HARDWARE EFFICIENT ARTIFICIAL NEURAL NETWORK DEMONSTRATOR

Info - Video

Technologies

- Artificial neural networks
- Embedded systems
- Performance analysis
- Python programming

Internship overview

- Bachelor/Master Student
- Graduation Assignment
- Electronics / Embedded Systems
- Location: Eindhoven

Assignment

Sioux wants to have a similar demonstrator for recognizing a hand sign language in real time.
During this project a PC may be used for the demo, but at some point in the future, we want to have a demo on a battery powered FPGA platform. Therefore, a training framework should be created for training an ANN, considering energy and resource efficiency on hardware. The goal of this project is to make a hardware efficient ANN training framework, and make a demonstrator with an event camera and an AI accelerator system which can show real time predictions and resource / energy estimations during inference.

Context

Both ANNs and edge computing devices have gained widespread popularity across various applications. However, traditional ANNs are often not resource and energy efficient on hardware, making them not suitable for edge devices. Other types of ANNs, such as spiking neural networks and binary neural networks are more energy and resource efficient on hardware and thus better suitable for edge devices such as FPGAs. Techniques such as pruning and quantization might improve efficiency even further. The development of a training framework for hardware efficient ANNs offers exciting prospects for future projects within Sioux.

Input	Neurons	Spikes	Output

Hand clap
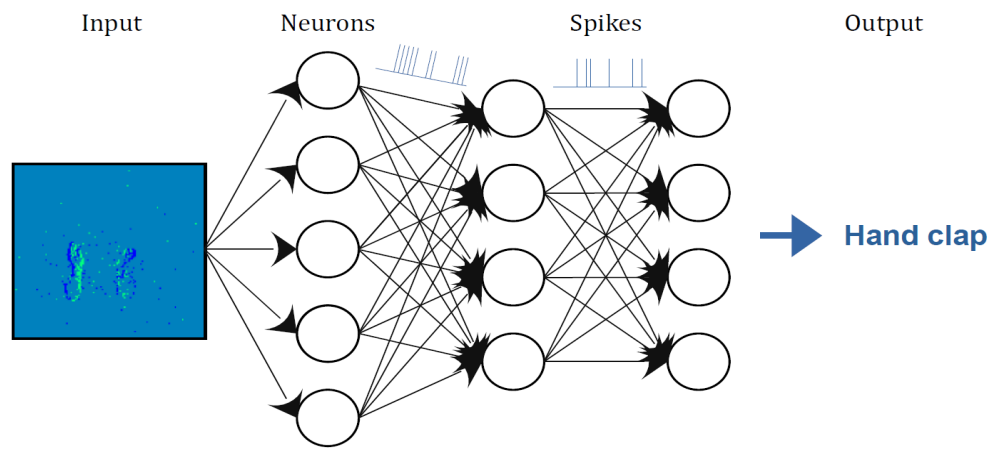
Activities

- Research different types of ANNs and determine which type is most suitable for the application and hardware efficiency
- Make a training framework for training this type of ANN
- Research different pruning and quantization methods
- Incorporate pruning and quantization in the training framework
- Prepare a demonstration which shows real-time predictions, and estimations of resource usage and energy consumption
- Train an ANN and demonstrate it

Why choose Sioux?

- Working on innovative technology
- Challenging, dynamic and varied work
- A comfortable and personal work environment
- Plenty of opportunities for personal development
- Great carreer opportunities
- Contributing to a safe, healthy and sustainable society

Get in touch!
Would you like to know more about this student assignment?

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