

# EE/CprE/SE 491 WEEKLY REPORT 09

## Video Pipeline for Machine Computer Vision

11/8/24 - 11/14/24  
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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### Table of Contents:

- Team Members:..... 1
- Table of Contents:..... 1
- Weekly Summary:..... 2
- Past Week Accomplishments..... 2
- Pending Issues..... 4
- Individual Contributions..... 5
- Forward Plan..... 5
- Advisor Meeting Notes..... 6
- Client Meeting Notes - 11/10..... 6

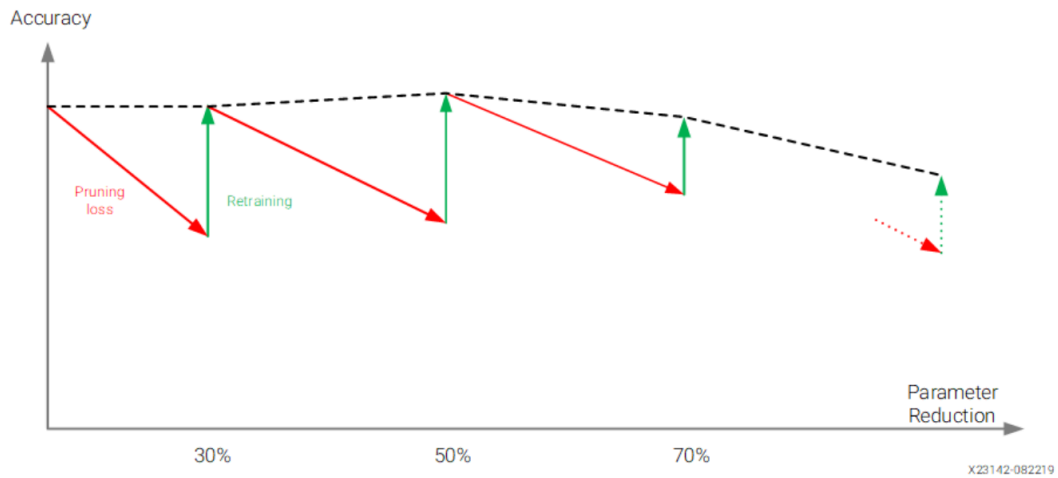
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## Weekly Summary:

This week the team continued our progress. We showcased YOLO and HAAR eye detection algorithms, opened Tensil's shell for compiling models, created scripts to calculate FLOPS, and demo webcam applications within the PYNQ environment. The team is continuing to look at optimizations for models and algorithms this week. We also finalized the NDA, allowing our team to look at the code of previous teams.

## Past Week Accomplishments

- ❖ Lindsey's Accomplishments
  - Continued research on eye detection algorithms
    - Gathered more pros and cons of each algorithm
    - Developed environment Tested Haar Cascades algorithm
    - Started Development environment for YOLO, and EigenEye
  - Created a notes slide to show team an overview of each algorithm's functionality and its importance
- ❖ James' Accomplishments
  - Run demo webcam application in PYNQ environment
- ❖ Eli's Accomplishments
  - Eli compiled an .onyx model with an Ultra96v2 .tarch file.
- ❖ Mason's Accomplishments
  - Created script to compute the number of floating point operations (FLOPS) each convolutional layer. Note that the non-convolutional layers noted in the legend have a relatively tiny number of FLOPS compared to the Conv2d layers, and that they essentially do not appear in the graph.
    - The diagram is protected under NDA, thus not included in the document.
  - Created a script which discovered that the current open-source model uses torch.float32 type parameters. This identifies a key optimization that will need to be made: switching to torch.uint8 parameters for integer operations.
  - Further researched pruning techniques, specifically with the Vitis-AI documentation.
  - Gained a better understanding of the pruning development process, depicted below.



