BLACKLYNX

Image and Video Edge Analytics Acceleration

Xilinx FPGAs and BlackLynx technology combine to maximize the potential of image and video analysis at the edge of the network

- **Maximizes performance of FPGA technology versus doing image/video machine learning**
- **Uses GPU or CPU trained Convolutional Neural Networks on FPGAs for inference analysis**
- **Achieves reliable, accurate results with smaller, low-power solution**

INTRODUCTION

Data Centers
Over the last several years, machine learning applications for both object detection and image classification have exploded in use, largely through leveraging massively multi-core GPUs.

A significant amount of capital investment has been made by both the commercial community and government agencies to advance the state-of-the-art in image and video machine learning, largely leveraging best-of-breed CNN technology with many layers.

The Challenges with the Status Quo
To date, in most deployed environments, image and video machine learning solutions make use of large GPU farms in datacenter environments not only for training but also for inference applications. The power, cooling, and space requirements needed for GPU farms is not practical at the edge of many networks. A more practical answer is needed.

Key Benefits of BlackLynx Technology

The Power of Heterogenous Computing Solutions
BlackLynx is a leader in providing heterogenous computing solutions and because there are distinct operational advantages of optimally implementing advanced heterogenous solutions. The diagram below illustrates the combined benefits of including multiple high-performance computing capabilities (GPU and FPGA) in an architecture.
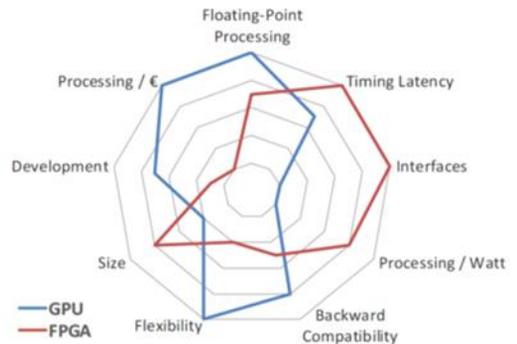

Source: Berten DSP 2016

SOLUTION OVERVIEW

BlackLynx does not deploy the output models obtained from training on the same class of CPU and GPU devices that created the models in the first place. Instead, the models are deployed on more edge-appropriate devices such as FPGAs, which are managed by appropriate CPU resources. This means that the BlackLynx-enabled edge platform that runs the machine learning inference algorithms can be much smaller, consume up to ten times less power, yet achieve reliable, accurate results up to an order of magnitude faster given the advantages of FPGA for the inference pieces of the machine learning problem space.

FPGAs size, flexibility, and processing/watt makes it the best solution for deployment at the edge. BlackLynx software detects the available compute and storage configuration and automatically leverages the accessible computing to most efficiently accomplish the task.

Easy to use
It is important to recognize that BlackLynx users are not required to understand FPGA processing. The models resulting from training deploy in truly seamless fashion to the FPGA fabric with tools that BlackLynx provides, and

the output results are simple answers which can be readily ingested in practically any downstream data analysis or application framework using common output data formatting technologies including CSV and JSON. To achieve this level of seamless integration into the machine learning frameworks and pipelines available today, BlackLynx has closely partnered with Xilinx Corporation, the world's leading FPGA vendor.

Bring Your Own Model
New models are being created daily to address customers' specific use cases and objects that they wish to detect. Although most models start as an open source model, the reality is the model quickly is trained for specific use case or mission-specific characteristics. An example of object detection machine learning is shown in the picture to the right, discovering the person and airplane objects.   GPUs excel at training for models. BlackLynx deploys the GPU output models obtained from training on more edge-appropriate devices such as FPGAs, which are managed by appropriate CPU resources.
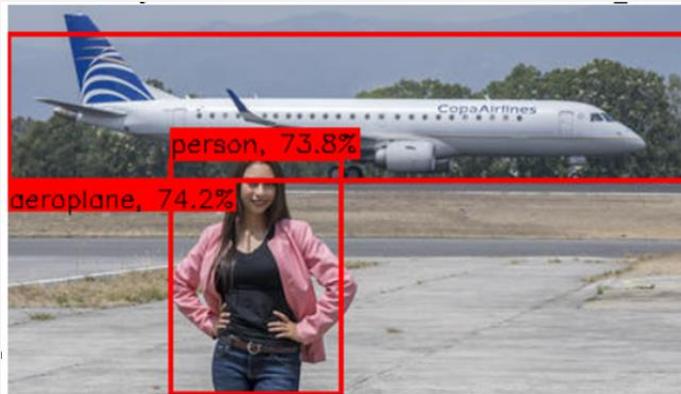
BlackLynx estimates that the functionality that now requires a very large, deployed data farm, including power and cooling, can be packaged in a much smaller footprint with up to 10 times less power.

CONCLUSION

Existing image and video object detection and image classification frameworks targeted for edge deployments often leverage combinations of CPU and GPU technology, which enables users to leverage a variety of popular machine learning algorithms. BlackLynx technology enables leveraging of existing open-source machine learning frameworks by allowing for machine learning model exports from pre-trained models (and/or newly-trained models). This provides seamless deployment to FPGA-accelerated fabric using BlackLynx-enabled acceleration specifically for inference-specific applications in edge environments. These powerful use-case focused solutions allow for significantly smaller implementation form factors, lower power requirements, higher image processing and video frame throughput, and seamless integration into existing higher-layer application stacks and existing machine learning artifacts, including existing and newly trained models.
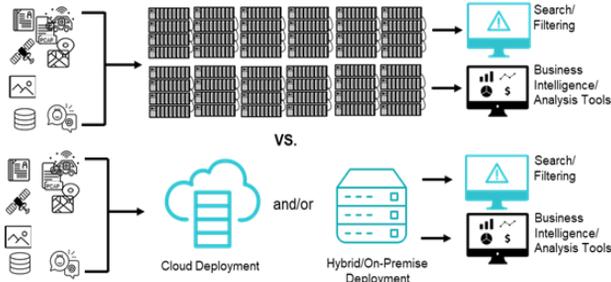
Infrastructure Reduction Benefit
The practical implementation of these features results in huge operational advantages for the users.

TAKE THE NEXT STEP

Please visit www.blacklynx.tech and www.xilinx.com/alveo for complete details and to place an order today.

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