TIANAO LI

https://lukeli0425.github.io lta19@mails.tsinghua.edu.cn https://github.com/Lukeli0425/
Tsinghua University, Beijing, P.R.China

EDUCATION

Tsinghua University **Beijing, P.R.China**
B.E. in Electronic Engineering *Sept. 2019 - Jun. 2023*
Curricular Certificate Program in Astronomy
GPA: 3.84/4.0 (top 20%)
Relevant Coursework: Digital Image Processing (A-), Introduction to Fourier Optics (A), Probability and Stochastic Processes (A), Introduction to Auditory-Visual Information System (A-), Advanced Matlab Programming (A+), Data and Algorithm (A-), Signals and Systems (A-), Digital Signal Processing (A-), Linear Algebra(A-)

Beijing No.4 High School **Beijing, P.R.China**
High School Diploma *Sept. 2016 - Jun. 2019*

HONORS & AWARDS

- Tsinghua University Scholarship of Comprehensive Excellence (top 10%, 2022)
- Tsinghua University Scholarship of Comprehensive Excellence (top 10%, 2021)
- First Prize in National College Students' Physics Competition (top 1%, 2020)
- Tsinghua University Scholarship of Social Work (2020)
- Third Prize in Tsinghua Hardware Design Competition (top 5%, 2020)

RESEARCH INTERESTS

My research interest lies at the intersection of computational imaging, computer vision, signal processing, optimization, and machine learning. I'm especially interested in inverse problems in imaging, physics-informed deep learning, and astronomical imaging. I'm also open to bio-inspired vision, NeRF, and HDR imaging.

PUBLICATIONS

[1] **Tianao Li**, Emma Alexander. **Galaxy Image Deconvolution for Weak Gravitational Lensing with Physics-informed Deep Learning**, in submission, 2022.

RESEARCH EXPERIENCE

Northwestern University, *Bio-Inspired Vision Lab* *Evaston, IL, USA*
Research Intern (Remote), Advisor: **Prof. Emma Alexander** *Apr. 2022 - Present*
• Applied algorithm unrolling to the PSF deconvolution problem in galaxy images, significantly reducing systematic error in weak gravitational lensing shear measurements. Adopted a more appropriate Poisson noise model and used a neural network to learn the priors with Plug-and-Play ADMM.
• The proposed method outperforms previous algorithms in shape error of recovered galaxies.
• Paper submitted to Monthly Notices of the Royal Astronomical Society (MNRAS), currently under review.

Tsinghua University,*Tsinghua Visual Intelligence and Computational Imaging Lab* Beijing, P.R.China
Research Assistant, Advisor: **Prof. Lu Fang** *Sept. 2021 - Feb. 2022*
• Collaborated with a Ph.D. student on an Diffractive Neural Network (DNN) implemention of NeRF.
• Implemented a Point Cloud classification network with DNN.

SKILLS

- Coding: Python, PyTorch, TensorFlow, Matlab, C/C++, Git, LaTeX
- Language: English (TOEFL:111, S:26), Mandarin (Native)

SELECTED PROJECTS

Fire Detection [Github] Jun. 2022

- A Python implemention of a non-deep learning fire detection pipeline.
- Pipeline comprises of three parts: color space classifier, color component classifier and texture classifier.
- The model was trained and tested on the BoWFire Dataset and is able to detect fire from static images with an accuracy of 80%.

Video-Audio Signal Processing [Github] Dec. 2021

- Developed joint video-audio processing algorithms in Python.
- The algorithm is capable of recognizing faces from videos clips, recognizing voices from audios and separating speeches from videos with given visual and audio information of the speakers.

Video Editing Based on Rhythm Matching [Github] [Video] Jul. 2021

- Developed a video-editing algorithm in Matlab.
- Our algorithm was designed to create a video from a given set of video clips and a piece of background music to best match the clips' audio rhythm with the background music.

EXTRA-CURRICULARS

- **Vice president of Tsinghua Astronomy Society (2021-22).**
- Head of school observatory (2021-22).
- Organized astronomical popularization summer camp for junior high students in Guizhou and Xizang, China in 2021.
- Volunteer at Tsinghua Q&A Workshop with a total service hour of 147.5h.