

Weekly Progress Report

Oct 4 - 8th, 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



Weekly Summary

- Done:

- Checking for once eval_metric
- Writing script for evaluation: `eval_log_extraction.py` (to be pushed)
 - Picking the best checkpoint in terms of
 - Average mAP for BEV of the 4 classes {car, truck, pedestrian, cyclist}
 - Threshold = 0.3, 0.5, 0.7 ?
- Plot best checkpoint for each evaluation (oracle)
 - Oracle:
 - p40 \rightarrow p40
 - ONCE \rightarrow ONCE
 - M2 \rightarrow M2
- Plot best checkpoint in oracle for each naive evaluation
 - Naive:
 - ONCE \rightarrow M2
 - p40 \rightarrow M2

- In Progress:

- ➡ - Retrain m2_oracle with full dataset (previously 5k)
- Plot mAP for all checkpoint for each class

- Recent Goals:

- Visualize frames having good and bad performances
- Understanding: once_metric vs kitti metric

Work Logs

- Oct 4 (Monday)
 - Re-evaluate once dataset (was not evaluated using kitti metrics)
 - Has “eval_metric: kitti” but not outputting the kitti output
 - Result: we cannot use KITTI metric for ONCE due to its lack of information
 - Writing script for evaluation
 - Picking the best checkpoint in terms of
 - Average mAP for BEV of the 4 classes {car, truck, pedestrian, cyclist)
 - Threshold = 0.3, 0.5, 0.7

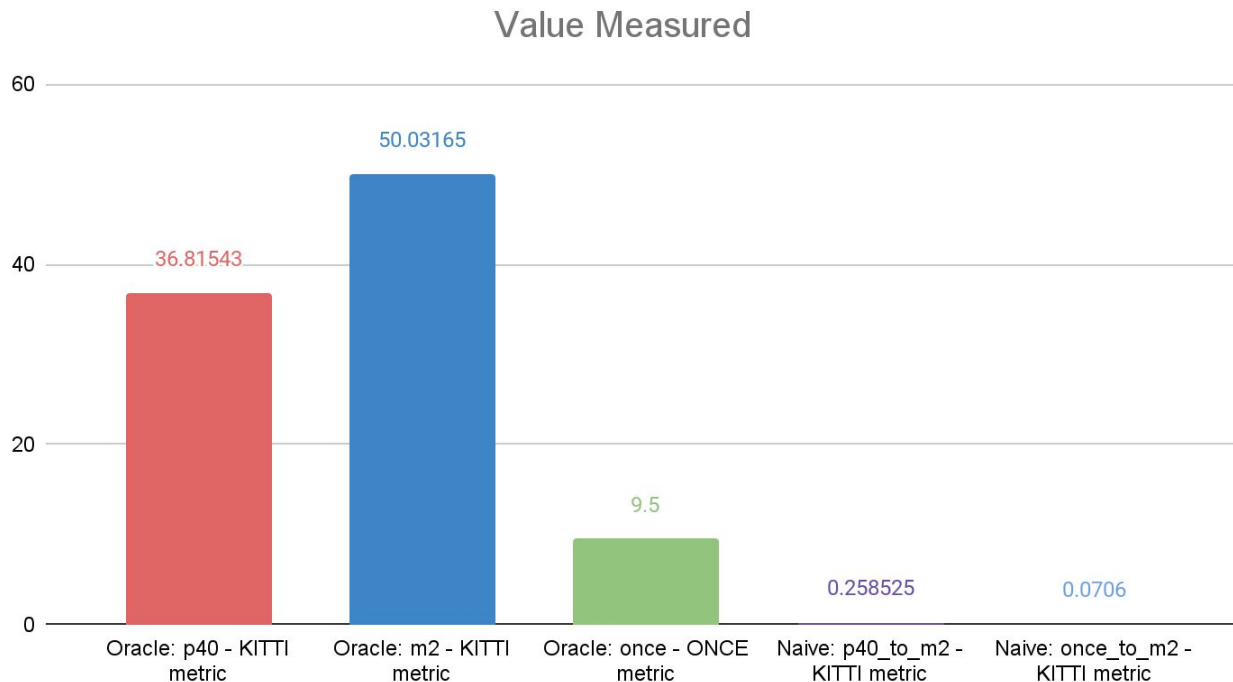
Work Logs

- Oct 5 (Tuesday)
 - Developed “evel_log_extraction.py”
 - p40: oracle

	Metric	Measured value	ckp#
Oracle: p40_avg_mAP	kitti	36.81543	74
Oracle: m2_avg_mAP	kitti	50.03165	58
Oracle: once_avg_0-30m	once	9.5	74

