

JUNKAI HUANG

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EDUCATION

The Hong Kong University of Science and Technology

Sept 2019 - Present, Hong Kong

- Double major: BSc in Computer Science & BSc in General Math, Major GPA: 3.960 / 4.3 (top 5%, Total GPA: 3.942).
- Selected Coursework: Introduction to Computer Vision, Deep Learning in Computer Vision, Advanced Computer Graphics, Deep Learning in Medical Image Analysis, Algorithmic Game Theory, Topology.
- University's Scholarship, Dean's list for all active semesters.

RESEARCH & PROJECTS

NeRF-RPN: A general framework for object detection in NeRFs

May 2022 - present, HKUST

Authors: Benran Hu*, Junkai Huang*, Yichen Liu*, Yu-Wing Tai, and Chi-Keung Tang. (* First three authors have equal contribution.)

Advisors: Prof. Yu-Wing Tai and Prof. Chi-Keung Tang.

- Proposed NeRF-RPN, the first significant 3D object detection framework that introduces the Region Proposal Network (RPN) to the Neural Radiance Fields (NeRF). Paper submitted to **CVPR2023**. arXiv. Video. Project page is coming soon.
- Prepared a large-scale public indoor dataset for 3D object detection, based on the existing synthetic indoor dataset Hypersim and 3D-FRONT, and real indoor dataset ScanNet and SceneNN, carefully curated for NeRF training.
- Personal Contribution: Explored NeRF, TensorRF, Instant-NGP for better reconstruction quality. Implemented 3D Swin Transformer, VGG backbones. Implemented 3D Midpoint-offset rotated bounding box regression, 2D projection loss. Generated heat map results visualization by volume rendering. Dataset survey on 3D-FRONT, SceneNN, ScanNet, etc. Extensive NeRF data labeling and clean up.

Semi-Supervised Tumor Infiltrating Lymphocytes (TIL) Segmentation

Feb 2022 - May 2022, HKUST

Course project for Deep Learning in Medical Image Analysis | Instructor: Dr. Hao CHEN.

- Conducted experiments on TIL segmentation task with U-Net, TransUNet, and Swin-UNet, incorporating semi-supervised strategies including label guessing and MixMatch. Achieved dice coefficient 55.2% for invasive tumor segmentation.

Artificial Intelligence Methods for Medical Videos

Oct 2021 - Jan 2022, HKUST

UROP Project | Supervisor: Dr. Xiaomeng LI

- Applied MS-TCN to surgical video workflow prediction with timestamp & cross pseudo supervision. Perform video feature extraction.

Image Style Transfer Application: From Photo to Cyberpunk

Sept 2021 - Nov 2021, HKUST

Course project for Deep Learning in Computer Vision | Instructor: Dr. Qifeng CHEN

- Analyzed style transfer models including Neural Style Transfer, CycleGAN, CUT. Proposed a new loss objective for Neural Style Transfer.

Deep learning methods for Mitotic Figure Detection

July 2021 - Aug 2021, HKUST

UROP Project | Supervisor: Dr. Hao CHEN

- Implemented whole slide image preprocessing pipeline and mitotic figure detection model training and testing pipeline.
- Trained and tested YOLOv3, Faster R-CNN, and Cascade R-CNN. Analyzed their performance degradation on domain-shifted data.

WORK EXPERIENCE

AI Developer Intern in Sebit Company Limited, Hong Kong

June 2022 - Aug 2022, Hong Kong

- Major work: Developed AI components for a medical image analysis platform. Developed a customizable, plug-and-play module for deep learning model training, evaluation, inference.

TA for COMP4411 Computer Graphics

Feb 2022 - May 2022, HKUST

- Major work: Conduct lab sessions for the Ray Tracing project. Grade homework. Answer questions.

TA for MSBD5016 Deep Learning Meets Computer Vision: Practice and Applications

Feb 2022 - May 2022, Sept 2022 - Present, HKUST

- This is a PG-level computer vision course. Major work: Answer questions. Grade homework. Set up virtual machines.

Student Helper for COMP2012 Object-Oriented Programming and Data Structures

Sept 2021 - Nov 2021, HKUST

- Major work: Help with lab sessions. Answer questions regarding lab work and homework.

EXTRA-CURRICULUM SERVICES

Deputy Head, HKUST Student Ambassador

Dec 2021 - Present, HKUST

Project Manager, Mechanical Engineer in HKUST ENTERPRIZE RoboMaster Team

Dec 2019 - June 2021, HKUST

SKILLS & PROFICIENCIES

Programming Languages: Python, C/C++, MATLAB, Java

Libraries: PyTorch, Scikit-learn, OpenCV, TensorFlow, Numpy, Matplotlib, SciPy, Panda

Languages: English (Fluent), Mandarin Chinese (Native)