XU, Yanbo (Billy)

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Education

Carnegie Mellon University 2023, Sep. – Current
Master of Science in Robotics GPA: 4.08/4.3

Hong Kong University of Science and Technology 2018, Sep. – 2023, Jun.
Bachelor of Science in **Computer Science** and **Mathematics** **First** Class Honor

École Polytechnique Fédérale de Lausanne 2022, Feb. - July
Exchange Student in **Computer Science**

Publications

- **Yanbo Xu**, Jayanth Srinivasa, Gaowen Liu, Shubham Tulsiani. "**Diverse Score Distillation.**" *Preprint, 2024.*
- Hao Zhang*, **Yanbo Xu***, Tianyuan Dai*, Yu-Wing Tai, Chi-Keung Tang. "**FaceDNeRF: Semantics-Driven Face Reconstruction, Prompt Editing and Relighting with Diffusion Models**." Accepted by *2023 Conference on Neural Information Processing Systemson (**NeurIPS 2023**)*
- **Yanbo Xu*,** Yueqin Yin*, Liming Jiang, Qianyi Wu, Chengyao Zheng, Chen Change Loy, Bo Dai, Wayne Wu. "**TransEditor: Transformer-Based Dual-Space GAN for Highly Controllable Facial Editing.**" Accepted by *2022 IEEE/CVF Conference on Computer Vision and Pattern Recognition (**CVPR 2022**)*
- Qing Lian, **Yanbo Xu**, Weilong Yao, Yingcong-Chen, Tong Zhang "**Semi-Supervised Monocular 3D Object Detection by Multi-View Consistency**." Accepted by *2022 European Conference on Computer Vision (**ECCV 2022**)*

Research Experience

CMU Physical Perception Lab 2023 Sep. – Current
Master Student Supervisor: **Prof. Shubham Tulsiani**

- "**Diverse Score Distillation.**" We propose a score distillation method that ensures diversity by simulating ODE trajectory from DDIM. Our method can generate diverse 3D shapes and can also be used for multi-modality single view reconstruction.

HKUST 2023 Jan. - May.
Research Project Supervisor: **Prof. Chi Keung Tang**, **Prof. Yu-Wing Tai**

- **"FaceDNeRF: Semantics-Driven Face Reconstruction, Prompt Editing and Relighting with Diffusion Models**." With the nice latent space of trained 3D GAN model and a diffusion model, we can perform face reconstruction, prompt editing and relighting. Our method can also generate high-quality 3D shapes given text input.

EPFL Image and Visual Representation Lab 2022, Mar. – Aug.
Semester Research Project Supervisor: **Prof. Sabine Süsstrunk, Dr. Tong Zhang**

- A research project about the disentangled representation for 3D GAN and 3D latent space.

HKUST Bachelor Final Year Thesis 2022, Jun. – 2023, May
Final Year Thesis Supervisor: **Prof. Qifeng Chen**

- Editing NeRFs using Diffusion Models.

Shanghai AI Lab 2021, Feb.- Dec.
Computer Vision Researcher Internship Supervisor: **Prof. Chen Change Loy, Prof. Bo Dai, Dr. Wayne Wu**

- "**TransEditor: Transformer-Based Dual-Space GAN for Highly Controllable Facial Editing**". In a dual-space GAN structure, we introduce interaction between two latent spaces, achieving semantic disentanglement and better editing performance.

HKUST Statistic and Machine Learning Research Group 2021, Jan.- Dec.
Undergraduate Research Assistant Supervisor: **Prof. Tong Zhang, Mr. Qing Lian**

- "**Semi-Supervised Monocular 3D Object Detection by Multi-View Structure from Motion**". We introduce a semi-supervised framework for 3d object detection. The proposed photometric loss provides dense supervision signal for labeled and unlabeled data, resulting in improved performance.

HKUST Undergraduate Research Opportunity Program

Undergraduate Research Assistant

Detecting Deep Learning Software Defects 2020, Jun.- Sep.

Supervisor: **Prof. Shing Chi Cheung, Prof. Yongqiang Tian**

- This research project aims at enabling PyTorch developer to get code coverage in function, blocks and branch level. The project involves special compilation of PyTorch, collection of unit test, generation and analysis of Gcov files.

Common Sense Reasoning with Knowledge Graphs 2019, Sep.- Dec.

Supervisor: **Prof. Yangqiu Song, Dr. Hongming Zhang**

- This project evolves improving training of NLP models using knowledge graphs generated from images. My job was trying to recreate an event-to-event NLP model.

