

EE/CprE/SE 491 WEEKLY REPORT 08

Video Pipeline for Machine Computer Vision

11/1/24 - 11/7/24
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:

This week, the team worked to get closer to accomplishing their semester goal of creating a prototype system. James worked on getting the board set up and running a “hello world” C program on it. Eli continued learning about Tensil.ai, its related technologies, and how they work together. Mason created and shared a simple algorithm output file with the hardware team (James and Eli) so that they can iteratively ensure their system is compatible as they begin development. Mason also continued research on neural network strategies. Lindsey continued researching and comparing eye location algorithms. The team also coordinated with advisors to complete the NDA, increasing the team's knowledge and resources for the following weeks.

Past Week Accomplishments

- ❖ Lindsey's Accomplishments
 - Continued research on eye detection algorithms
 - Gathered more pros and cons of each algorithm
 - Found code and research papers to calculate the computational expense of each algorithm for comparison
 - Created a notes slide to show team an overview of each algorithm and its relative importance
- ❖ James' Accomplishments
 - Created for development practices on the board like compiling and running code
 - Experimenting with using ctypes for creating python bindings for the code the previous team has
- ❖ Eli's Accomplishments
 - Successfully opened a shell inside the Tensil container, which is necessary to be able to compile ML models. Note that this is something I struggled with for a couple of weeks.
- ❖ Mason's Accomplishments
 - Setup WSL Connection to run Vitis-AI Framework.
 - Setup Vitis-AI Docker
 - Created .pkl to .onnx script, enabling compatibility with Tensil
- ❖ Team Accomplishments
 - Continued to work well as a team, communicate status and blockers.

Pending Issues

- ❖ Lindsey's Issues

- Difficulties measuring the level of computation expense with certain algorithms.
- ❖ James' Issues
 - No issues
- ❖ Eli's Issues
 - None as of now.
- ❖ Mason's Issues
 - More time needed to gain understanding through research. Due to exams and the blockers from previous weeks, less time has been spent on research than anticipated.
- ❖ Team Issues
 - No issues.

Individual Contributions

Name	Cumulative Hours	Week of Report 8
Lindsey	90	12
James	76	8
Eli	76	8
Mason	96	8
Team	338	36

Forward Plan

- ❖ Lindsey's Plan
 - Continue comparing algorithms to each other to find the most relevant algorithm for our project. Finish up slide show to "present" my findings to the team.
- ❖ James' Plan
 - Finish slide deck and present to the team
 - Build information on creating python bindings for C code that's been compiled for the board
- ❖ Eli's Plan
 - Compile an ML model.
 - Analyze verilog code
 - Analyze other outputs from compiling ML model
- ❖ Mason's Plan
 - Begin work on implementing Vitis-AI tooling to prune the model.
- ❖ Team Plan

- Begin making design decisions and implementation
- NDA

Advisor Meeting Notes

No advisor meeting was held this week. James contacted Dr. Jones and got the NDA finalized and sent to the client asynchronously.

Client Meeting Notes - 11/3

In our client meeting, we discussed specific technical steps and requirements for the project. The client emphasized the importance of compatibility across the software layers and gave us a few deliverables to focus on. He'd like to see a simple demo of the board being set up with a basic "hello world" execution, with the goal being to initialize the video pipeline that the previous team worked on. The client also gave some insight into the computational cost of our algorithms and what perspective to tackle them from.