alEE/CprE/SE 491

HAML: Heterogeneous and Accelerated Computing for Machine Learning
Week 10 Report

3/26/24 - 4/1/24

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 continue working towards completing the "4-week plan." This included figuring out setting up code and utilizing the GitHub repo for version control, figuring out dataflow, modifying the previous team's code, using Trello to track each other's work and manage tasks accordingly. Research into preprocessing techniques such as semantic segmentation. Research into different ways to isolate memory for different threads and input images. Utilizing different profiling techniques using the VART library to monitor, the system performance and how to monitor error of neural network operating on the Kria board environment.

This Week's Individual Contributions

- Justin
  - Continued four-week plan, by fully implementing blink_algo.c, and set up times to meet with group members to collaboratively integrate the program onto the board and start testing running inference on the Kria board.
    - Structured the code from previous team's code and heavily commented all aspects of the inference operation for other team members to use and learn.
  - Created low level bounce diagram for blink_algo thread, for documentation and understanding among group.
- Jonathan
  - (On-going) Coordinated with Kai, Josh, and Justin to figure out proper dataflow of the system.
  - Set up Trello to help team track tasks.
  - Rewrite Makefile to compile and link project code with required libraries.
  - Started working on team website.
- Josh
  - Researched further on pupil tracking
    - Looked up online and from previous team's code how it can be done
  - Started to work on previous team's code
    - Focusing on removing the need to use the RPU
    - What section of the main.cc code is related to pupil tracking
    - How the code relates to the hardware.
- Kai
  - Worked on image semantic segmentation model
    - Have set up an environment for the image pre-processing by using the semantic segmentation model.
    - Tested the semantic segmentation model with the frames given by the client
- Santiago
  - (On-going) Set up necessary profiling tools on the board
  - (On-going) Test profiling and tracing environments

Team Member	This Week's Task	Completion Date	Hours Took	This Week's Hours	Total Project Hours
Justin Wenzel	Attended meetings	NA	3	10	57
	Implemented blink_algo.cc, and set up times to meet with group to collaboratively integrate program onto the board for inference testing.	3/28	5		
	Created low level bounce diagram for blink_algo.cc thread, for documentation and group understanding.	3/28	2		
Jonathan Tan	Attended meetings	NA	3	5	52
	Set up Trello	3/25	~0		
	Rewrite Makefile to compile and link project code with required libraries.	3/31	1		
	Started working on team website.	4/1	1		
Josh Czarniak	Attended meetings	NA	3	7	54
	Continue to look at previous team's code	3/27	2		
	Continued work on the previous team's code	3/28	2		
Kai Heng Gan	Attended meetings	NA	2	17	68.5
	Have set up an environment for the image pre-processing by using the semantic segmentation model	Ongoing	15		
	Tested the semantic segmentation model with the frames given by the client				
Santiago Campoverde	Attended meetings	NA	3	5	49
	Set up necessary profiling tools on the board	Ongoing	1		
	Test profiling and tracing environments	Ongoing	1		

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	Meet with group members to begin running inference tests on the Kria board using blink_algo.cc, and integrate program into main.cc.	4/6	5
	Create a presentation to share different memory isolation techniques the group could use to isolate memory for threads and data on the Kria board.	4/5	2
Jonathan Tan	Work with Justin to integrate blink code into main().	4/6	5
	Write a function to simulate a 200fps camera feeding frames into the program.	4/6	3
Josh Czarniak	Meet with Justin to underdstand and work on previous teams, main.cc, code	4/3	4
	Start to work on the eye tracking code that we will integrate into our main code	4/5	3
Kai Heng Gan	Try run image segmentation with CPU instead of GPU	4/6	7
	Continue work on taking some images into image pre-processing process and analyze the result	Ongoing	4
	Modify the code to produce grayscale output instead of color	4/13	10
Santiago Campoverde	Test profiling and tracing environments	4/6	1
	Set up necessary profiling tools on the board	4/5	2