Work Logs

- Oct 5 (Tuesday) (cont')



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Work Logs

- Oct 6 (Wednesday)
 - Plot best checkpoint in oracle for each naive evaluation
 - Naive:
 - ONCE \rightarrow M2
 - p40 \rightarrow M2
 - Compare m2 oracle result with Xingxin, found that we used 5k split (to be retrained with full dataset)
 - Plot mAP for all checkpoint for each class

	Metric	Measured value	Ckp #
Naive : p40 \rightarrow m2_avg_mAP	kitti		74
Naive : once \rightarrow m2_avg_mAP	kitti		58

Work Logs

- ➡ - Oct 7 (Thursday)
 - Plot mAP for all checkpoint for each class
 - Re-configure m2 oracle training with full dataset split
 - Push `evel_log_extraction.py` to gitlab
- Oct 8 (Friday)
 - Train m2 oracle full data split
 - Write visualization script to see oracle's & naive's performances
 -

End of October 8th, Weekly Report

Weekly Progress Report

Oct 11 - 15th, 2021

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Weekly Summary

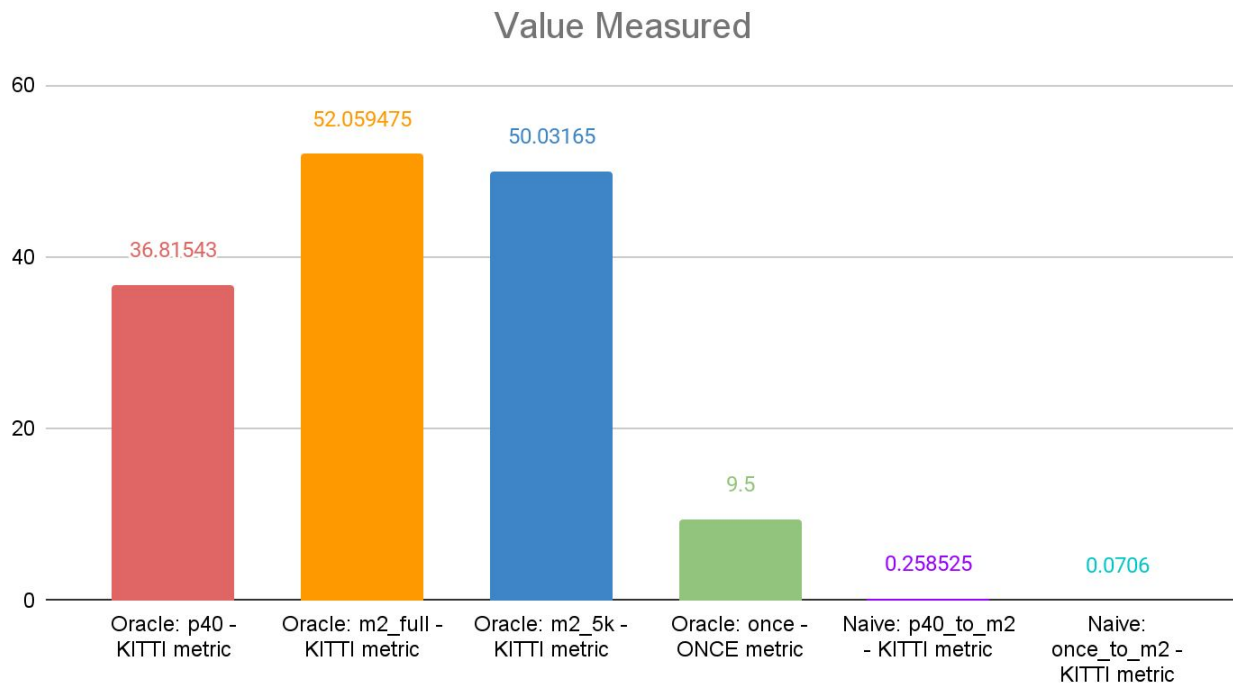
- **Done:**
 - Configured and retrained m2_oracle with full dataset split (previously 5k)
 - Validated m2_full_oracle and picked the best checkpoint
 - Discuss with Xingxin and compare m2_full_oracle results
- **In Progress:**
 - Visualize frames having good and bad performances (see Work Logs on next page for more details)
 - Understand the testing pipeline (done)
 - Shorten dataset for rapid testing (done)
 - ➡ - Locate evaluation for individual frame (in progress)
 - Rank frames by AP (TODO)
 - Visualize frame with high & low AP (TODO)
- **Recent Goals:**
 - Create video for p40, m2, once pointcloud
 - 4 point views
 - Plot mAP for all checkpoint for each class
 - Understanding: once_metric vs kitti metric

