Jong Hoon Park

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EDUCATION

Carnegie Mellon University (CMU) — Pittsburgh, PA
Master of Science in Mechanical Engineering – Research | GPA: 3.89/4.0 — May 2024
Coursework: AI/ML, Big Data Science, Deep Learning, Visual Learning & Recognition, On-Device Machine Learning

University of California, Davis — Davis, CA
Bachelor of Science, Aerospace Engineering and Mechanical Engineering — Dec 2019

SKILLS

Languages & Frameworks: Python, C++, PyTorch, TensorFlow, Git, Linux, AWS, Google Cloud Platform
A.I.: Deep Learning, Computer Vision, Model Optimization, On-Device ML, Multimodal ML, LLMs

WORK EXPERIENCE

Robot Intelligence Group @ CMU | Graduate Research Assistant — Pittsburgh, PA

Pilot Workload Estimation via Multimodal Machine Learning | Industry Funded Project — May 2023 – Present

- Developing multimodal ML models and algorithms with an $125B automobile company's research subsidiary to extract and reason on multi-modal representation of biometric data to estimate pilot workload.
- Executed IRB-approved user studies with over 20 pilots, collecting and processing BVP, GSR, fNIRS, eye gaze data, etc.
- Projected eye gazes onto scenes, reducing projection time from 8 hours to 4 minutes per pilot via parallel computing.
- Segmented FPV flight scenes using a transformer-based model to extract semantic information for training models.

Boeing Airplane Motion Prediction via Airport Context Learning | Boeing Funded Project — May 2023 – Aug 2023

- Transformed airport map images into semantic graph data, analyzing its efficiency and impact on motion forecasting.
- Achieved a 7.8m error in predicting airplane motion within airport by training a MLP with GPT-based attention layers.

Celerity Consulting Group | Engineering Consultant — Walnut Creek, CA

Transmission Line Upgrade Analysis & Mapping Support — Feb 2020 – May 2022

- Piloted a new project assessing integrity of electric transmission lines and recommended repairs to client company.
- Mentored new hires by providing feedback after quality-checking work and identifying areas for improvement.

ACADEMIC PROJECTS

Q&A System with Retrieval-Augmented Generation via LLM | *PyTorch, LLM* — Jan 2024 – Present

- Designing an LLM pipeline to create a Q&A system utilizing LangChain APIs.
- Implementing Retrieval-Augmented Generation (RAG) for vector search from a database to mitigate hallucination.

Cockpit View Segmentation via Domain Adaptation | *PyTorch, ML, Computer Vision* — Nov 2023 – Dec 2023

- Fine-tuned a pretrained Mask R-CNN to extend its domain for segmenting real-world cockpit views.
- Created a custom dataset by capturing cockpit view images across four different airplanes using a flight simulator.

Machine Learning Model Compression on Device | *PyTorch, ML, Model Compression* — Sept 2023 – Dec 2023

- Deployed and compressed a 73 million-parameter generative AI model into an NVIDIA Jetson Nano.
- Performed knowledge distillation on a sub-model, reducing size by 58% with minimal performance drop.
- Enhanced inference speed on device by 94% on GPU via post-training static quantization to float16 domain.
- Reduced FLOPs by 66.7% with just 2.1% accuracy drop by down sampling input image size by one-fourth.
- Devised a filter-wise structured pruning method and found sensitive convolution kernels among 1,200 in encoders.

Quantitative Modeling and Forecasting of Excess Return | *Applied ML, Big Data* — Apr 2023

- Applied rolling regression to 14 financial explanatory variables to predict equity premium, achieving an R_2 of 99.8%.
- Identified trends in historical data for future return forecasting using RNN and Bootstrap Aggregation.

Perception – Vehicle Image Classification | *PyTorch, ML, Computer Vision* — Apr 2023

- Attained 2nd position in an academic course's Kaggle competition for vehicle image classification.
- Employed end-to-end vehicle image cropping and feature extraction during model training.
- Achieved 69% classification accuracy by fine-tuning a pre-trained ResNet18 model with 7,573 driving scene images.

Human Facial Emotion Recognition | *PyTorch, ML, Computer Vision* — Oct 2022 – Dec 2022

- Built a CNN from scratch for emotion prediction from 291,650 facial expressions, attaining 70% prediction accuracy.
- Implemented and showcased real-time emotion recognition and assessed performance via a confusion matrix.

LEADERSHIP

LLM (Large Language Model) Project Team Lead, Course 24-782, CMU, Pittsburgh, PA — Jan 2024 - Present
Advanced Modeling Aeronautics Team Section Lead, UC Davis, CA — Feb 2018 – June 2018
Artillery Gun Section Squad Leader, Republic of Korea Army, Paju, South Korea — Sep 2016 – Jul 2017