Pham Duc Anh Khoa

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About me

I am a final year student in Computer engineering major expected to graduate in 2024. I highly interest in research about Deep neural network optimization for edge device related to autonomous driving and 3D scene reconstruction. Beside that, I am also working as a C++ software engineer to gain experience on how computer vision AI apply to industrial products. I am also planning to pursuit a PhD in AI field, specifically computer vision related to autonomous driving.

Publications

Optimizing 3D Semantic Scene Completion on Embedded Systems
*2024 International Seminar on Intelligent Technology and Its Applications (ISITIA) - **Accepted***

- Research on 3D semantic scene completion baseline.
- Proposed optimal solution related to adaptive structural pruning on neural network.
- Run experiments on Jetson Xavier NX embedded computer and compare with other methods
- Achieve **32%** increment in inference speed on embedded system.

Experience

C++ Software / Algorithm Engineer Sep 2022 – Present
OPSWAT Vietnam *Ho Chi Minh City*

- Investigate and research on deploy AI computer vision for image processing on file processing software.
- Implement algorithm to process and sanitize several file types such as text, archive, etc..
- Apply C/C++ programming fundamental and OOP technique to design and develop file processing technology, including:
  - Sanitize, check file structure and remove threats.
  - Reconstruct file after removing threats.
  - Detect vast majority of file type (pdf, docx, jpg, png, ...).
  - Convert multiple file types.
  - Researching on bringing application to FPGA
- Develop engine on Linux and Window to use with file processing technology, working with multi-process engine
- Integrate and test computer vision's framework to C++, C# code base.

Research student May 2023 – Present
Ho Chi Minh University of Technology *Ho Chi Minh City*

- Research on 3D reconstruction using deep learning methods.
- Propose methods for enhancing 3D reconstruction model with input resource constraint.
- Investigate on reduce computation on deep learning models using structural pruning technique with computation graph.
- One accepted paper related to 3D scene reconstruction optimization for embedded system.

Education

Ho Chi Minh University of Technology - VNU Ho Chi Minh City, Vietnam
Bachelor of Computer Engineering *Sep 2020 – Sep 2024*

- Study fundamental about digital system, computer architect, algorithms and AI optimization for deployment on edge devices.
- Course work: Data structure and algorithm, Computer vision, Programming fundamental, Operating system, etc

Projects

Thesis: Monocular 3D Semantic Scene On Embedded System May 2023 - June 2023
Deep learning, PyTorch, Jetson Xavier NX

- Investigate on related works of 3D semantic scene completion.
- Study trade off between performances and computation complexity between models.
- Propose methods to convert LiDAR based model into Monocular image based.
- Propose method to reduce computation complexity on baseline model.
- Run experiments on Jetson Xavier NX embedded system and ablation study on several aspect related to the project.
- **Achieved score: 9.78/10**

Integrate computer vision AI model to software May 2023 - June 2023
Industrial project

- Survey on several baseline best fitted for software's use case.
- Analyze on chosen model and run benchmark on several scenario.
- Data augmentation on given dataset for benchmark.
- Successfully integrate AI model into software.
- Be able to replace recognized pattern with generated pattern using basic computer vision technique.

Deploy SLAM algorithm to Husky UGV robot May 2023 - June 2023
Robot operating system, Python, Robot simulation

- Implement controller based Robot operating system to simulate for CART Husky vehicle robot.
- Research on deploy SLAM algorithm to CART Husky vehicle robot.
- Run experiments on real campus environment to measure performance.

Programming Skills

Languages: C/C++, Python, Linux Scripting, Assembly, Javascript
Frameworks: PyTorch, Tensorflow, OpenCV (C++ and Python), Tensorboard, Open3D, mmcv, gtest, NodeJs
Tools: Git, CMake, Docker, Visual Studio, Jira, Confluence

AI Knowledge

Learning method: Supervised, Unsupervised, Semi-supervised, Knowledge distillation
Deep Neural network lighten method: Quantization, Unstructured pruning, Structural pruning.
Deep Neural network computation method: 2D Convolution, 3D convolution, Sparse convolution, Cross-attention, etc..

Software Engineering Knowledge

C/C++ knowledge: File processing, Basic pointer, OOP, Basic fundamentals
Embedded Software knowledge: STM32, SPI, UART, I2C, Timer, GPIO Controlling