Work Logs

- Oct 11 (Monday)
 - Thanksgiving (holiday)
- Oct 12 (Tuesday)
 - Finished Train m2 oracle full data split (m2_full_oracle)
 - TODO: Validate m2_full_oracle and plot against other configuration
 - Write visualization script to see oracle's & naive's performances
 - For each best oracle and naive checkpoint:
 - Run through each frame and sort frames by mAP
 - Sample frames from two extrema to visualize
 - output the “path, classes, #instance, and mAP for each frame”
 - Plot against ground truth (gt) for: x, y, z (of centroid), h, w, l, theta
 - Show delta of each parameters
- Oct 13 (Wednesday)
 - Validated m2_full_oracle and plot against other configuration (see next page)
 - Discussion with Xingxin to compare m2_full_oracle results
 - Write visualization script to see oracle's & naive's performances

Work Logs

- Oct 13 (Wednesday) (cont')



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Work Logs

- Oct 14 (Thursday)
 - Attend Waterloo workshop
 - Worked on frame visualization
 - Step 1: Identify evaluation pipeline:
 - Test_naive_visualization.py: eval_one_epoch()
 - > eval_utils.py: dataset.evaluation()
 - > m2_dataset.py: kitti_eval.get_official_eval_result()
 - > pcdet/dataset/kitti/kitti_object_eval_python/eval.py
 - get_official_eval_result()
 - do_eval()
 - eval_class()
- Oct 15 (Friday)
 - Worked on frame visualization
 - Step 2: shorten frame size for rapid testing:
 - pcdet/dataset/__init__.py
 - Set short_dataset by torch.utils.data.random_split(dataset) >> creating a subset
 - Copy all attributes of the dataset to the subset

End of October 15th, Weekly Report

Weekly Progress Report

Oct 18 - 22th, 2021

Presented by Yannis (Yiming) He 84189287

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Weekly Summary

- **Done:**
 - Create video for p40, m2, once pointcloud
 - 4 point views
 - Visualize frames having good and bad performances
 - Understand the testing pipeline (done)
 - Shorten dataset for rapid testing (done)
 - Locate evaluation for individual frame (done)
 - Test validity of single frame by using ground Truth as input (done) → error found in pipeline
 - Train m2 oracle without data augmentation
- **In Progress:**
 - Train p40 without data augmentation (running on gpu 0-3)
 - ➡ - Evaluate & Plot m2 oracle without data augmentation
 - Visualize frames having good and bad performances
 - Investigate correlation between performance & bbox (in progress)
 - Run entire pipeline with each frame individually (TODO)
 - Rank frames by AP (TODO)
 - Visualize frame with high & low AP (TODO)
- **Recent Goals:**
 - Evaluate p40 without data augmentation → m2 naive
 - Detailed diagram for evaluation pipeline
 - Implement ROI
 - Plot mAP for all checkpoint for each class
 - Understanding: once_metric vs kitti metric
 - Prepare a decision diagram & flowchart for testing pipeline

