TECHNISCHE UNIVERSITÄT WIEN

Institut für Computertechnik
Institute of Computer Technology

Thesis: Exploring FPGA and eGPU for Disaster-Scene Analysis

This master thesis project aims to investigate the use of FPGA and Vitis-AI for accelerating semantic segmentation neural networks in the context of disaster-scene analysis. We will participate in the 2023 Low Power Computer Vision Challenge (LPCVC), developing models for semantic segmentation on the NVIDIA Jetson Nano platform and comparing them to the FPGA performance on Xilinx FPGAs. Therefore, we evaluate the impact of adaptive networks and quantization techniques on accuracy, latency, and power consumption. Our study will provide valuable insights into the trade-offs involved in using FPGAs for semantic segmentation in disaster-scene analysis and help to identify the best approaches for different applications:

- How does the performance of semantic segmentation neural networks on FPGA with Vitis-AI compare to a baseline system using the Jetson Nano platform?
- How do adaptive networks and quantization techniques impact the performance of these neural networks in the context of disaster-scene analysis?

To address the research questions, we will follow the following steps:

- Participate in the 2023 LPCVC, developing models for semantic segmentation on the NVIDIA Jetson Nano platform and submitting them for evaluation.
- Use the Vitis-AI library to implement the developed solution on Xilinx a FPGA and compare the standard performance metrics to the baseline system.
- Investigate the impact of adaptive networks and quantization techniques on the performance of the neural networks.

(a) Input (b) Prediction

Figure 1: An example image for the disaster-scene analysis task. (https://lpcv.ai/2023LPCVC/program)

For details, please consult:

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