

Machine Learning for X-ray Pulse Retrieval

Scientific Achievement

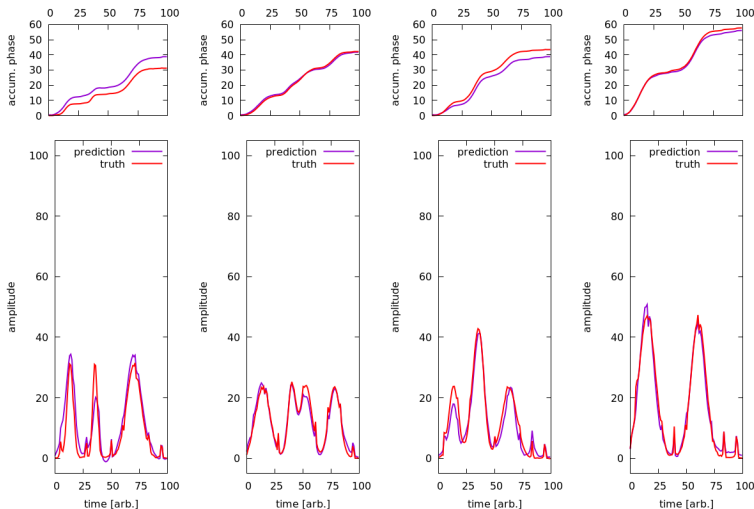
Machine Learning Inference Engine for reconstructing x-ray time-energy distribution.

Significance and Impact

FPGA-based inferencing will allow a pipelined data throughput for x-ray pulse reconstruction used in streaming data routing and veto decisions at LCLS-II(-HE)

Research Details

- Simulation based on measured waveforms in an under-sampling regime
- Demonstrates efficacy for a moderately deep convolutional neural network
- Next steps: shallower models, modularization with top layers compiled to the Xilinx Kintex KU115 FPGA in digitizer carrier card, Kernel Density Estimation for opposing versus 90 degree separated detectors.



Reconstructed pulses for a feed forward convolutional neural network with input simulations based on measured instrument response functions.

Work was performed at the LCLS with the help of PULSE and TID with close integration into L2SI data systems efforts.



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