

EE / CprE / SE 492 – sddec20-proj01

PROJECT TITLE : Machine learning for pilot biometrics

Week 9-10 Report

*10/13/2020 – 10/26/2020*

*Client: Rockwell Collins*

*Point of contact: JR Spidell*

*Faculty Advisor: Akhilesh Tyagi*

**Team members:**

Jianhang Liu--Data Manipulation SME

Feng Lin--Hardware SME

Xuewen Jiang --- Camera Interface SME

Xiuyuan Guo --- Algorithm SME

Sicheng Zeng - python SME

Junjie Chen --- C code SME

Sicheng Zeng - Team leader

**Bi-weekly Summary**

For these two weeks, we continue the work for the last two weeks such as improving the algorithm with various techniques like hyper-parameter tuning, quantization, pruning and hardware acceleration. PCB design hopes it will finish soon, and we will start the PCB layout review this week and hope we can start to order the materials.

**Individual Contributions**

Xuewen - Finish and update the bill of materials and get the total price of the daughter card. We decided to order 4 boards for the best cost performance. We did the layout review and hope that will finish soon.

Junjie Chen - This week we are writing on documentations for the various commands we had to use to set up the correct train and inference environment, different connectivity commands, things to watch for.

Feng Lin-figure out why the face-detection project can compile. Learning some simulating tools in order to observous ML layers' performance.

Sicheng Zeng- Using a new prune way to detect which method gets higher accuracy. I used a weight prune before. I try to use a dropout way on our project. I imported a sample on my computer, and it works great. I will work on pruning the model with less size and higher accuracy.

Xiuyuan Guo- During this time, changed our algorithm by changing the hyperparameter of our model model which include use the early stopping to find the best epoch and the learning rate scheduler to find the best learning rate.

Jianhang Liu- For the last week, Issac and I have made some changes based on the comments and questions on the layout review, and we will update and finalize the current PCB design in these weeks.

Team Member	Contribution	Hours Worked for the Week	Total Cumulative Hours
Junjie Chen	Rebuilt the DPU kernel with operation and architecture matching our project	8 h	$83 + 8 = 41h$
Sicheng Zeng	Work on using a new dropout pruning program to achieve higher accuracy	8h	$54+10+9+8 = 89h$
Xuwen Jiang	Finished BOM and ready to buy the materials, do layout reievw	5h	70h
Feng Lin	Documentation Vivado/Vitis software workflow.	6h	36h
Xiuyuan Guo	Change the hyperparameter of the given algorithm and use that to find the best so far to increase the accuracy and decrease latency of algorithm by reduce the layer of the CNN	10h	$18+10=28$
Jianhang Liu	Made some changes based on layout review, will update and finalize current PCB design recently	5h	70h

## **Pending Issues**

Don't have experience on assemble PCB and testing  
Ran out virtual memory when building the DPU kernel

## **Plans**

1. Optimize total latency about the pruned model running on board.
2. Increase after prune model accuracy
3. Increase swap space on host ubuntu machine to increase the RAM by swapping in between hard drive