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Hardware acceleration for fast Magnetic Resonance Fingerprinting map reconstruction: FPGA porting of a deep learning algorithm

Wednesday 12 June 2024 14:45 (20 minutes)

Magnetic Resonance Fingerprinting (MRF) is a fast quantitative MR Imaging technique able to obtain multi-parametric maps with a single acquisition, but data processing is limited by escalating memory and computation needs. Neural Networks (NNs) accelerate reconstruction, but training still requires significant resources. We propose an FPGA-based NN for real-time brain parameter reconstruction from MRF data. After a traditional software validation, the NN is reduced through Quantization Aware Training to meet the available resources of the FPGA hardware accelerator, creating a quantized model that uses lower precision without affecting the NN performance. Training the NN is estimated to take 1000 to 10000 seconds, representing a significant improvement over standard CPU-based training, which can be up to 36 times slower. This approach has the potential to enable real-time brain analysis on mobile devices, potentially revolutionizing clinical decision-making and telemedicine.

Talk's Q&A

During the talk

Talk duration

20'+10'

Will you be able to present in person?

Yes

Authors: RICCHI, Mattia (University of Pisa & INFN, Bologna (IT)); ALFONSI, Fabrizio (INFN, Bologna (IT)); MARELLA, Camilla (University of Bologna)

Co-authors: BARBIERI, Marco (Stanford University (USA)); RETICO, Alessandra (Università di Pisa & INFN (IT)); GABRIELLI, Alessandro (Università e INFN, Bologna (IT)); BRIZI, Leonardo (University of Bologna (IT)); TESTA, Claudia (University of Bologna & INFN (IT))

Presenters: RICCHI, Mattia (University of Pisa & INFN, Bologna (IT)); MARELLA, Camilla (University of Bologna)

Session Classification: Algorithm implementation

Track Classification: Algorithm implementation in HDL and HLS