Experiences

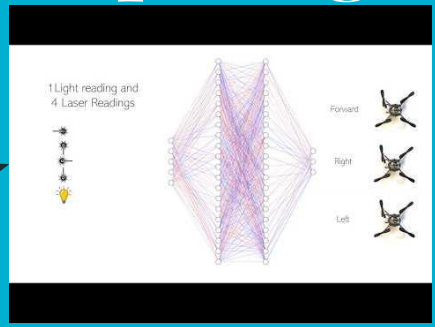
Sharad Chitlangia

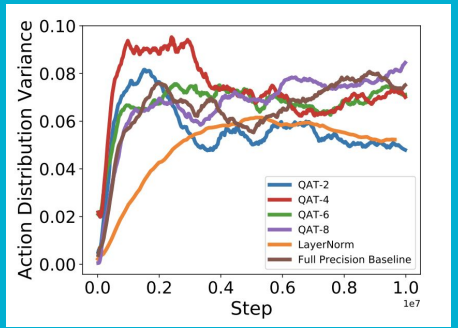
Email | Website

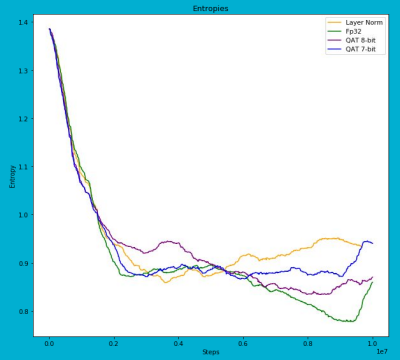
Research Intern @ Harvard Edge Computing Lab

1. Deep Reinforcement Learning for Embedded Devices like UAVs, etc.
2. Studied effects of techniques like Quantization on RL algorithms e.g. DQN, PPO2, DDPG, A2C.
3. Showed Quantization acts as a regularizer. Adding quantization loss to the loss metric enables higher exploration by creating higher entropy policies.
4. Showed policies can be quantized upto 6-8 bits of precision without loss of accuracy.
5. Showed with quantization, one can achieve as much as 18x speedup in the loop rate and 4x memory reduction
6. Ongoing remote work. For more results check, Research Pre-print: https://arxiv.org/abs/1910.01055.

Example use case produced during the internship



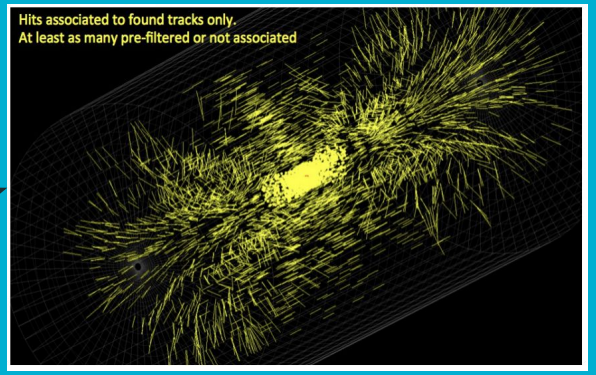




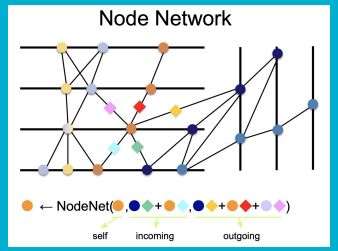
Higher action distribution variance and higher entropy policies. QAT denotes Quantization aware trained policies.

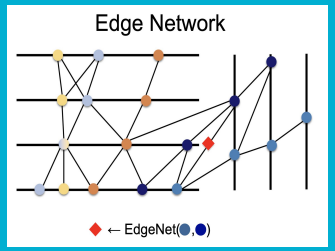
Google Summer of Code with CERN-HSF

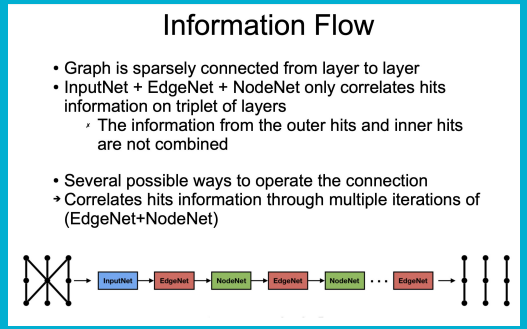
Problem statement



1. Particle Track Reconstruction using Machine Learning
2. Ported, studied and developed top reconstruction algorithms to ACTS-Framework.
3. Models used included Graph Neural Networks, NNs operating on top of DAGs, Logistic Regression.
4. Explored approaches to better techniques using optimization of Gradient Boosting Classifiers, Logistic Regression, etc
5. Developed end-to-end pipeline of deploying and testing pytorch models in ACTS.







GNN approach

Others

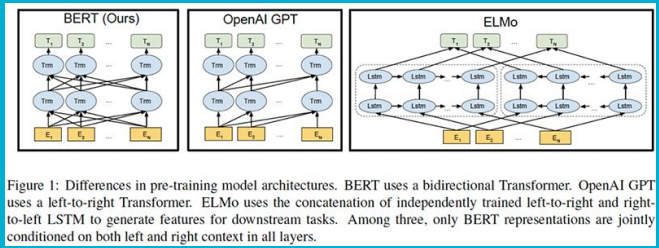


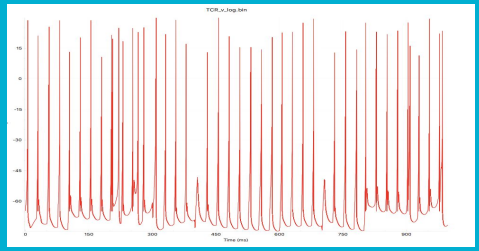
Figure 1: Differences in pre-training model architectures. BERT uses a bidirectional Transformer. OpenAI GPT uses a left-to-right Transformer. ELMo uses the concatenation of independently trained left-to-right and right-to-left LSTM to generate features for downstream tasks. Among three, only BERT representations are jointly conditioned on both left and right context in all layers.

ML Intern @ Unfound.ai (summer 2018)

Work with contextual embeddings, Information Retrieval, API microservices, Stance Detection in NLP

Pneumonia Detection with TCS Research: Implemented SOTA approaches and fine tuned for RSNA dataset (Fall 2018)

Remote unofficial setting with Prof. Ashwin Srinivasan



Formulating simple RL approaches for Neuromodulated STDP (Dopamine based learning) on Visual thalamus plus basal ganglion response learning using Spiking Neural Networks (Ongoing)

As DOP with Prof. Basabdatta Sen Bhattacharya

Miscellaneous

1. Leading group of exceptional undergraduate researchers - SAiDL
2. Intel AI Student Ambassador - Publishing blogs on latest research in AI.
3. Teaching course on Deep Learning. Course structure similar to CS231n
4. Teaching course on RL, this semester in part to implement the Rainbow RL algorithm under TIP.
5. Project Implementation of various SOTA papers on Github.
6. Checkout : https://sharad24.github.io/