DUC-HAI PHAM

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RESEARCH INTERESTS

My research interests are in computer vision, specifically 3D perception and reconstruction. I am developing methods that allow robots to understand 3D scene geometry and semantics from casual image inputs, with applications in autonomous driving, robotics, and augmented reality.

PUBLICATIONS

(*) denotes equal contribution.

[P1] Duc-Hai Pham*, Tung Do*, Phong Nguyen, Binh-Son Hua, Khoi Nguyen, Rang Nguyen. **"SharpDepth: Sharpening Metric Depth Predictions Using Diffusion Distillation"**. In **The Conference on Computer Vision and Pattern Recognition (CVPR 2025)**.

[P2] Duc-Hai Pham, Tuan Ho, Anh Pham, Dung Nguyen, Phong Nguyen, Khoi Nguyen, Rang Nguyen. **"VFG-SSC: Semi-supervised camera-based Semantic Scene Completion with 2D Vision Foundation Model guidance"**. In **The 39th Annual AAAI Conference on Artificial Intelligence (AAAI 2025)**.

[P3] Trung Pham-Dinh, Bao Bach-Gia, Lam Luu-Trinh, Minh Nguyen-Dinh, **Duc-Hai Pham**, Khoa Bui-Anh, Xuan-Quang Nguyen and Cuong Pham-Quoc. **"An FPGA-based Solution for Convolution Operation Acceleration"**. In **The First International Conference on Intelligence of Things 2022 (ICIT 2022)**.

EDUCATION

Ho Chi Minh City University of Technology - Vietnam National University   **Ho Chi Minh City, VN**
*B.E in **Computer Engineering**. **CGPA:** 8.49/10*   ***Aug 2020 - Jul 2024***
Graduate Thesis: *Monocular Semantic Scene Completion on Embedded System (grade 9.78/10)*

Coursework: Linear Algebra, Calculus, Computer Vision, Data Structures & Algorithms, Probability & Statistics, Operating System and Computer Architecture.

EXPERIENCES

VinAI Research - AI Research Resident   ***Aug 2023 – Present***
Advisor: Dr. Phong Nguyen, Prof. Binh-Son Hua, Dr. Khoi Nguyen, and Dr. Rang Nguyen.

- Introduce a novel architecture for metric depth sharpening to increase high-frequency details of pre-trained metric depth estimation models **[P1].**
- Propose a new task of 3D understanding: semi-supervised semantic scene completion, and address it with a novel 3D segmenter leveraging depth and semantics from vision foundation models as strong 3D cues **[P2].**
- Developed methods for human mesh recovery from a single image with accurate 3D localization.

VinAI Research - AI Research Intern   ***Feb 2023 – Aug 2023***
Advisor: Dr. Khoi Nguyen and Dr. Rang Nguyen.

- Enhancing bird's-eye-view 3D object detectors for the 3D occupancy prediction task.
- Conducting multi-node model training on large-scale datasets (up to 1M images) using HPC systems.
- Participated in CVPR2023 Workshop in Autonomous Driving, **ranked 16th** (Team VinAI) on the Occupancy Prediction Task Challenge (**out of 400 entries**). The highest-ranking Southeast Asia team in the competition.

ML4U Research Group - Research Intern   ***Aug 2022 – Feb 2023***
Advisor: Dr. Dung Nguyen Duc.

- Developed methods to tackle night-time self-supervised monocular depth estimation.
- Researching data-reconstruction methods to improve depth estimation in night-time conditions.
- Conducting experiments and evaluations of different models on Oxford RobotCar dataset.

HCMUT-VNU Computer Engineering Lab - Research Intern   ***Aug 2021 – Sep 2022***
Advisor: Associate Prof. Cuong Pham Quoc.

- Quantized Depthwise-separable convolution-based models: MobileNetv1 and EfficientNetv1 using Python.
- Verified Convolution Operation using Verilog HDL, achieving **0.224 GOP** per core in simulations.
- Conducted performance comparison with ARMv7 CPU using Python, recording a **50X** speed increase **[P3].**

SKILLS

Programming Languages: C++, Python, and LaTeX
Tools/Packages/Framework: PyTorch, TensorFlow, Numpy, OpenCV, mmdetection, Scikit-learn, Pytorch3D
Hardware: Field-Programmable-Gate-Arrays (Xilinx and Intel) and Raspberry Pi.

LANGUAGES

Mother tongue: Vietnamese
Other languages: English - IELTS 8.0 (Listening: 8.5, Reading: 8.5, Writing: 7.0, Speaking: 7.0)

HONORS & AWARDS

Students with 5 Good Merits - Ho Chi Minh City *Jan 2023*
Awarded by the Student Union of Ho Chi Minh City to the top students in all the universities in the city for their contributions to scientific research and academic achievements within the academic year.

Pony Chung Foundation Scholarship *Dec 2022*
Awarded by Pony Chung Foundation & Huyndai Company to the top 30 students in Vietnam National University Ho Chi Minh City for their contributions to scientific research and academic achievements within the academic year.

Second prize Science-a-thon challenge and Travel grant *Aug 2022*
Awarded by Rencontres du Vietnam (leading association scientific in knowledge and international scientific exchanges in Vietnam) for the 9th Vietnam Summer School of Science - a camp to inspire courage and support Vietnamese students and young generations who are keen as well as full of passion for pursuing research as a career.

Highly Commended Award - Green Summer Initiative HCMUT *Jul 2022*
Awarded by the Ho Chi Minh University of Technology for students with outstanding contributions to the Green Summer Volunteering Program.

Second Prize - Bach Khoa Innovation Startup Competition *Dec 2021*
Led a team of 5 to develop a cross-platform application for High School Students to quickly navigate university admission in both private and public universities in Vietnam using Flutter and BLOC pattern. Received **Second Prize** (competed against 100 teams) and funded **15.000.000 VND** by the university to continue developing.

Study Grant *May 2021*
Awarded by Math and Summer Science Program to students with high academic abilities to study Data Science with experts from high-ranked universities in the US and Europe.

PROFESSIONAL SERVICES

Reviewer: ACCV (2024), CVPR (2025)

REFERENCES

Dr. Rang Nguyen - Applied Research Scientist, Team Lead Surrounding View Monitoring Product

VinAI Research. Email: v.rangnhm@vinai.io

Professor. Binh-Son Hua

Trinity College Dublin. Email: binhson.hua@tcd.ie

Dr. Dung Nguyen Duc - Researcher, Lecturer

Ho Chi Minh City University of Technology - Vietnam National University. Email: nddung@hcmut.edu.vn