CprE/SE 491 "Weekly" Report 15

Dates: 4/27/2017 - 9/13/2017

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
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Webmaster:	Robert Stemig		

Summary:

This is a summary of what has been done since the 491 senior design presentation of Spring 2017 through the first few weeks of Fall 2017.

Individual Contributions:

Bijan Choobineh

Over the summer, was working with the RCL lab at Iowa State. Due to this time commitment I was unable to commit as much time to the senior design project as I had initially planned on doing. In the first few weeks of the semester, efforts were made to establish communication between our team, advisors, instructor, and client for senior design. In addition, with the team working in parallel, I looked into streaming video from another machine to the FPGA board as an effort towards starting to work on a demo which would consist of streaming flight simulator video data to the FPGA board for analysis.

Darren Davis

Over the summer, I was at an internship with AGCO in Minnesota. Due to this and going home every weekend to maintain things around my house, I was not able to commit as much time as I wanted to the project. The time I spent on the project was researching different networks, such as Alexnet and GoogleLeNet, and how to train them. At the start of the semester, I worked with the rest of the team on getting meeting times set-up and going over the project status. Also, I worked with other team members on getting the board up and running, installed Caffe on my own computer, and downloaded image sets for training and testing. In the last week we split the group and I have been concentrating on a demo. For the demo I have been looking into the best format and way of sending a video feed to the board, since there is no HDMI or VGA input. Explored YOLO, SSD, and Faster RCNN for combining prediction and detection.

Tracy La Van

Over the summer, I was at an internship in Rochester, MN with IBM. Due to this commitment, I was unable to commit time to the senior design project over the summer. At the beginning of the

semester, I began working on figuring out how to best go about building a home-grown neural network for our project.

Jesse Luedtke

My time over the summer was spent mostly working. The little time I did spend on senior design was mostly becoming more familiar with the Caffe API.

Davis Schott

Over the summer, I was at an internship and took a summer class. Besides that, I investigated some ways of installing the Caffe machine learning toolkit onto my laptop. I also worked on fetching some images from public-facing datasets online (from Google OpenImages as well as ImageNet) that could be used for training our neural network. Finally, I explored training my own rudimentary neural network to see if I installed Caffe correctly.

Robert Stemig

Over the summer i was working full time to cover school funds. Due to that didn't have much time to devote to 492. However i did continue own research over the summer on Caffe and installing on my personal computer. As well as looking into existing networks such as AlexNet.

Summary of Team Meeting at Beginning of Fall 2017:

The following is a summary of what each group member plans help tackle this semester and what they plan to do within the next week.

Bijan Choobineh

The following are my semester plans. First; continue to establish healthy communication between all parties involved in process. Second, work very closely with the Demo subteam towards working with ImageNet and DetectNet to be able to process live flight simulator data feed into the FPGA board itself. Will be cross collaborating will all parties during the semester.

Darren Davis

This semester, I will work with Robert and Bijan focusing on the final demo. I will also be working with entire team incorporating work done by both groups to present a final product. For the demo the main focus is to get a video feed of a flight simulator working with the preinstalled networks on the board. The focus this next week will be getting a video to the board of good quality and minimal latency.

Tracy La Van

This semester, I plan to work with Jesse and David to work with the neural network part of the project. I plan to dive into Python Machine Learning by Sebastian Raschka so that I can gain a better understanding of neural network models and how to fine tune them. Specifically, I plan to look over how we can parameterize the network to better work with our anticipated data and work on the confidence intervals and/or other statistics used in our model. Over this next week, I will begin working my way through relevant chapters in the book and going over the code that David uploaded to Git last this past summer.

Jesse Luedtke

For the semester, I will be working closely with Tracy and David on designing our own CNN and modifying an existing network. Over the next week I will become more familiar with with tools needed to train a CNN on the Jetson board.

Davis Schott

This semester, I plan to work with Tracy and Jesse to work with the neural network part of the project. I plan to try and see if I can train a neural network to recognize flying objects from images in a similar fashion as I did on my laptop, especially utilizing the GPU board. Over the coming week, I plan to transfer training datasets over to the board.

Robert Stemig

This semester I will be working along side bijan and darren focusing efforts towards creating a demo setup with the existing image classifiers already on the board. So far been researching ways to continuous feed video to the board. Along with this getting familiar with the Image/detect networks preloaded on the board. As well as looking into code that Josh our client has spoken about in emails regarding our demo but will get more info during our first meeting with him.

Fall Hours: Note: Restarting hours for fall.

NAME	Individual Contributions	Hours This Week	Cumulative Hours
Bijan C.	Organizational. Communication. Image/DetectNet with Video. Streaming video to FPGA with throughput in mind.	6.0	6.0
Darren D.	Installing Caffe, downloading images, help setting up the board, experimenting with Image/DetectNet, researching pre-installed video tools and video feed methods, explored other networks that combine prediction and detection.	5.0	18.0
Tracy L.	Mainly organizational tasks so far this semester.	5.0	5.0
Jesse L.	Setting up of the Jetson board including installation of required software. Exploring software tools provided on the board.	15.0	15.0
David S.	Exploring the environment of the embedded board by connecting to ssh, trying to help set it up, catching up with everyone	5.0	25.0
Robert S.	Image/DetectNet work, video input research	3.0	3.0
	Totals:	39.0	72.0