

# EE/CprE/SE 491 WEEKLY REPORT 01

## Video Pipeline for Machine Computer Vision

08/22/24 - 19/19/24  
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:

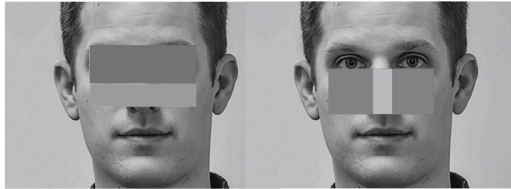
Our objective this week was to better define our project scope between the advisors and the client. Now that we received the hardware, each team member can focus on their specific research area. However, we are still waiting on NDAs to begin looking into the previous group's work that will serve as a baseline for our project.

Summary Here.... Paragraph in length... What was the overall objective for the week? In general, what tasks were completed? Were there any changes made to the project?

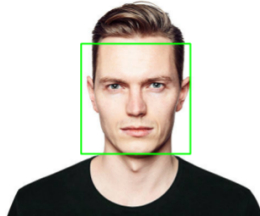
## Past Week Accomplishments

### ❖ Lindsey's Accomplishments

- Got the development environment setup working and tested!
  - Started research slides on [Traditional Face Detection](#)



Research: Haar-like features, how we detect facial features



Action Item: output for the face detection algorithm

### ❖ James' Accomplishments

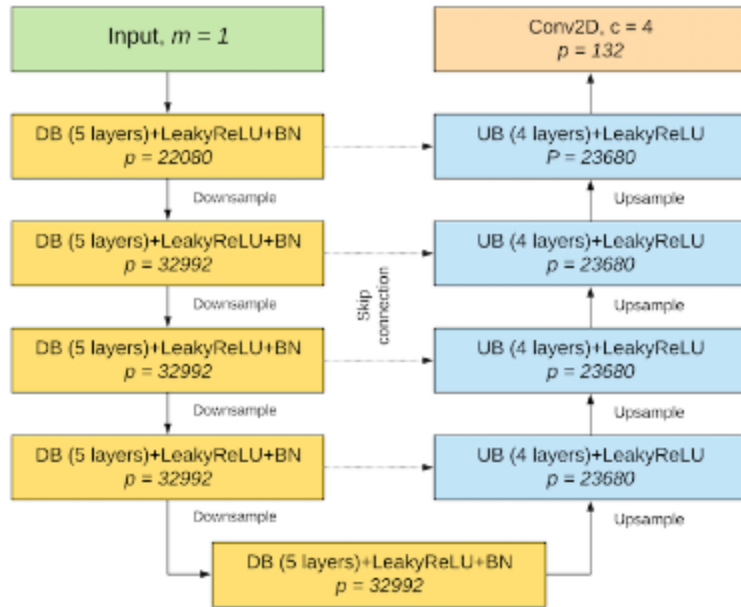
- Gain basic understanding of Tensil

### ❖ Eli's Accomplishments

- Determined project focus.
- Received Ultra-96 board.
- "Team Leader" for the week.

### ❖ Mason's Accomplishments

- Performed secondary research into RITnet, an award winning semantic segmentation algorithm (<https://github.com/AayushKrChaudhary/RITnet>)



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- The UNET architecture displayed above shows the encoding convolutions (yellow), followed by the decoding convolutions (blue), as well as the skip convolutions to tie in important aspects from each layer. This model trained around [NDA] epochs has approximately [NDA]% accuracy. Possible optimizations include making the output 2-channel ( $c=2$  for the box in orange) as well as deeper research to see if each layer is needed for our application.

➤ Continued research into Convolutional Neural Networks (CNNs) and the base principles of how they work. Working on a knowledge sharing slide show

#### ❖ Team Accomplishments

➤ Advisors, Client, and all team members were able to meet all at once to discuss project requirements without communication barriers.

#### Pending Issues

##### ❖ Lindsey's Issues

➤ Finding time in the week to sit down and work on the project. Working in small segments is causing learning/development delays.

##### ❖ James' Issues

➤ N/A

##### ❖ Eli's Issues

➤ See team issues.

##### ❖ Mason's Issues

- Setting up a development environment is taking some additional time. There are many dependency issues when using the environment.yml file.
- ❖ Team Issues
  - Waiting on NDA from client.

### Individual Contributions

Name	Cumulative Hours	Week 3
Lindsey	40	16
James	32	8
Eli	32	8
Mason	32	8
Team	136	40

### Forward Plan

- ❖ Lindsey's Plan
  - Start making a prototype to detect faces
  - Continue research by learning about [Eye Tracking](#)
  - Start making a prototype to detect eyes
- ❖ James' Plan
  - Look over CPRE 488 MP-2 lab.
  - Experiment on Ultra96 board
- ❖ Eli's Plan
  - Overview "AI High-Performance Solution on FPGA".
  - Begin researching Tensil.ai
  - Obtain a better understanding of the system as a whole.
- ❖ Mason's Plan
  - Pull the RITnet Github and run it locally. Getting some initial hands-on experience will help me learn tremendously.
  - Make a small presentation to share with the team and client to share knowledge and findings.
- ❖ Team Plan
  - Continue research in individual areas. Consolidate information for future meetings and begin breaking down the design.

### Advisor Meeting Notes

Dr. Jones, Dr. Zambreno, the client, and all team members held a meeting to discuss what the scope of our project is. Additionally, concerns of the lack of design were addressed and

handled. The outcome of this meeting was everyone having a better understanding of the project as a whole, by removing the “middleman” communication we (the team members) were doing.

### Client Meeting Notes

We had a meeting with our whole team this past Friday – all four engineers, both advisors, and our client. The purpose was to refine our project requirements. We did so. Our focus is now to buy-and-large optimize an existing system completed by the previous team.

Additionally, our team met with our client this past Sunday. We collaborated on our collective next steps, action items, and the high level schematic of the system we will be working with. This provided a great opportunity to refine the contributions that each team member will make and gave each engineer a better understanding of how their part fits into the whole.