SOLUTION BRIEF

Zebra™ by Mipsology: Accelerating Neural Network Inference

INTRODUCTION

FPGAs: Ideally suited for Inference Acceleration

FPGAs are full of basic computing elements and filled with memories, ideally suitable for high performance and low latency CNN inference computing. They are reprogrammable at the hardware level allowing for continual adaptation. But FPGA programming can be challenging.

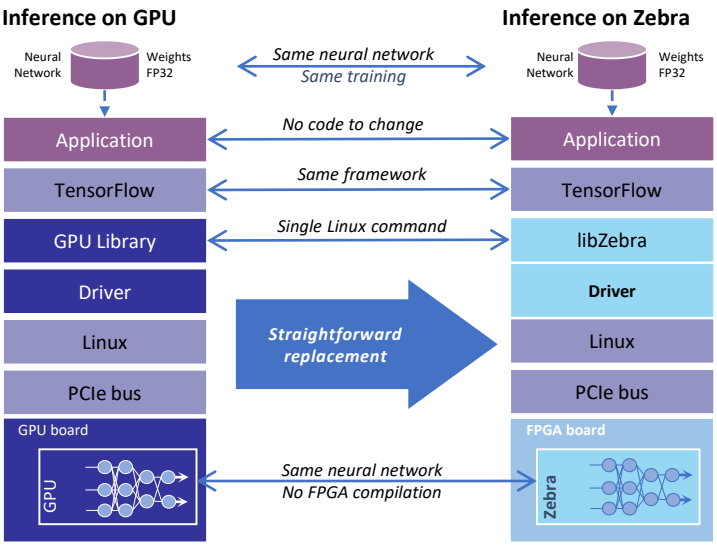
SOLUTION OVERVIEW

Zebra Software Accelerates Inference.

Zebra is the ideal compute engine to accelerate CNN inference. Zebra seamlessly replaces CPUs/GPUs to compute any neural network on an FPGA faster, with lower power consumption, and at lower cost.

Simply type a single Linux command. No knowledge of FPGA technology, compilation, or any changes to the environment or the application are required.

Zebra lets AI engineers focus on application development, while enjoying unmatched performance.



- Delivers high performance from edge to cloud
- Supports most popular deep learning frameworks and broad range of CNN inference
- Easy to use – a single Linux command replaces costly CPU or GPU inference nodes

---

- Zero Neural Networks Change
- Zero New Training
- Zero Line of Code to Add
- Zero FPGA Knowledge
- Zero FPGA Compilation
- Zero Transition Effort

… In Short, ZERO Effort

Adaptable. Intelligent.

KEY BENEFITS

The Fastest Inference
- Computes neural networks highest speed with lowest latency

Supports All Neural Networks
- Accelerates any CNN, including user-defined neural networks

Extremely Simple to Use
- Deploying Zebra is a “Plug & Play” process

No Changes to the Software Environment
- Not a single line of code must be changed in the application

Scalable, Flexible and Adaptable
- Easy replacement of GPUs or complement CPUs

SOLUTION DETAILS

Neural Networks
- Supports CNN without modification
- Delivered with tested networks: GoogLeNet V1, Inception V3, Inception V4, VGG16, VGG19, ResNet50, ResNet152, YoloV1, YoloV2, YoloV3, Tiny YoloV2, Tiny YoloV3, VDSR, SSD, MobileNet…
- Accelerated layers: convolution, fully connected, max/average pooling, concat, batch norm, scale, add eltwise, reorg, up sampling, depth to space, reduce mean, dilated convolution, squeeze, separable depth wise, clip to value, relu, leaky relu, relu6, sigmoid…
- Automatic split of graph
- Up to 3.2 billion weights
- Up to 1 million layers
- Unbounded number of convolutions
- Single or multiple outputs
- Up to 1360x1360x3 input images
- Up to 24 simultaneous independent users

Supported Frameworks
- TensorFlow, PyTorch, ONNX, Caffe, MXNet
- No change to source code required

Precision
- 8-bit
- Automatic proprietary quantization

Migration from GPU or CPU
- Trained parameters from GPU/CPU training without changes
- No proprietary training or re-training needed, and no pruning required
- Usable immediately
- Similar accuracy as FP32

Power & Cooling
- From few watts in the field to 140W in data centers

RESULTS

Zebra’s quantization ensures results stay accurate and does not require retraining the NN.

Performance and Accuracy on Alveo Portfolio						
	Large Batch			Batch = 1		
Neural Network	Xilinx Alveo U250	Xilinx Alveo U200	Xilinx U50	Xilinx Alveo U250	Xilinx Alveo U200	Xilinx Alveo U50
InceptionV3	1,352	1,025	**665**	1,247	877	**604**
ResNet50	2,828	2,130	**1,472**	2,087	1,427	**1,104**
YoloV2	433	325	**240**	409	307	**212**
TinyYoloV2	1,813	1,360	**866**	1,711	1,282	**763**

TAKE THE NEXT STEP

Learn more about Xilinx Alveo accelerator cards, Learn more about Mipsology www.mipsology.com
Reach out to Mipsology sales zebra@mipsology.com

XILINX