Tai-Yu (Daniel) Pan

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SUMMARY

My research focuses on **Large-Scale Computer Vision** and **Machine Learning**, including:

- **2D/3D Detection, Segmentation, Generation**: ICCV'21, NIPS'21, ECCV'22, CVPR'23, ICLR'24, [C8], [C9]
- **Imbalanced**, **Long-Tailed Learning**: ICCV'21, NIPS'21, ECCV'22
- **Representation Learning**: ICCV'21, CVPR'23, ICLR'24
- **Multi-Modal**, **Multi-Agent**, **Robotic (Ego-Centric) Perception**: CVPR'22, ICLR'24, [C8], [C9]
- **Autonomous Driving**: ICLR'24, [C8], [C9]
- **Medical Imaging**: [C1], [J1]

RESEARCH & EMPLOYMENT

Meta — May 2023 – Aug. 2023
Research Scientist Intern, GenAI — Bellevue, WA

- Researched efficient training of large vision and language models (VLM)

Adobe — May 2022 – Dec. 2022
Research Intern — Columbus, OH

- Researched open-world part segmentation
- Published in CVPR'23, applied patent for the developed algorithm

Buckeye AutoDrive, The Ohio State University — Aug. 2020 – Present
Team Lead — Columbus, OH

- Developed 2D/3D perception algorithms, pipeline & message with Robot Operating System (ROS)
- Managed and mentored 50+ undergraduate & graduate students
- Designed tutorials and workshops (topics: general programming, image processing, object detection, machine learning, and deep learning, 3D point cloud, etc.)
- Won 2nd place in nationwide collegiate SAE AutoDrive Challenge II (held by General Motors)

Computer Science and Engineering, The Ohio State University — Aug. 2018 – Present
Graduate Research Assistant — Columbus, OH

- Developing sensory (LiDAR) simulation with generation techniques
- Developed a new learning scenario for collaborative autonomous driving
- Developed a pre-training algorithm that saves 80% of annotation effort for 3D detection
- Improved object detection on large-scale long-tailed dataset
- Improved vision and language model for multi-modal navigation task
- Built 3D detection models for lung nodule detection (medical imaging)
- Built 2D detection models for the detection and segmentation of pancreas neoplasia (medical imaging)

EDUCATION

The Ohio State University (OSU), Columbus, OH — Sep. 2018 – **Nov. 2024**
Ph.D. and M.S. in Computer Science and Engineering, advised by Wei-Lun (Harry) Chao

University of Washington (UW), Seattle, WA — Sep. 2016 – Jun. 2018
M.S. in Chemical Engineering / Data Science, advised by Jim Pfaendtner

National Taiwan University (NTU), Taipei, Taiwan — Sep. 2010 – Jun. 2014
B.S. in Chemical Engineering

HONORS

- Graduate Student Research Award at OSU
- Invited talk to workshop in ICCV'21

PUBLICATIONS

Conferences

[C9] Perceptual Perspective Transfer: Controllable 3D Generation for Multi-Agent via Diffusion
Tai-Yu Pan, Sooyoung Jeon, Mengdi Fan, Yihong Sun, Katie Z Luo, Mark Campbell, Kilian Q Weinberger, Bharath Hariharan, Wei-Lun Chao
Under submission.

[C8] Learning 3D Perception from Others' Predictions
Jinsu Yoo, Zhenyang Feng, **Tai-Yu Pan**, Yihong Sun, Cheng Perng Phoo, Xiangyu Chen, Mark Campbell, Kilian Q Weinberger, Bharath Hariharan, Wei-Lun Chao
Under submission. arXiv preprint arXiv:2410.02646

[C7] Pre-Training LiDAR-Based 3D Object Detectors Through Colorization
Tai-Yu Pan, Chenyang Ma, Tianle Chen, Cheng Perng Phoo, Katie Z Luo, Yurong You, Mark Campbell, Kilian Q Weinberger, Bharath Hariharan, Wei-Lun Chao
*International Conference on Learning Representations (**ICLR**)*, 2024.

[C6] Towards Open-World Segmentation of Parts
Tai-Yu Pan, Qing Liu, Wei-Lun Chao, Brian L. Price
*IEEE/CVF Conference on Computer Vision and Pattern Recognition (**CVPR**)*, 2023.

