ZHENYU LIN

Software Engineer Internship

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EXPERIENCE

Research Assistant

Sony x SFSU Mobile and Intelligent Computing Lab

Sep 2021 – Current San Francisco, California

- Implemented **Functionality-based Pruning** using **Gradient-weighted Class Activation Mapping** and **K-Means clustering** to reduce deep learning model parameters.
- Compressed a CNN model from **14 MB to 0.55 MB** through **functionality-based pruning**, achieving 95% image recognition accuracy.
- Further compressed the model **from 0.55MB to 0.21 MB** using **8-bit quantization** to deploy on a **0.1W IoT device** with 500ms processing delay, achieving 90% image recognition accuracy for 96x96x2 images.

PROJECTS

Robust High-Density EMG Pattern Recognition Framework

Sony x SFSU Mobile and Intelligent Computing Lab

Jun 2022 – Dec 2022

- Developed the RoHDE framework, utilizing a **Generative Adversarial Network** (GAN) to generate synthetic HD Electromyography signals, achieving a 95% similarity with real HD Electromyography signals.
- Improved gesture recognition accuracy from **64% to 94.89%** for **CNN-based models** affected by noisy signals.
- Improved gesture recognition accuracy by 30% in noisy conditions using **only 15% synthetic noisy signals**.

CNN Model for EMG-Based Neural Machine Interface

Sony x SFSU Mobile and Intelligent Computing Lab

Jun 2023 – Aug 2023

- Developed a CNN model using **Python** and **PyTorch** to interpret Electromyography signals, achieving an **90% accuracy** in predicting user intentions.
- **Standardized** Electromyography signals to reduce the impact of outliers and used **sliding window augmentation** to enhance spatial and temporal feature extraction.
- Implemented **deep transfer learning** to adapt a pre-trained CNN model to user-specific Electromyography data.

Real-time Bionic Arm Control Via CNN-based EMG Recognition

Sony x SFSU Mobile and Intelligent Computing Lab

Jun 2023 – Aug 2023

- Conducted functionality-based pruning and **8-bit quantization** to compress a CNN model from **463kB to 73kB**, achieving an 85% reduction in size with less than 1.5% accuracy drop.
- Deployed the compressed CNN model on a **0.1W IoT device with 1.5MB sRAM** using **TensorFlow Lite Micro**
- Achieved clinical-grade control **latency of 160ms** with **C++** by using the CNN model to interpret EMG signals and send PWM signals to control a 3D-printed bionic arm.

PUBLICATIONS

Conference Paper

- Z. Lin, P. Liang, X. Zhang, and Z. Qin, "Toward robust high-density emg pattern recognition using generative adversarial network and convolutional neural network," in *2023 11th International IEEE/EMBS Conference on Neural Engineering (NER)*, IEEE, 2023, pp. 1–5.

AWARDS

Invited Presenter, IEEE Neural Engineering Conference

- Presented the first framework addressing the robustness issue of deep learning-based HD EMG pattern recognition.

First Prize of Sony's 2022 Spresense Challenge

- Awarded 1st Prize out of 500 international competitors
- Developed a real-time deep learning algorithm for EMG-based neural-controlled bionic arm.
- Responsible for CNN model compression in a team effort.

SKILLS

Python | Java | C/C++ | JavaScript

PyTorch | Tensorflow | Keras | Scikit-learn | OpenCV | FreeRTOS

Docker | Linux

EDUCATION

Master of Science in Electrical and Computer Engineering

San Francisco State University

Aug 2023 – Dec 2025

Bachelor of Science in Computer Science

San Francisco State University

Aug 2019 – Jun 2023