❖ Team Accomplishments

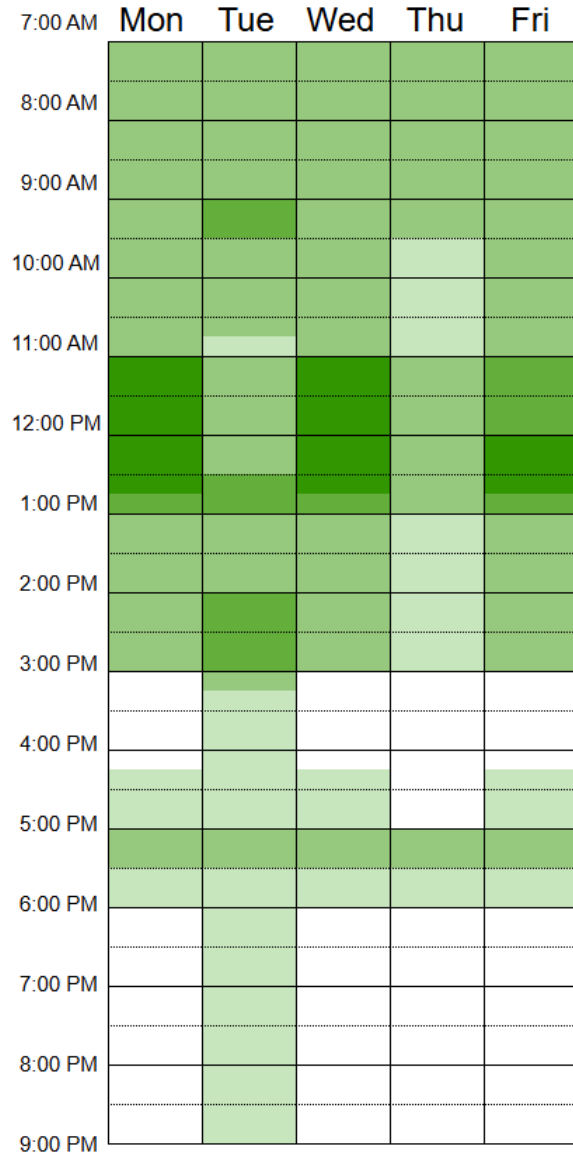
- Continued to work well as a team, communicate status and blockers.
- Got NDA fully signed and sent in

➤ Coordinated future availability of team members

### Group's Availability

0/4 Available  4/4 Available

Mouseover the Calendar to See Who Is Available



#### Pending Issues

❖ Lindsey's Issues

- Difficulties measuring the level of computation expense with certain algorithms.

- Lack of time
- Potential change of expectations
- ❖ James' Issues
  - No issues
- ❖ Eli's Issues
  - Understand where the Tensil shell is relative to my file directory – How do I get the files that the compilation generated?
- ❖ Mason's Issues
  - Vitis-AI Environment setup dependency issues with RITnet.
- ❖ Team Issues
  - No issues.

### Individual Contributions

Name	Cumulative Hours	Week Hours
Lindsey	102	12
James	84	8
Eli	84	8
Mason	108	12
Team	378	40

### Forward Plan

- ❖ Lindsey's Plan
  - Continue comparing algorithms to each other to find the most relevant algorithm for our project.
  - Finish up slide show & “present” my findings to the team.
  - Try to fix the 2021 teams code & compare it
  - Set up Development Environments for each algorithm
- ❖ James' Plan
  - Work with existing team to look into go over their camera sensor code
  - Demonstrate board setup to the team and client
- ❖ Eli's Plan
  - Figure out how to retrieve generated files from compiling the ML model.
  - Compile Mason's ML model.
  - Analyze verilog code
  - Analyze other outputs from compiling ML model
- ❖ Mason's Plan
  - Continue work on implementing Vitis-AI tooling to prune the model.

❖ Team Plan

- Begin making design decisions and implementation

[Advisor Meeting Notes](#)

No advisor meeting was held this week.

[Client Meeting Notes - 11/10](#)

Each member of the team, excluding James (absent with reason), presented progress made this week, goals for next week, current challenges, and their favorite coding languages. Set end of semester goals; everyone has set up a working development environment, the board works as an exact replica of the previous teams board, the team has a viable design approach.