EE/CprE/SE 491

HAML: Heterogeneous Computing for Machine Learning Algorithms

Week 8 Report

3/5/24 - 3/18/24
Faculty Advisor   : Phillip Jones
Client   : JR Spidell

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Team Members:

Jonathan Tan   - DPU Management, Kria Board Manager
Josh Czarniak   - Pupil Center Location Algorithm
Justin Wenzel   - Blink/No-Blink Algorithm, Meeting Leader of the Week
Kai Heng Gan   - OpenCV
Santiago Campoverde   - Data Profile/Model Analytics

Summary for Progress This Week

This week's objectives were to:

1. Continue working with our advisor, client, and ETG on setting up a workstation. We went back to trying running PetaLinux on RHEL8, and after installing the SDKs, we verified that RHEL8 can indeed accomplish what we need it to do.
2. We started working on the "4-week plan," which is a plan to, by the end of 4/8, be able to pass one frame through the program.

This Week's Individual Contributions

- Justin
  - Completed Docker setup including an interactive GUI environment, and detailed documentation for future teams to set up Docker environments to work within on Window systems.
    - Team has decided to use RHEL8 system for development environment
    - Docker documentation will provide future groups with other development environment options
  - Communicated with group members about bounce diagrams, and stack diagram implementations, including environment to build them and developing them throughout the project.
  - Constructed and lead the team meetings for client and team meetings.
- Jonathan
  - Set up SDKs (PetaLinux, Vitis, Vivado) on our RHEL8 workstation in 1301.
  - Continue looking into setting up an efficient development environment for PetaLinux development (aka, what is the best/good way to code a PetaLinux application, i.e., with access to a debugger, and less manual work to flash code onto the board).
  - Looked into software locking mechanisms for DPU and made presentation on it.
  - Work with ETG to get the board
- Josh
  - Researched further on pupil tracking
    - Looked up online and from previous teams code how it can be done
  - Started to work on previous team's code
    - What type of model that they trained as well as how they trained that model
    - They used a TensorFlow model and turned it into an xmodel using XIR
    - Focusing on removing the need to use the RPU
- Kai
  - Worked on the semantic segmentation machine learning model for image pre-processing.
    - Set up the environment
    - Debug the machine learning model
- Santiago
  - Researched GMIO ports and their purpose in memory mapping
  - Set up Personal Linux environment to test and get familiar with profiling tools

Team Member	This Week's Task	Completion Date	Hours Took	This Week's Hours	Total Project Hours
Justin Wenzel	Attended meetings	NA	3	7	37
	Set up Docker environment and set up documentation, providing another development environment choice.	3/11	3		
	Communicated with team about bounce diagrams/stack diagram for VART and	3/16	1		

Jonathan Tan	Attended meetings	NA	3	8	42
	Came up with software locking mechanism and make PPT	3/16	1		
	(on-going) Look into setting up development environment	Ongoing	4		
Josh Czarniak	Attended meetings	NA	3	10	37
	Looked at previous team's code	3/11	3		
	Started work on previous team's code	3/13	4		
Kai Heng Gan	Attended meetings	NA	1	9	40.5
	Worked on the semantic segmentation machine learning model for image pre-processing.	Ongoing	8		
Santiago Campoverde	Attended meetings	NA	3	7	37
	Investigated about GMIO ports	3/11	2		
	Set up personal Linux environment and testing to get familiar with profilers	Ongoing	2		

Note: 1. This is per week hours, Σ "hours taken" = "week hours". 2. Due to multiple meeting times, meetings' "completion date" are "NA".

Plans for Coming Week

Team Member	Plans for Coming Week	Planned Completion	Planned Hours Required
Justin Wenzel	Set up xmodel for blink model this contains converting the quantized blink h5 file to xmodel.	3/23	3
	Start of four week plan, begin implementing blink_algo.c to control the xmodel and run iference on the board.	3/27	6
Jonathan Tan	Learn how to compile h5/pb model files into xmodel. (side quest, low priority)	3/29	5
	Continue figuring out how to set up the most efficient development environment for Petalinux dev.	3/22	3
	Look into hardware locking mechanism on the Kria board	3/23	2
	Start drafting code and push to GitHub	3/23	1
Josh Czarniak	Understand more about machine learning	3/20	5
	Work more on the previous teams code	3/22	4
	Understand more of the previous Teams code	3/21	3
Kai Heng Gan	Continue research on the image segmentation technique. Set up the environment and debug the image segmentation code.	3/23	7

	Continue work on taking some images into image pre-processing process and analyze the result	Ongoing	4
Santiago Campoverde	Getting a Linux environment to test profiling and tracing environments.	3/23	2
	Find if previous build of the environment has necessary profiling tools.	3/23	2