to extract rotation-invariant features that can be flexibly embedded in CNNs. The method does not change the network structure or increase the parameters.
- Proposed a class-enhancement contrastive learning method to tackle the long-tailed issue in skin datasets.

## SELECTED HONORS

|   |           |
|---|-----------|
| Postgraduate Excellent Academic Innovation Achievement Award of Beihang University  | June 2023 |
| Excellent graduate student of Beihang University                                    | Dec 2022  |
| Second Prize of “Lee Kum Kee Astronautics Scholarship”, Beihang University          | Nov 2021  |
| Outstanding Graduates of Beihang University   | Jun 2021  |
| Special Prize of “Outstanding Academic Performance”, Beihang University             | Dec 2020  |
| Finalist Winners of the International Mathematical Contest in Modeling (MCM), COMAP | May 2020  |
| Outstanding Volunteer of Beihang University   | Dec 2018  |
| Special Prize of “Social Practice Scholarship”, Beihang University                  | Dec 2018  |

## TECHNICAL SKILLS

**Languages:** Python, C++, Matlab, Perl, etc

**Packages:** Pytorch, OpenCV

## EXTRACURRICULAR

|  |                     |
|--|---------------------|
| <b>Employment Practice Department of the Graduate Student Association</b>                            | Nov 2021 – Jun 2022 |
| <i>Member – Committed to hold activities such as job sharing lectures</i>                            |                     |
| <b>Education Support Department of Bluesky Volunteers' Association of BUAA</b>                       | Nov 2018 – Jun 2020 |
| <i>Deputy Director – Responsible for organization of volunteer services</i>                          |                     |
| <b>College Student Rural Volunteering Summer Program</b>   | Nov 2017- Aug 2018  |
| <i>Volunteer, Team Leader – Held a summer camp for rural children in charge of an 18-people team</i> |                     |

# Full Publication List

- **ECL: Class-Enhancement Contrastive Learning for Long-tailed Skin Lesion Classification**  
*International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2023*  
Yilan Zhang, Jianqi Chen, Ke Wang, and Fengying Xie  
[\[Paper\]](#) [\[Github\]](#)
- **TFormer: A throughout fusion transformer for multi-modal skin lesion diagnosis**  
*Computers in Biology and Medicine (CBM), 2023*  
Yilan Zhang, Fengying Xie, and Jianqi Chen  
[\[Paper\]](#) [\[Github\]](#)
- **Dermoscopic image retrieval based on rotation-invariance deep hashing**  
*Medical Image Analysis (MedIA), 2022*  
Yilan Zhang, Fengying Xie, Xuedong Song, Yushan Zheng, Jie Liu, and Juncheng Wang  
[\[Paper\]](#) [\[Github\]](#)
- **A rotation meanout network with invariance for dermoscopy image classification and retrieval**  
*Computers in Biology and Medicine (CBM), 2022*  
Yilan Zhang, Fengying Xie, Xuedong Song, Hangning Zhou, Yiguang Yang, Haopeng Zhang, and Jie Liu  
[\[Paper\]](#)
- **Early Diagnosis Model of Mycosis Fungoides Based on Intelligent Analysis of Dermoscopic Images**  
*Medical Journal Of Peking Union Medical College Hospital (Rhzh Test), 2021*  
Zhaorui Liu, Yilan Zhang (Co-first author), Fengying Xie, and Jie Liu  
[\[Paper\]](#)
- **Dense Pixel-to-Pixel Harmonization via Continuous Image Representation**  
*Under Review, IEEE Transactions on Circuits and Systems for Video Technology (TCSVT), 2023*  
Jianqi Chen, Yilan Zhang, Zhengxia Zou, Keyan Chen, and Zhenwei Shi  
[\[Paper\]](#) [\[Github\]](#) [\[Demo\]](#)
- **Zero-Shot Image Harmonization with Generative Model Prior**  
*Under Review, Annual AAAI Conference on Artificial Intelligence (AAAI), 2023*  
Jianqi Chen, Zhengxia Zou, Yilan Zhang, Keyan Chen, and Zhenwei Shi  
[\[Paper\]](#) [\[Github\]](#)
- **Diffusion Models for Imperceptible and Transferable Adversarial Attack**  
*Under Review, Neural Information Processing Systems (NeurIPS), 2023*  
Jianqi Chen, Hao Chen, Keyan Chen, Yilan Zhang, Zhengxia Zou, and Zhenwei Shi  
[\[Paper\]](#) [\[Github\]](#)

- **Skin lesion classification based on two-modal images using a multi-scale fully-shared fusion network**

*Computer Methods and Programs in Biomedicine(CMPB), 2023*

Yiguang Yang, Fengying Xie, Haopeng Zhang, Juncheng Wang, Jie Liu, **Yilan Zhang**, Haidong Ding

[\[Paper\]](#)