EE / CprE / SE 492 – sddec20-proj01
PROJECT TITLE：Machine learning for pilot biometrics
Week 3-4 Report

8/31/2020 – 9/14/2020
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. We reviewed PCB design and hope it will finish soon.

Individual Contributions

Xuewen - We reviewed the daughter card design with our client and group members. We got several things to change and hope that wouldn't take too long.

Junjie Chen - This week we successfully synthesized DPU for our eye_detection algorithm. We used the 'vitis ai' framework, quantized, and compiled our model from a generated .pb file. We documented the process to serve as instructions on how to have machine learning algorithms to run on FPGA fabric.

Feng Lin- Trying to re-do the face detection project which is using DPU to do the inference acceleration. Now I am able to config DPU and set up all the environment variables. However, during the hardware synthesis step, there still something went wrong. After discussing it with our team, we think it might be out of memory.

Sicheng Zeng- During the last two weeks, I worked on the lucid code to visualize our model. I successfully transfer our model.h5 to model.pb which includes some information about layer and input images. And I read two papers about visualization. Next week, I will work on transferring the pb model to images and work with teammates for the pruning part.

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 several weeks, Issac and I have finished the PCB design including components placing and tracing. There is something that needs to be updated in the schematic. After the update is complete, Issac and I will redo some parts of the PCB layout to make sure it is the same as the circuit in schematic.

Team Member	Contribution	Hours Worked for the Week	Total Cumulative Hours
Junjie Chen	Built petalinux, ran examples within 'Vitis Ai' and DNNDK	10 h	65 + 10 = 75h
Sicheng Zeng	Transfer the keras open/close eyes code to tensorflow lite and run in an ultra 96 board. Fix several problems about sparsity and frequency number.	10h	54+10=64h
Xuewen Jiang	Review the schematic with the team; do some changes after we get all the suggestions.	10h	10h+10h
Feng Lin	Trying different systems and versions of vivado to see if it works for our practicing	6h	6h

	face detection project		
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	Finish PCB components placing and tracing. Will redo some part of PCB layout after the schematic update is applied.	7h	54h

Pending Issues

Plans

1. Finish schematic design.
2. Optimize total latency about the pruned model running on board.
3. Go through interacting with DPU from python language on an ARM processor .