EE / CprE / SE 491
Machine Learning Heterogeneous Computing
Bi-Weekly Report #4

Time: Oct. 11 - Oct. 24
Client: JR Spidell
Faculty Advisor: Diane Rover

Team Members:

Sandro Panchame
Rudolph Nahra
Alek Comstock
Jeffery Kasper

Biweekly Summary

These weeks, the team made progress in configuring the operating system of our board to allow us to implement. Specifically, we have partitioned the memory and configured 4 processors to each run a standalone program. Also continued to refine our dataset that we will use to further train our model.

Past Bi-Weekly Accomplishments

Jeffery K: Attempted to create Petalinux images for the Kria Boards but had issues with package downloading and compilation. Began working on a docker image of the teams petalinux project to make sharing the project easier.

Sandro P: Expanded the data storage on the virtual machine for an additional 200GB. Working with 400GB total. Devised a way, through a structural similarity index,to further trim down the training data by removing incredibly similar frames. Found that not all blinks are classified with negative positions, trimming down the dataset will be helpful for this issue. Implementation of Structural Similarity index derived from the sci-kit learn library.

Found that the movement classifications in the dataset has a classification for each frame, comparison with Remodnav may be difficult. Discovered Remodnav has more classifications than the ones we are looking at, they most likely describe specific behaviors of the classifications we are looking at.

Ended up extracting frames of less than 2.5 minutes, resulting in extracting frames from roughly 70% of the dataset.

Alek C. attempted to modify parts of the echo test code. Hope to modify code base to do how we are designing our code to function, rather than attempting to work from the ground up. Touched up on powerpoint for openAMP API.

Rudolph: Had issues with our design, made the decision to use the APU cores in SMP (symmetric multiprocessing) mode running with the operating system rather than standalone. This is because libraries would not be supported in standalone mode. Finished interprocessor communication between RPU and APU, can now compile custom petalinux build packaged with these applications for the RPU and APU.

Pending Issues

Sandro P: Selecting an appropriate threshold with which to trim the data even further (Through Structural Similarity index). Training the model may take a long time, may have to ask for additional resources from ETG. Blinks are still within the dataset, although some are classified with a negative position, others are not. May affect performance of the model.

Alek C. I will need help learning how to get what version of openAMP is on the board. I have a half semester class starting and it is a bigger workload than initially expected; I will have less time to put towards working on the project at hand. I am waiting for a schedule change in my work schedule to go throw so I have more time for my studies.

Rudolph: None, just pressured by time.

Jeffery K. Solve petalinux package issues and solve docker image problems.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Sandro Panchame	Wrote down some additional functions. Ran into some issues when writing the images to a csv file, settled for using the imagePath instead. Devised some ways to compare performance of models, similarity between images, and movement classifications.	10	91
Rudolph Nahra	Completed interprocessor communication system.	12	139
Alek	Modify bits of the openAMP code	4	71
Jeffery Kasper	Troubleshoot petalinux package compilation issues and began working on a docker image for the project.	20	100

Plans for Coming Weeks

Jeffery K : Finish the docker image for the petalinux project. Begin to implement inter-process communication model inside of Vitis AI project.

Sandro P: Find an appropriate threshold for trimming the dataset even further, primary focus is to remove blinking images. Devise a way to use remodnav and classify movements similarly to the dataset (for each frame). As an aside, this may line up with an approach to real-time classification. Use of a circular buffer may be key.

Rudolph: Complete the loop by adding the DPU to programmable logic and running an inference on it.

Alek C.: I plan on trying to get ahold of the board to match our versions of openAMP. I hope to upload my edited code to github so we can begin testing and further modifying the inter-process communication code base for the board.