EE/CprE/SE 492 BI-WEEKLY REPORT 1

Video Pipeline for Machine Computer Vision

12/15/24 – 1/28/25
Group number: sdmay25-01
Advisors: Dr. Zambreno and Dr. Jones
Client: JR Spidell

Team Members:

Lindsey Wessel — ML Face & Eye Detection

James Minardi — Hardware

Eli Ripperda — Embedded Systems

Mason Inman — Semantic Segmentation Optimization

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Weekly Summary:

The team accomplished a few goals over winter break. Since coming back the team has met with their client, and each other in order to get back into the semester groove. The team has set goals for the semester, and has planned out weekly team and client meetings, and a professor meeting is to be decided.

Past Week Accomplishments

- ❖ Lindsey's Accomplishments
  - ➢ Narrowed selection down to two potential algorithms. Researched and began experimenting with algorithm arguments & parameters, to improve quality and reliability of the algorithm. Started testing and recording how far away the user can be from the camera and still get accurate results.
- ❖ James' Accomplishments
  - ➢ Read IMX219 to display port example project for Ultra96 PL (non pynq) and relevant datasheets
- ❖ Eli's Accomplishments
  - ➢ Generated RTL files for Ultra96v2.tarch
  - ➢ Received hardware "handoff" from VPIPE team
  - ➢ Stepped through how to get to JuPYter notebooks on FPGA (With Deniz from VPIPE team) and took notes on this.
  - ➢ Learned how to connect FPGA to the desktop computer in the lab
- ❖ Mason's Accomplishments
  - ➢ Completed a demo Post-Training-Quantization Depth Wise Separable Convolutions Model (PTW-DSC).
  - ➢ First iteration of Quantization Aware Training (QAT) and making the model prepared for QAT.
- ❖ Team Accomplishments
  - ➢ The team enjoyed winter break, and is ready to start a new semester!

Pending Issues

- ❖ Lindsey's Issues
  - ➢ Need a reliable way to test the accuracy of the algorithm at varying distances. Want to know how well the algorithm work on the PGA board.
- ❖ James' Issues
  - ➢
- ❖ Eli's Issues
  - ➢ There are a lot of steps to getting the correct environment and compiling an .onnx file. Is there an easier way?
- ❖ Mason's Issues

- ➢ Running into Pytorch error where QAT is not supported for the pointwise convulsions since groups equals input size rather than the supported number of exactly 1.
        - ➢ QAT diverges after several seemingly stable epochs.
    - ❖ Team Issues
        - ➢ None currently, simply starting back up for the semester.

Individual Contributions

Name	Cumulative Hours	Hours Worked Since Dec 15th
Lindsey	129	15
James	100	5
Eli	100	5
Mason	140	24
Team	469	49

Forward Plan
- ❖ Lindsey's Plan
    - ➢ Continue experimenting on algorithm parameters to increase reliability and speed. Test and record an ideal interval for the distance from the camera to the user.
- ❖ James' Plan
    - ➢ Run and test previous team's demo and configuration programs.
    - ➢ Work with Eli to complete example Tensil project and ramp up on Vivado.
- ❖ Eli's Plan
    - ➢ Compile .onnx file that Mason has generated
    - ➢ Set up Xlinix Vivado on personal computer OR use it on a lab computer
    - ➢ Begin learning how to Synthesize for Ultra96
    - ➢ Document Hardware Received from VPIPE team.
- ❖ Mason's Plan
    - ➢ Work to resolve current issues with QAT, to ultimately get a non-diverging QAT script working.
    - ➢ Further plan, deliver a ONNX file that was created with QAT
- ❖ Team Plan
    - ➢ Set up new meeting times for the semester.

Advisor Meeting Notes
Advisors have been contacted to schedule a meeting time with the second-semester availability, but no meeting has been scheduled as of the time of this writing.

Client Meeting Notes - 1/19/2025

After about a month from our previous meeting, the team met up with the client again before the second semester began. The team shared in some comradery sharing their break experiences and gave status updates on their portions of the project. The client shared that there may not be another team after us, which is to everyone's surprise, as we have planned around having a successful handoff to another team. Besides that we confirmed everyone's schedules for the upcoming semester and got a new meeting time scheduled.