Weekly Progress Report

June 7-11th, 2021

Presented by Yannis (Yiming) He 84189287

Noah's Ark | Autonomous Driving Lab
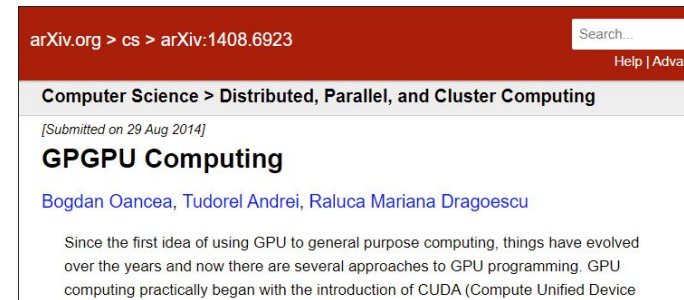LiDAR Domain Adaptation

Manager: Bingbing Liu 00435285
Supervisor: Eduardo Corral Soto 00407762

- June 7th (Monday):
    - (running progress: lcpss STEP1) ~~(running on GPU4)~~ (finished)
    - Finished udass STEP2
    - Run Cycada STEP3 using data generated by udass (finished) (Appendix 2)
        - Visual run on port *localhost:9100*
    - AODA Training
- June 8th (Tuesday)
    - Record experiments and list experiment to be done
    - Run experiment: 4GPU with 1 batch (running on GPU 4,5,6,7, using docker 5)
        - visualization using docker 6
    - Draw block diagram for lcpss pipeline
- June 9th (Wednesday)
    - Finish lcpss pipeline block diagram
    - STEP2 for udass(where STEP1 used 4 GPU) (Step 1 not finished yet)
    - Learning Voxelization:
        - https://www.youtube.com/watch?v=PL6wD8jczkE&ab_channel=ThomasFrankThomasFrankVerified
        - https://www.youtube.com/watch?v=ctdi4Fjp_50&ab_channel=HenryAILabs
        - https://www.youtube.com/watch?v=vfL6uJYFrp4&ab_channel=SULabUCSanDiego

- June 10 (Thursday)
    - Organizing notes/questions about lcpss
    - Talk to Eduardo for questions related to lcpss
    - Talk to Arash about Server (still waiting for my own server…)
        - Many experiment is waiting to be done
    - Research towards how multiGPU/multi-thread works for parameters update (forward, backward, etc)
- June 11 (Friday)
    - Compare lcpss and udass training
    - Paper reading session (2:30 pm)
    - Check if udass using 4 GPU (STEP1) is finished.
        - ~~If so, start STEP2~~ (nope, it didn't finish)
    - Search online for multi-gpu cycleGAN
    - ~~Ask Aich and Mrigank for multi-gpu (they are using multi-gpu to train SALSANext)~~
    - Current issue facing: Lack of GPU to do experiment
        - Each experiments takes long time and have to do them in series due to the lack of GPU
            - Each experiment takes around 1 week…
                - Hard to make changes and see improvement

- June 11 (Friday) (cont')
  - Alternative approach:
    i. Get latest udass and get it to train SALSAX on 4 GPUs
    ii. Make a copy and introduce the cycleGAN networks and losses
    iii. Evaluate the outputs on STEP3 SSnet Training
  - Search for pytorch github repos that use multi-gpu for some simple task
    i. Use them as template and rewrite the multiGPU cycleGAN if needed :(
  - How (multi-)GPU works in Machine Learning training:
    i. https://www.youtube.com/watch?v=6stDhEA0wFQ
    ii. https://www.youtube.com/watch?v=0_TN845dxUU&ab_channel=AndroidAuthority
    iii. https://www.youtube.com/watch?v=GRRMi7UfZHg
    iv. https://www.youtube.com/watch?v=a6_pY9WwqdQ
    v. GPGPU Papers:

arXiv.org > cs > arXiv:1408.6923

Search...
Help | Advar

Computer Science > Distributed, Parallel, and Cluster Computing

[Submitted on 29 Aug 2014]

GPGPU Computing

Bogdan Oancea, Tudorel Andrei, Raluca Mariana Dragoescu

Since the first idea of using GPU to general purpose computing, things have evolved over the years and now there are several approaches to GPU programming. GPU computing practically began with the introduction of CUDA (Compute Unified Device

