

EE/CprE/SE 491 WEEKLY REPORT 05

Video Pipeline for Machine Computer Vision

10/10/24 - 10/17/24
Group number: sdmay25-01
Advisors: Dr. Jones and Dr. Zambreno
Client: JR Spidell

Team Members:

- Lindsey Wessel** – *ML Face & Eye Detection*
- James Minardi** – *Hardware*
- Eli Ripperda** – *Embedded Systems*
- Mason Inman** – *Semantic Segmentation Optimization*

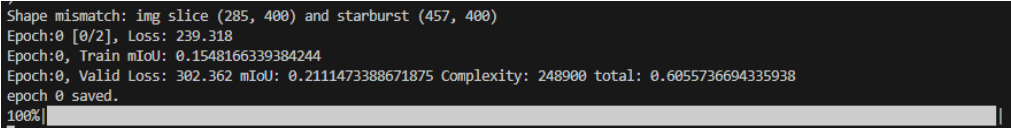
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Weekly Summary:

The team made progress on several tasks. Lindsey continued exploring advanced face and eye detection methods. James worked on remote board access and troubleshooting JTAG. Eli prepared a Tensil.ai presentation and coordinated with the V-PIPE team. Mason focused on CUDA setup, DenseNet layer analysis, and Vitis AI exploration. A new stretch goal to use a MIPI camera was discussed, aiming to potentially improve efficiency.

Past Week Accomplishments

- ❖ Lindsey's Accomplishments
 - Continued research on Detecting Faces
 - CAMShift Continuously Adaptive Mean Shift Algorithm
 - Continued research on Eye Locating
 - Template Matching
 - Adaptive EigenEye Method
 - Started comparing algorithms based off relevant capabilities
- ❖ James' Accomplishments
 - Grab the camera using jupyter notebook and output it onto display.
 - Have a few hiccups with the JTAG environment, but I'm getting close to setting it up to connect remotely.
- ❖ Eli's Accomplishments
 - Researched Tensil, and began developing a presentation on it.
- ❖ Mason's Accomplishments
 - Setup and run a training session, set up without cuda enabled.
 - Began work on setting up a cuda (gpu) enabled training environment
 - Began work on identifying, and further understanding, each layer of the densenet model. More specifically, why are there some layers with double the amount of parameters, but same image and kernel size.
 - Looked into Vitis AI framework as a way to work with PyTorch in extracting layer information.
- ❖ Team Accomplishments
 - Worked as a team and with the client to build a high-level system diagram.

Pending Issues

- ❖ Lindsey's Issues

- Lack of available time to dedicate to the project
- Finding relevant detection algorithms to make comparisons between
- ❖ James' Issues
 - No issues
- ❖ Eli's Issues
 - See team issues.
- ❖ Mason's Issues
 - Due to not having an NDA yet, I am still working on open-source code and not the code that is planned to be handed off to our group.
- ❖ Team Issues
 - Waiting on NDA from the client.

Individual Contributions

Name	Cumulative Hours	Week 4
Lindsey	70	8
James	60	8
Eli	60	8
Mason	68	8
Team	258	32

Forward Plan

- ❖ Lindsey's Plan
 - Research other forms of Face & Eye Tracking algorithms
- ❖ James' Plan
 - Finish up being able to remote access board and transfer files
- ❖ Eli's Plan
 - Research Tensil.ai (our FPGA image generator), finish a presentation on it, and present it to the team and client.
 - Meet with V-PIPE to understand their recent breakthrough
- ❖ Mason's Plan
 - Look into Vitis AI framework for extracting more data from each layer to use in addition to Torchsummary.
 - Learn and understand the Dropout and LeakyReLU layers in the Densenet model
 - Setup GPU enabled training environment
- ❖ Team Plan

- Meet with V-PIPE team to discuss their current implementation and take notes on any tips they have for our team.

Advisor Meeting Notes

Informed advisors of MIPI camera stretch goal. Dr. Zambreno discussed doubts about the performance increase, along with the complexity increase, with the MIPI camera. He advised us to focus on testing with video and image files before considering one over the other.

Additionally, the team discussed the overarching project statement. Discussed the importance of an “elevator pitch” of the project and how it will create better resulting presentations.

Client Meeting Notes - 10/13

The client had discussed a “breakthrough” to our team and had expressed interest in implementing this additional requirement into our project. This ultimately would result in scope creep, so it is now a stretch goal for our group. This new stretch goal is to use a MIPI camera instead of a USB camera in our system, which would send just the ROI image, rather than the full image to do processing on, which would significantly decrease the data throughput and increase efficiency in the system.