Project & Internship Experience

Differentiable Rendering for Local Parameters 2024, Jan. - May

- In the course project from CMU Physics-based rendering, I implement a differentiable framework of local parameters on top of DIRT. The framework enables optimization of material parameter with path-tracing.

Learning Skill from Video Demonstration 2024, Sep. – Dec

- In the course project from CMU Introduction to Robot Learning, we extract 3D hand and object interaction from monocular videos and train a robot policy that learns the skill.

The Effect of Delay and Momentum in Asynchronous SGD 2022, Feb. – July

- In the course project from EPFL Optimization for Machine Learning (PG Level), we study how dose asynchronization influence the convergence of a deep network, and how momentum could be used to resolve the issues.

Q-learning and Deep Q-learning 2022, Feb. – July

- In EPFL Artificial Neural Network (PG Level), I implemented the standard Q-learning and Deep Q-learning methods on the game tic-tac-toe. I also study the effects of different learning strategy (self-learning, optimal player) and learning parameters.

Shanghai AI Lab 2021, Feb. - Aug

Computer Vision Researcher Internship project: High-quality Makeup Transfer

- Reviewed SOTA GAN methods for style transfer, processed human face data from videos/photos, improved and trained GAN models, and integrated a full data processing pipeline.

SYNYI AI 2020, Nov. – 2021 Feb.

AI Algorithm Engineer Internship project: Automatic Decision Making for Hospital Resources

Analyzed hospital data, modeled problems mathematically, implemented algorithms using statistical and deep learning, and conducted advanced research for optimized solutions.

HKUST Deep Learning in Computer Vision 2020, Feb. – Jun.

- Our project "A Chronological Illustration Generation Framework For Documents" provides a model which generates a series of images to describe a relatively long story.

VR Gaming Design 2019, Jul. – Sep.

- In the summer program held by PKU and HKU, we designed a VR game using Unity 3D. My job was some 3D modelling and writing code for the game.

Team Member in HKUST RoboMaster Team 2019. Jan. - May

- RoboMaster is a robot competition held by DJI. My Role is an assistant machinal engineer making partial design of the drone.

Honors & Awards

HKUST Research Travel Grant (2022), HKSAR Government Scholarship Fund - Reaching Out Award 2021/22, CVPR 2022 Travel Grant, HKUST Entrepreneurship Competition Student Team Award (2022), HKSTP Ideation Program (2022), HKUST Undergraduate Research Opportunity Program Stipend, HKUST University's Scholarship Scheme for Continuing Undergraduate Students (2019 & 2021), Wu Ti Hsien Science & Education Foundation Fund Scholarship (2019 & 2020) HKUST Dean's list of School of engineering (2019 & 2022), HKUST Admission Scholarship (2018)

Teaching & Service

TA for CMU 16-825 Learning for 3D Vision 2025 Jan. – May.

Conference Reviewer

CVPR (2023, 2024), ICLR (2025), NeurIPS (2024), ECCV (2024)

Extracurricular Experience

HKUST-Sino One Million Dollar Entrepreneurship Competition 2022

We start a company to solve collaboration and version control problems in multimedia industry. We won the student team award and got into the HKSTP Ideation Program.

Leading Peer Mentor in Peer Mentor Program 2019-2020

The Peer Mentor Program is held by MSSUG, HKUST. The responsibility of Peer Mentor is to guide and help year 1 students when entering the university.

HKUST BIZCATHON 2019

A hackathon about virtual banking in Hong Kong. Our team designed a mobile app with ability to visualize data using AR.

Skills & Related Courses

Skills:

- **Programing**: **Python** (Numpy, Pytorch, Scikit-learn, Flask, Fastapi), **C++** (Cmake, QT), **JavaScript** (js, Vue), **SQL**, **MIPS**
- **Mechanical: CAD Designing** (SolidWorks), **3D Printing**

Related Courses:

- **Computer Science:** Honors Design and Analysis of Algorithms, Computer Organization, Programming with C++, Object-Oriented Programming and Data Structures, Introduction to Computer Science, Artificial Neural Network, Optimization for Machine Learning, Theory of Computation, Operating Systems.
- **Mathematics:** Mathematical Analysis, Discrete Math, Linear Algebra, Probability Theory, Differential Equation, Calculus, Abstract Algebra, Statistic, Real Analysis, Multivariable Calculus, Stochastic Process, Statistical Machine Learning.
- **Vision and Graphics:** Deep Learning in Computer Vision, Computer Vision, Physics-based Rendering, Learning for 3D Vision.
- **Robotics:** Math fundamentals for Robots, Introduction to Robot Learning.