End of June 11th, Weekly Report

Weekly Progress Report

June 14-18th, 2021
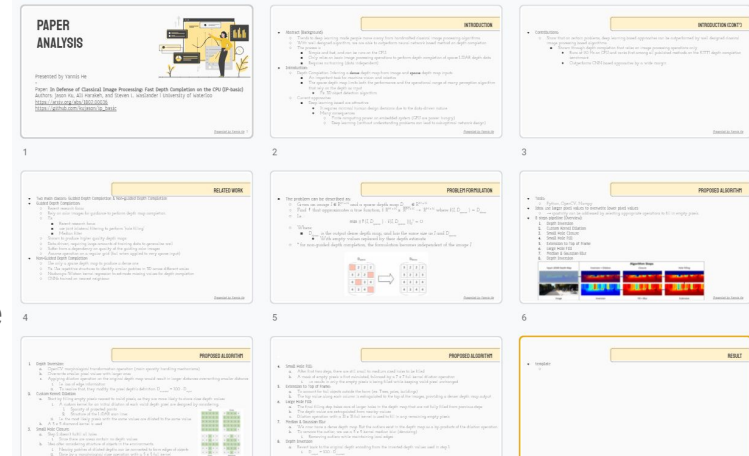
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- June 14 (Monday)
  - Meeting with Eduardo
  - Put multi-GPU aside since Eduardo has some progress and we are waiting for the result
  - Look into Corel loss
  - Depth Completion & Normals
    - Contact Thomas
    - Read papers about Depth Completion:
      - *In Defense of Classical Image Processing: Fast Depth Completion on the CPU*
        - https://arxiv.org/abs/1802.00036
      - *Depth Completion from Sparse LiDAR Data with Depth-Normal Constraints*
        - https://arxiv.org/abs/1910.06727
    - Get it work with Semantic Kitti
    - Nuisance
    - Understand the difference
    - Integrate it to dataloader
  - Look into Corel Loss (should be a single file)
    - Introduce the corel loss into our total loss
    - Do experiment with it and see the performance.
- June 15 (Tuesday)
  - Paper Reading
  - UofT Autonomous Vehicle Workshop

- June 16 (Wednesday)
    - Paper Reading
    - UofT Autonomous Vehicle Workshop
- June 17 (Thursday)
    - Meeting with Eduardo
    - Integrating depth completion on the new lcpss pipeline
    - Create selector for depth completion algorithm
- June 18 (Friday)
    - Understanding the code from Thomas and "range.py"
    - Integrating depth completion on the new lcpss pipeline
- June 19-20 (weekend)
    - Finished code reading
    - Read a paper related to depth completion
    - Ask questions to Thomas related to his code. Waiting for response before next step

End of June 18th, Weekly Report

Weekly Progress Report

June 21-25th, 2021

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- June 21 (Monday)
    - Received questions response from Thomas
    - Integrate the depth completion to lcpss pipeline
    - Modify configuration file to add the depth completion method as a hyper-parameter
    - Return 3D normal information to the pipeline
- June 22 (Tuesday)
    - Meeting with Thomas
    - Inspect range.py with modification
    - Meeting with Eduardo
        - Inspect the projection method.
            - Compare projection methods between lcpss vs Thomas depth completion method
- June 23 (Wednesday)
    - Compare projection method by comparing the output of the same image frames
        - Compare through visualization
    - New Tasks (complete by this weekend - June 27):
        - 1. Find 10 research papers from ICRA 2021 on 10 different types of robots (1 for each slides)
        - 2. Merged our ICRA 2021 paper analysis from Eduardo, Aich, Ryan

- June 24 (Thursday)
    - Reached out to Eduardo, Aich, Ryan for their ICRA 2021 papers reports
    - Finished depth completion functionality
    - Visualizing the dataset before and after the depth completion
- June 25 - 27 (Friday & Weekend)
    - Noah Ark Forum: Planning in Autonomous Driving @ 11 am
    - Remove redundant process for depth completion   } today
        - Break down Thomas's pipeline
    - Clean up the code and hand over to Eduardo
    - ICRA 2021 paper reading
        - Select 10 papers
        - Read, summarize   } Weekend
        - Make report
    - Copying datasets (Sementic KITTI, Nuscenes) from gx6 to gx9

End of June 25th, Weekly Report

Weekly Progress Report

## June 28 - July 2nd, 2021

<u>Presented by Yannis (Yiming) He 84189287</u>

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- June 28 (Monday)
    - ICRA - my paper analysis (cont')
    - Meeting with Eduardo for lcpss depth completion pipeline delivery
- June 29 (Tuesday)
    - Formatting paper analysis from others into PPT form
        - Eduardo, Aich, Ryan, planning team
- June 30 (Wed)
    - Meeting with Eduardo for next step
        - UMAP:
            - Read UMAP papers (in progress)
            - Learn how to install & use UMAP
        - TSIT
            - Look into its github
            - Get it to work with dataset they use (skyscapes)
    - Meeting with Eduardo for Depth completion integration
        - Ground truth completion need to be done too
        - Format from (64,2048) into (64, 2048, 5)
- July 1 (Thursday)
    - Holiday
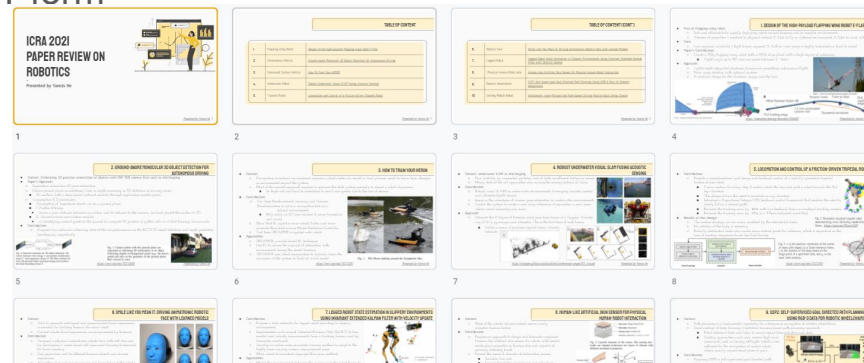
- July 2 (Friday & Weekend))
    - Connect with Thomas (waiting for his response)
    - Modify Thomas's pipeline's output based on our need
    - Depth completion on ground truth
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End of July 2nd, Weekly Report