[C5] Learning with Free Object Segments for Long-Tailed Instance Segmentation
Cheng Zhang*, **Tai-Yu Pan***, Tianle chen, Jike Zhong, Wenjin Fu, Wei-Lun Chao
*European Conference on Computer Vision (**ECCV**)*, 2022.

[C4] One Step at a Time: Long-Horizon Vision-and-Language Navigation with Milestones
Chan Hee Song, Jihyung Kil, **Tai-Yu Pan**, Brian Sadler, Wei-Lun Chao, Yu Su
*IEEE/CVF Conference on Computer Vision and Pattern Recognition (**CVPR**)*, 2022.

[C3] On Model Calibration for Long-Tailed Object Detection and Instance Segmentation
Tai-Yu Pan*, Cheng Zhang*, Yandong Li, Hexiang Hu, Dong Xuan, Soravit Changpinyo, Boqing Gong, Wei-Lun Chao
*Conference on Neural Information Processing Systems (**NeurIPS**)*, 2021.

[C2] MosaicOS: A Simple and Effective Use of Object-Centric Images for Long-Tailed Object Detection
Cheng Zhang*, **Tai-Yu Pan***, Yandong Li, Hexiang Hu, Dong Xuan, Soravit Changpinyo, Boqing Gong, Wei-Lun Chao
*IEEE/CVF International Conference on Computer Vision (**ICCV**)*, 2021.
Invited research talk at LVIS Challenge 2021 in ICCV 2021.

[C1] Computer-aided detection of advanced neoplasia in intraductal papillary mucinous neoplasms using confocal laser endomicroscopy
Somashekar G Krishna, Wei-Lun Chao, Sarah Poland, Victoria Alexander, Tassiana Maloof, Kelly Dubay, Olivia Ueltschi, Dana M Middendorf, Muhammed O Jajeh, Aadit Vishwanath, Kyle Porter, David Carlyn, **Tai-Yu Pan**, Georgios Papachristou, Phil A Hart, Zobeida Cruz-Monserrate, Darwin L Conwell
GASTROENTEROLOGY. Vol. 158. No. 6.

Journals

[J1] High Performance in Risk Stratification of Intraductal Papillary Mucinous Neoplasms by Confocal Laser Endomicroscopy Image Analysis with Convolutional Neural Networks
Jorge D. Machicado, Wei-Lun Chao, David E. Carlyn, **Tai-Yu Pan**, Sarah Poland, Victoria L. Alexander, Tassiana G. Maloof3, Kelly Dubay, Olivia Ueltschi, Dana M. Middendorf, Muhammed O. Jajeh, Aadit B. Vishwanath, Kyle Porter, Phil A. Hart, Georgios I. Papachristou, Zobeida Cruz-Monserrate, Darwin L. Conwell, Somashekar G. Krishna
Gastrointestinal Endoscopy

MENTORSHIP & TEACHING

Instructor, The Ohio State University — Summer of 2019 & 2020
- CSE 1222 Computer Programming in C++ for Engineers and Scientists

Graduate Teaching Assistant, The Ohio State University — Sep. 2018 – Aug. 2020
- CSE 5523 Machine Learning and Statistical Pattern Recognition
- CSE 1222 Computer Programming in C++ for Engineers and Scientists

ACADEMIC SERVICE

Reviewer: CVPR 2024/2023/2022, ICLR 2024, NeurIPS 2023, ECCV 2024/2022, ICCV 2023, BMVC 2022

SKILLS

- Programming Languages: Python, C++, JavaScript, WebGL, Bash Script, MATLAB, Fortran
- Other Computer Skills: Unix, Linux, PyTorch, ROS, AWS, Docker, AutoCAD
- Languages: Native Mandarin, Fluent English

PROJECTS

Machine Learning Projects, The Ohio State University

- Project Limb Rescue: developed a cloud service and a machine tool helping patients to monitor the risk of lymphedema, with 67% accuracy on simulated test data. [link], [link]
- Emoji Prediction: Naive Bayes and BiLSTM with Character Embedding, detecting one of 20 emoji labels by tweets, leveraging LSTM and BiLSTM model with embedding techniques, with competitive 46.48% accuracy on competition board. [link]

Data Science Projects, University of Washington

- Development of Lignin pyrolysis model with Python, leveraging machine learning techniques such as Artificial Neural Network/Sklearn with 99.2% accuracy. [link]
- Development of open-sourced software package (EASE) leveraging machine learning (Random Forests Classification) and statistical analysis techniques to provide electricity sources and profit profiles based on cost and weather. [link]