

XINHAI HOU

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EDUCATION

University of Michigan, Ann Arbor, U.S.

Ph.D. Candidate, Bioinformatics and Scientific Computing | GPA: 4.0

Sep 2021 - present

- Advisor: Prof. Todd Hollon, Honglak Lee.

The Chinese University of Hong Kong, Shenzhen, China

B.S. with First Class Honours (top 10%), Statistical Science | GPA: 3.6

Sep 2016 - May 2020

RESEARCH HIGHLIGHTS

Visual foundation model for histopathology | *Visual pretraining, LoRA, Prompt tuning*

Nov 2022 - present

- Built the largest Stimulated Raman Histology dataset for generalist foundation model pretraining.
- Benchmarked SOTA visual pretraining methods (e.g. DINOv2) on 7 few-shot tasks as baseline and emergent properties.
- Proposed gigapixel images end-to-end finetuning with PEFT (Prompt Tuning) increasing F1 score from 78.1% to 80.6%.
- Refactored the ML pipeline for scalability (4x) and efficiency (2x) using distributed and mixed-precision training.

Hierarchical self-supervised learning for biomedical microscopy | *SimCLR, BYOL*

Aug 2022 - present

- Proposed a set of novel self-supervised hierarchical discriminative learning methods for Whole Slide Images.
- Benchmarks on multiple datasets showed SOTA results approaching fully supervised methods (only 1.5% less in MCA).
- Provided a paradigm for whole slide image pretraining for both patch and slide encoder in different scales of data regimes.

PUBLICATIONS

A self-supervised framework for learning whole slide representations

Xinhai Hou, ..., Honglak Lee, and Todd C. Hollon.

ICML 2024 (under review)

Hierarchical Discriminative Learning Improves Visual Representations of Biomedical Microscopy

Cheng Jiang*, Xinhai Hou*, ..., Honglak Lee, and Todd C. Hollon.

CVPR 2023 (highlight)

OpenSRH: Optimizing Brain Tumor Surgery Using Intraoperative Stimulated Raman Histology

Cheng Jiang*, Asadur Chowdury*, Xinhai Hou*, ..., Honglak Lee, and Todd C. Hollon.

NeurIPS 2022

Valproic acid-induced changes of 4D nuclear morphology in astrocyte cells

Alexandr Kalinin, Xinhai Hou, ..., Brian Athey.

Molecular biology of the cell, 2021

INDUSTRY

Machine Learning Engineer | Tencent (Beijing), advised by Dr. Pengfei Xiong

Feb 2021 - Aug 2021

- Fine-tuned GPT-2 and UniLM on social media and news corpus for title generation used in WeChat Search.
- Doubled the training speed by distributed training and increased 50% on ROUGE score by beam search over greedy search.
- Won fifth award in a ACM challenge: [Multimodal Video Advertisement Competition](#) out of 4335 participants.
- Adopted a generalizable pretrained image encoder (CLIP and Swin) and gained 10.3% more in average precision.

Research Intern | Michigan Medicine, advised by Dr. Brian Athey

July 2020 - Feb 2021

- Extracted features from 3D cell images and justify the morphological changes induced by the drug over time.
- Improved population cell embeddings by using weakly-supervised attention-pooling layer increasing F1 from 78% to 85%.

CORE COURSEWORK

Machine Learning	Computer Vision, Machine Learning Foundation, Large Language Modeling, Optimization Theory
Statistics	Data Mining, Statistical Inference, Time Series, Nonparametric Statistics, Models in Financial Markert.
Computer Science	Data Structure and Algorithm, Parallel Computing, Database Management.
Bioinformatics	Bioinformatics concepts and algorithms, Biology for computational scientists

SKILLS

Programming languages	Python, Shell, R, C/C++, MATLAB
Framework	Pytorch, Keras, Pandas, Scikit-Learn, Matplotlib, OpenMP, MPI, OpenCV
Tools	Git, Vim, VS Code, L ^A T _E X, Adobe Illustrator

AWARDS

- **CVPR 2023 DEI Scholarship** 2023
- **Dean's List** (Top 5%), 2016 - 2020
The Chinese University of Hong Kong, Shenzhen
- **Undergraduate Research Award** 2016 - 2020
The Chinese University of Hong Kong, Shenzhen

PROFESSIONAL SERVICE

- Conference reviewer: **ECCV 2024, CVPR 2024, WACV 2023, NeurIPS 2023, NeurIPS 2022**
- Journal Reviewer: **Journal of Digital Imaging**