

Changpeng Yang

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EDUCATION EXPERIENCES

Peking University

Beijing, China

Master of Industrial software, Cell Mechanics Lab

Sep. 2021 – Jun. 2024 (Expect)

- **Key Courses:** Machine Learning(A-), Cell Mechanics(B+), Applied Mathematics in Biomedicine(A), Engineering Data Analytics(A), Multi-omics Artificial Intelligence Methods(A+).

University of Shanghai for Science and Technology

Shanghai, China

Bachelor of Information Management and Information System

Sep. 2016 – June 2020

- **Key Courses:** Management Science(94), Production Management(99), Operating System(97), Computer Network(90), Course Design of Database (99), Web-Design Technology(92).

RESEARCH INTERESTS

- **Computer Vision for Biological Image**
- **Multi-Omics Data Analysis with Machine Learning**
- **Integrating Multi-Omics, Computer Vision, and Large Language Models in Multimodal Biological Science.**
- **Lab Automation and High-Throughput Drug Screening for Precision Medicine**

RESEARCH EXPERIENCES

A High-throughput Drug Screening System Based on Deep Learning. (Master Thesis)

Visiting Student, Institute of Biomaterials, UCAS

Oct. 2022 – Oct. 2023

Project1: High-Throughput Drug Screening System Based on Segmentation of Multi-cellular Collagen Gel

- Validated the efficacy of collagen gel contraction assays for drug screening.
- Utilized a confocal microscope reflection mode to demonstrate the principle of collagen gel contraction.
- Explored using a Bio-3D printer to create micro-arrays of collagen gels.
- Developed semantic segmentation algorithms to improve the efficiency of collagen gel segmentation.
- Evaluated system for various drugs, including anti-tumor, anti-myocardial fibrosis, and asthma drugs.
- Developed an platform to enhance model training and drug screening improving universality.
- Patent pending and ongoing research.

Project2: High-throughput Drug Screening System with Micro-patterned Agarose Stamp at Cellular Scale

- Explored multi-cellular agarose gel pattern deformation for drug screening for asthma drugs screening.
- Conducted single-cell micro-pattern agarose gel deformation in drug screening.
- Emphasized the effectiveness through benchmarking with traction force microscopy.
- Improve fine-grained algorithms to accurately segment the micro-pattern.

Multimodal Single-Cell Data Integration

Research Assistant, Big Data and Biomedical AI Lab, PKU

NoV. 2023 – Present

Project1: Modality Prediction

- Predict gene expression (GEX) from ATAC-seq data and infer antibody-derived tags (ADT) from GEX utilizing VAE.
- Acquire a modality-specific encoder from the source modality through instance normalization.
- Freeze the source modality-specific encoder and train a predictive decoder to forecast target modality.

Project2: Match Modality

- LSI Preprocessing consists of TF-IDF, L1-normalization and a log1p transformation and followed by truncated SVD and a zero mean and unit variance scaling.
- Acquire Encoders: Train an encoder to extract shared information through pre-training for each modality.
- Modality Matching: Utilize pretrained encoders for modality matching with maximum weight bipartite matching algorithm.

INTERNSHIP EXPERIENCES

4Paradigm

Beijing, China

Large Language Model & Computer Vision Algorithm Intern

Nov. 2023 – Present

- Develop an auto assistant to facilitate prompt engineering.
- Analyze raw data characteristics and construct a high-quality corpus.
- Fine-tune a large language model for the electric power knowledge domain.
- Improved accuracy in domain-specific knowledge answering based on retrieval augmented generation.
- Exploring integration of LLM agents with a series of computer vision algorithms.

4Paradigm

Beijing, China

Computer Vision Algorithm Intern

Apr. 2022 – Sep. 2022

Project1: Image Segmentation Algorithm for Image Tampering Region Recognition.

- Generate a real-time dynamic tampering dataset for model training, encompassing four forgery methods.
- Through data analysis, it was found that images in real-world scenarios mainly employ the JPEG format then implemented a strategy of JPEG compression.
- Exploring various backbones and significantly enhances the model's effectiveness using spatial-channel attention.
- ICDAR text manipulation recognition second prize.

Project2: Content Based Image Retrieval

- Exploring the effectiveness of global retrieval using three lightweight ViT-based backbones.
- Enhancing model performance by incorporating and comparing Curricular face loss and Arcface loss as contrastive training loss functions.
- Implement Image retrieval by contrastive learning based on Siamese network.

Deepwise

Beijing, China

Medical Image Algorithm Intern

Nov. 2021 – Mar. 2022

Cerebral Vertebral Vessel Segmentation

- 3D attention Unet for dense volumetric segmentation from sparse annotation.
- Used soft-Dice loss and soft-clDice loss for tubular structure segmenation.
- Since blood vessels are supposed to be connected, extract small chunks with DFS and remove them.
- Resample and visualize the 3D CT image, projecting it onto a 2D plane using the vessel centerline as a basis for reconstructing curved surfaces.

HONORS AND AWARDS

Hongcai Scholarship, Peking University

Jul. 2022

Outstanding Graduate, University of Shanghai for Science and Technology

Jul. 2020

Outstanding Student, University of Shanghai for Science and Technology

Jul. 2019

First Prize in the East China Competition, Enactus Social Enterprise Competition

Sep. 2019

National First Place Award, China University Business Elite Challenge

Jun. 2019

Outstanding Volunteer, University of Shanghai for Science and Technology

Jul. 2018

Third Prize in Mathematics Competition, University of Shanghai for Science and Technology

Jul. 2017

EXTRACURRICULAR EXPERIENCES

Project manager of You & Me, A Public Benefit Program on Spiritual Accompaniment.

Sep. 2017 – Sep. 2019

Leader of Summer Volunteer Teaching Team.

Jul. 2018 – Sep. 2018

SKILLS AND CERTIFICATIONS

Skills: Web Lab Skills, Python, C++, R, Matlab, OpenCV, Pytorch, MMCV Series, Docker.

Language: Chinese(Native), English(IELTS 7.0).

Interests: Volunteering, Photography, Cycling.