EE / CprE / SE 492 – sddec20-proj01
PROJECT TITLE : Machine learning for pilot biometrics
Week 5-6 Report

*9/15/2020 – 9/28/2020*
*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.

**Individual Contributions**

Xuewen - We tried to combine the layout and the schematic together. I learned how to do the layout with my teammate and work together. The work may take 1-2 weeks but that's the end of the PCB design.We hope that will work well and we can go and buy the parts for the daughter card.

Junjie Chen -  This week we are working on interacting with the DPU kernel we compiled earlier. We tried the python scripts, then running to some errors. We then mitigate the compatibility issues by interacting with the DPU through C++ program. We have made it possible to run and debug the compiled application on the FPGA board.

Feng Lin- learned how to use early stopped function to find best number for epochs for our machine learning algorithm, made a instruction for how to install vitis and vivado software, and write a step by step documentation with Junjie for how to visualize kernel of our eye blink detection model.

Sicheng Zeng- During the last two weeks, I worked on combining my prune model with teammates model and continue to work on lucid. For lucid, I try to create a correct freezing model including graph information. I also discuss with others about how to correctly import models into my prune project.

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. Waiting for the schematic update of daughter board

| Team Member | Contribution | Hours Worked for the Week | Total Cumulative Hours |
|---|---|---|---|
| Junjie Chen | Interact with DPU through cpp, compile executables to deploy on the board | 7 h | 75 + 7 = 82h |
| Sicheng Zeng | Combine prune models with others<br>Try to create a correct freezing model | 8h | 54+10=72h |
| Xuewen Jiang | Combine the layout and the schematic together. | 10h | 10h+10h |
| Feng Lin | Made a few documentations, and introduced a way to figure out the best number for epochs. | 6h | 26h |
| Xiuyuan Guo | Change the hyperparameter of the given algorithm and use that to find the best so far to increase the accuracy and decrease | 10h | 18+10=28 |

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|---|---|---|---|
| | latency of algorithm by reduce the layer of the CNN | | |
| Jianhang Liu | Finished PCB components placing and tracing. Will redo some part of PCB layout after the schematic update is applied. Waiting for the schematic update of daughter card | 5h | 59h |

**Pending Issues**

**Plans**

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