

CprE/SE 491 Weekly Report 20

Dates: 10/12/2017 - 10/18/2017

Dec1709 - ALVINN

Autonomous Vehicle Mission Processor with Machine Learning

Team Leaders:	Bijan Choobineh Darren Davis	Advisors:	Dr. Jones & Dr. Zambreno
Communicator:	Tracy La Van	Client:	Josh Bertram - Rockwell Collins
Key Concept Holders:	Jesse Luedtke David Schott	Email:	dec1709@iastate.edu alvinn@iastate.edu
Webmaster:	Robert Stemig		

Weekly Summary:

This week was another week spent debugging errors trying to get video streaming on the board. Our DetectNet can now tell us confidence intervals for the aircraft that it detects. Caffe has been installed both on the TX1 and in the HPC - along with gathering some statistics for how fast the HPC is compared to personal devices. Hw0 and the BiWeekly Report 2 have been completed for class and the team has started working on Hw1.

Past Week Accomplishments:

- **As a Group:** Worked BiWeekly Report 2 for class.
- **Darren and Jesse:** Worked on resolving errors with feeding video stream into DetectNet.
- **Bijan Choobineh:** I worked with DetectNet in testing with the FlightGear data to see how well the current network would be able to detect images. I updated the DetectNet code such that it will also tell us the confidence intervals of each detected aircraft which it finds. The confidence intervals are generated through a moving window average which use ImageNet calls.
- **Darren Davis:** I wrote all of Hw0 for class. I continued trying to resolve issues with feeding a video stream into the DetectNet network. I Separated out just the OpenCV video capture code to see if there was an issue with OpenCV processing the GStreamer feed. Although, I still saw some of the errors we are getting in the lab, this test worked with both Python and C++ code. I also looked into different ways to stream including GStreamer's playbin and a UDP client and server. I installed the YoLo network on the board and it works with a video stream but had issues with it freezing while processing.
- **Tracy La Van:** This past week I mainly focused on the required work for the classroom portion of 492 with a bit of neural network exploration. I edited and proofread Hw0 after Darren was finished writing it. I attempted to get in contact with our client again to see when we could meet next.

- **Jesse Luedtke:** I worked on getting a Caffe model loaded in Python using the software installed on the board. I also worked on using GStreamer's API in C++ to receive a video stream, extract the latest image, and convert the image to the format used by our neural network.
- **David Schott:** I worked on completing the Caffe installation on both the embedded board and the HPC cluster. I tested training of the Caffe model on the HPC cluster and deployed it onto the board. Then I tried feeding it some images of varying resolutions. In doing so, I fixed previous issues with GPU enablement causing the program to crash during classification tasks.
- **Robert Stemig:** I was out of town this past weekend was unable to get a majority of work done. Continued with OpenGL pipeline endeavours with GStreamer on the TX1 as well on personal device. Did the final proofreading for Hw0.

Pending Issues:

- **As a Group:** Possible memory issue on the board causing errors (Darren and David have run across these). There are persistent issues with getting video streaming with DetectNet.

Plan for Coming Week:

- **As a Group:** The team will be working on getting Hw1 read for submission.
- **Bijan Choobineh:** Will be testing with different resolutions and sizes of images in the system to see how they affect the speed and accuracy of detection in order to find an optimal setup.
- **Darren Davis:** Resolving video stream issues with DetectNet or trying to get a different network up and running with a video stream.
- **Tracy La Van:** Will work on more neural network and training information.
- **Jesse Luedtke:** Getting GStreamer to work in C++ for our application and being able to load a Caffe model in Python while using the GPU.
- **David Schott:** I want to experiment loading some more complex pre-trained Caffe models with confidence intervals and bounding boxes, such as SSD.
- **Robert Stemig:** Gathering FlightGear image sets of aircraft for training network, as well as prepping FlightGear use for demo purposes to ensure ease of use in the demo.

Individual contributions:

<u>NAME</u>	<u>Individual Contributions</u>	<u>Hours This Week</u>	<u>Cumulative Hours</u>
Bijan C.	DetectNet Analysis, Confidence Testing with data from FlightGear, Confidence Intervals and Objection Box Detection all in one.	7.0	28.0
Darren D.	Wrote Hw0, tested OpenCV and GStreamer compatibility, looked into other methods for streaming video, tried YoLo on the board.	17.5	69.5
Tracy L.	Edited and proofread Hw0, Weekly Report, BiWeekly Report 2, began working on Hw1	5.0	35.0
Jesse L.	Loading caffe model in Python, extracting images from Gstreamer pipeline	10.0	55.0
David S.	Fixed GPU enablement issues, completed Caffe installation on HPC cluster and NVIDIA board. Successfully trained and deployed a model onto the board.	6.0	43.0
Robert S.	HW0, GStreamer, OpenGL	8.0	35.0
Totals:		53.5	265.5

Summary of Weekly Advisor Meeting (10/13/2017):

Zoom: <https://zoom.us/j/7680301181>

- Absent: Robert S., Dr. Zambreno
- David gave update on HPC & Caffe
- Be sure to document errors
 - For future students
 - For final reports
- Darren gave update about GStreamer & OpenCV Python vs C++ error
- Dr. Jones suggested
 - If speed isn't there, try lower resolution
 - Presentation - speed changes due to resolution (try a few)
 - Document training on HPC vs laptop

Summary of Weekly Client Meeting (10/17/2017):

Zoom: <https://zoom.us/j/757821200>

- Client was unable to attend.

Summary of Weekly Team Meeting (10/17/2017):

Zoom: <https://zoom.us/j/393292249>

- Discussed Hw0, Hw1, and BiWeekly Report 2
 - Please have Hw0 and BiWeekly Report 2 ready to go by Wednesday evening
- Discussed current errors we're running into on the board
- Jesse is still having issues with GStreamer
- David has Caffe up and going
- Bijan has looked into the confidence levels
- Robert will also capture images from FlightGear while learning how to master the program