

Vision Quadchart

26/02/24

Demonstrating Visual-Inertial A&OD & On-Orbit Edge Computing

Progress summary

65 days before May 1st

Updates

- Dataset:
 - Dataset download from 16 regions
- RC:
 - Prepared data ready for RCnet, ready to train on N salient data regions
- LD:
 - Customized Yolo loss function
 - Prepared training datasets from mass data download
 - Training LD for 16 regions on top salient landmarks at different scales

Blockers

- Computing resources for LD training
 - [ECE Community Compute Clusters](#)
 - [Pittsburgh Supercomputing Center](#)
 - ROBO Cluster

Weekly Plan

- Vision
 - Continue training experiments with pruning
 - Deploy trained models onto Jetson for GNC integration
 - Improve mAP of RCnet - finetune hyperparameters

Interface dependencies

Vision

- **Dataset**

- Downloaded data from 16 polarized regions -> [Dataset Download Report](#)
- Created YOLO datasets for 16 regions (train, val, test from different sources/years)

- **Training**

- **RC:**
 - Prepared new larger dataset ready for RCnet, ready to train on N salient data regions
- **LD:**
 - Customized YOLO loss function with an additional MSE (centroid pixel error) loss
 - Weighted using box weight
 - Customized YOLO validator batch/class metrics tracking throughout training
 - MSE per class
 - Batch average
 - Training a base LD net with for 16 regions on top salient landmarks at different scales
 - Script for evaluating trained models: MSE, missed, extraneous detections
 - Pruning landmarks after training

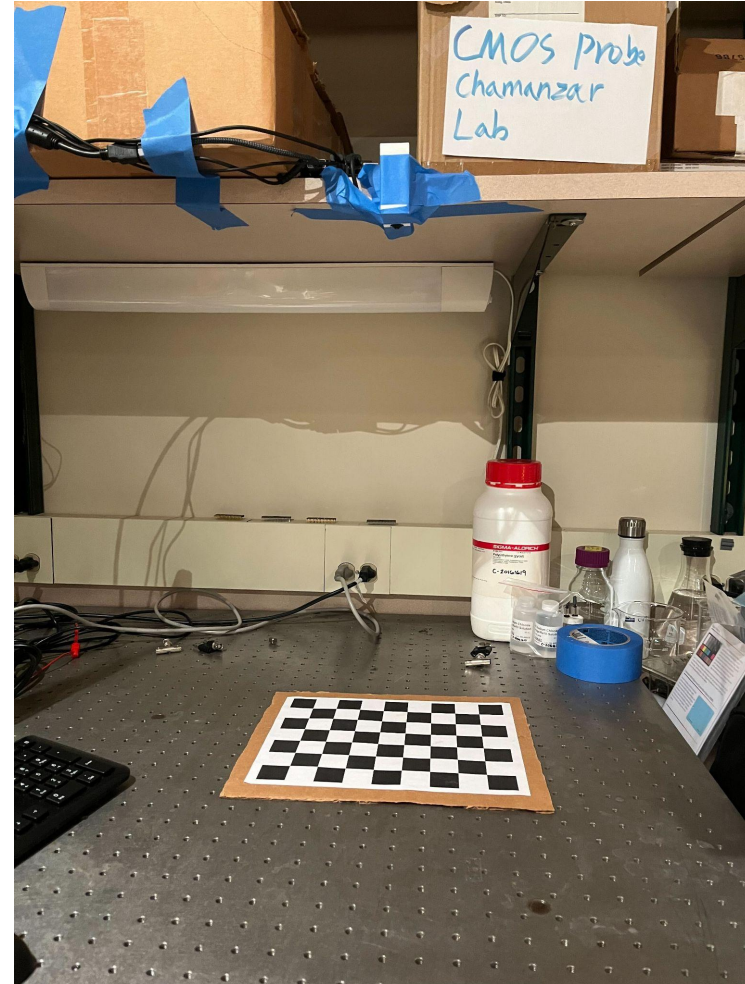
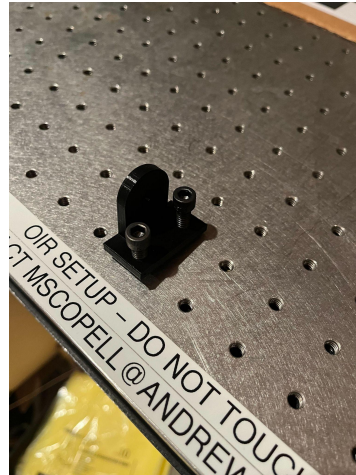
Calibration

Achievements:

- Finished the calibration test with optical table settings
 - The result is reasonable than before
 - Camera mounts are prepared

Next Step:

- Do multiple calibration and get the average, compare with the spec
 - Try with the mount equipments
 - Solid chessboard



Calibration

Color correction

Achievements:

- Finished data collection, and a test for color correction

Problem found:

- The images taken is vague
 - How to adjust the focal length of a CMOS camera?

