Tian XIA

Data Scientist | Machine Learning Scientist | Imaging Scientist | Computational Biologist

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I am currently a cross-disciplinary researcher with broad expertise in data science, biophotonics, and computational biology. My Ph.D. research focused on developing quantitative measurements for basic biological phenomena. It integrates functional optical imaging, advanced image processing, and reproductive biology. With a diverse background in biology, physics, and computer science, I have the skills and expertise to apply computational approaches such as Machine Learning and Deep Learning to address biological questions and beyond. I have developed several tools and machine learning models that have proven beneficial in a range of areas, including basic reproductive biology, disease prediction, and disease-related gene screening.

Education

2024 **Baylor College of Medicine**
Ph.D. Quantitative & Computational Biosciences
Concentration : Image Processing and Analysis, Machine Learning, Transcriptomics Analysis

2019 **Zhejiang University**
B.S. Pharmaceutical Sciences, GPA 3.97
Concentration : Molecular Biology, Cancer Biology, Computational Biology, Drug Discovery

Experience

Current – Dec 2019 | **Baylor College of Medicine - Larina's Lab | Imaging Science - Graduate Student**
Department of Integrative Physiology – Mentor : Dr. Irina Larina

- Developed a quantitative imaging method of cilia metachronal wave in mouse fallopian tube with optical coherence tomography in vivo (Published at **Optica**, IF=10.4)
- Established a dynamic image signal processing procedure to track spermatozoa movement toward the egg (Invited oral presentation at **SPIE, 2022**).
- Constructed an image segmentation procedure for quantifying follicle volumes during the mouse ovulation process (In preparation for **Nature**).

Imaging Analysis | Fourier Transform | Phase | Computer Vision | Machine Learning | Object Detection | Segmentation

Dec 2023 – Jan 2020 | **Rice University - Class | Machine Learning - Visiting Student**
Data Science Project, Statistical Machine Learning – Other Interview Questions

- Constructed a **machine learning pipeline** to identify genomic signatures in age-related macular degeneration. Reduced the number of feature from >18000 to <100 using **feature selection** techniques, including *minimum Redundancy Maximum Relevance, Random Forest, Generalized Linear Model, Principle Component Analysis, Statistical Test*.
- Built a Python package for identifying the possible genes related to the disease from machine learning feature selection perspective.
- Created a **classification network** (customized Resnet50 with Ensemble strategy) to distinguish fine-grained food images.
- Construct a **generalized linear model** to identify individuals with the high risk of stroke with more than 90% accuracy.

Data Science | Machine Learning | Computational Biology | Pandas | Scikit-learn | R | Version Control | Data Visualization

Apr 2019 – Sep 2018 | **Massachusetts Institute of Technology - Weinberg's Lab | Cancer Biology - Research Assistant**
Department of Biology – Mentor : Dr. Robert Weinberg

- Help build a genetically defined syngeneic mouse model of ovarian cancer (Published at **Cancer Discovery**)

Molecular Biology | Gene Editing | CRISPR | Drug Testing

Jul 2018 – May 2018 | **Princeton University - Kang's Lab | Cancer Biology - Research Assistant**
Department of Biology – Mentor : Dr. Yibin Kang

- Study the phenotype of mir200 knockout in the mouse model by Immunochemistry (IHC) imaging.

Immunohistochemistry Imaging | Statistical Analysis

Feb 2018 – Jul 2017 | **Zhejiang University - Shao's Lab | Cancer Biology - Research Assistant**
School of Medicine – Mentor : Dr. Jimin Shao
- Study the IL-6, p-stat3, Fra-1, Nanog pathway in the progression and metastasis of colon cancer by immunofluorescence (IF) imaging. (Published at **Oncogene**)

Immunofluorescence Imaging | Cancer Research

Publications

In vivo volumetric depth-resolved imaging of cilia metachronal wave with dynamic optical coherence tomography 2023
Tian Xia, Kohei Umezu, Deirdre Scully, Shang Wang, Irina Larina
Optica
Imaging Processing | Spatial and Temporal Imaging | Dynamic Signal Processing | Fourier Transform | Phase

Dynamic volumetric imaging and cilia beat mapping in the mouse male reproductive tract with optical coherence tomography 2022
Kohei Umezu, Tian Xia, Irina Larina
Biomedical Optics Express
Imaging Analysis | Volumetric 3D Imaging | Dynamic Signal Processing | Reproductive Biology

Tracking spermatozoa movement toward the egg with functional optical coherence tomography 2022
Tian Xia, Kohei Umezu, Shang Wang, Irina Larina
Dynamics and Fluctuations in Biomedical Photonics XIX
Object Detection | Dynamic Signal Processing | Denoising

The inflammatory cytokine IL-6 induces FRA1 deacetylation promoting colorectal cancer stem-like properties 2019
Tingyang Wang, Ping Song, Tingting Zhong, Xianjun Wang, Xueping Xiang, Qian Liu, Haiyi Chen, Tian Xia, ..., Riccardo Fodde, Jimin Shao
Oncogene
Cancer Immunology Pathway | Immunofluorescence Imaging | Imaging Analysis

Skills

Programming	Python, R, MATLAB, C, Bash, SQL, Git, LaTex
Data Science	Pandas, Scikit-Learn, AnnData, PyTorch
Imaging Analysis	OpenCV, Numpy, Scipy, ImageJ, Scikit-Image, Matlab Image Processing Toolbox
Data Visualization	Matplotlib, Seaborn, ggplot2
Research	Data Science, Machine Learning, Deep Learning, Imaging Processing and Analysis, Computational Biology
Soft Skills	Creativity, Critical Thinking, Communication

Position of Responsibility

2023-present | **JOSA A - Journal of the Optical Society of America A**
Invited Reviewer
- Top reviewer with high reviewer score and fast response

2022-present | **Cats of Houston - Stray Cat Adoption Platform**
Co-founder and Photographer
- Photograph and post kitten for adoption to reduce stray cat in Houston. Help more than 50 kittens to be adopted.

Achievements & Recognitions

2023 **Travel Award for Invited Talk** SPIE Photonic West 2023, San Francisco
2022 **Second Place for Poster Presentation** Texas Forum of Reproductive Sciences 2022, Houston
2018 **First-Class Scholarship for Outstanding Students** (Top 1%) Zhejiang University
2018 **The President's Scholarship** Zhejiang University
2018 **Championship of Men's Singles** Tennis Competition, Zhejiang University