Work Logs

- Oct 18 (Monday)
 - Create video for p40, m2, once pointcloud (4 point views)
 - Output 5 videos
 - P40 & m2 has “with augmentation” & “no augmentation”
 - Video saved in “/data/perception/datasets/pointcloud_visualization”
 - Visualize frames having good and bad performances
 - Locate evaluation for individual frame (done)
 - Eval.py: eval_class()
 - Maps gt_annos & det_annos into a dict, where dict[‘precision’] is a numpy with shape=(4,3,2,41)
 - This numpy can be mapped into mAP for different classes
 - Eval.py: get_trsholds()
 - This function maps the numpy array into a smaller size
 - Test validity of single frame by using ground Truth as input

Work Logs

- Oct 19 (Tuesday)
 - Visualize frames having good and bad performances
 - Test validity of single frame by using ground Truth as input
 - Found error in testing pipeline:
 - After making *Prediction = Ground Truth*, 3D & bev metric does not return 100%
 - Has error or both “single frame” & “full dataset”
 - However *bbox* & *aos* metric does return 100% for full dataset
 - Verified the correlation of *bbox*: higher is better
 - Can be potentially used as the metric to sort performance for each frame
 - Next step:
 - Validate that *bbox* shows 100% for single frame when making *Prediction = Ground Truth*
 - Training model with no data augmentation
 - M2 oracle without augmentation (in progress, gpu 0-3)
 - P40 without augmentation (TODO)

Work Logs

- Oct 20 (Wednesday)
 - Visualize frames having good and bad performances
 - Next step:
 - Validate that bbox shows 100% for single frame when making *Prediction = Ground Truth*
 - Training model with no data augmentation
 - M2 oracle without augmentation (done)
 - P40 without augmentation (in progress)
- Oct 21 (Thursday)
 - Visualize frames having good and bad performances
 - Next step:
 - Modify $N_SAMPLE_PTS = 41 \rightarrow N_SAMPLE_PTS = 1$ in `eval_class()`
 - See if 3d output will be 100% under *Prediction = GroundTruth*
 - Evaluate model with no data augmentation
 - M2 oracle without augmentation (TODO)
 - P40 without augmentation (Waiting training to finish)

Work Logs

- Oct 22 (Friday)
 - Visualize frames having good and bad performances
 - Next step when GPUs are free:
 - Modify $N_SAMPLE_PTS = 41 \rightarrow N_SAMPLE_PTS = 1$ in `eval_class()`
 - See if 3d output will be 100% under *Prediction = GroundTruth*
 - Evaluate model with no data augmentation
 - M2 oracle without augmentation (Running)
 - P40 without augmentation (Waiting training to finish)
 - Draw a evaluation diagram

End of October 22th, Weekly Report

Weekly Progress Report

Oct 25 - 29th, 2021

Presented by Yannis (Yiming) He 84189287

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Weekly Summary

- **Done:**
 - Trained, evaluated, and plotted m2 oracle without data augmentation
 - Trained p40 without data augmentation & evaluate oracle → picking best performance checkpoint
 - Evaluated P40_no_augmentation → m2 naive: better performance without augmentation for both naive & oracle
 - Trained & evaluated m2_5k without data augmentation
 - Clone Xingxin's latest code with ONCE fixed & modified according to gx9 setting
 - Trained & Evaluated ONCE oracle using the new pipeline (in progress on GPU 456): only saved 51-80 epochs
- **In Progress:**
 - A quick train to ensure having a working pipeline (in progress on GPU: 0123)
 - ➡ - Analysis ONCE evaluation, find best checkpoint and do naive DA on M2
 - Train P40 with ROI_x_flip_prob = 0.5 (bug found: To be fixed and run on GPU 456)
- **Recent Goals:**
 - Evaluate P40 with ROI_x_flip_prob = 0.5 on M2 dataset
 - Visualization every frame BEV, create a video
- **TODO:**
 - Understanding: once_metric vs kitti metric
 - Prepare a decision diagram & flowchart for testing pipeline
 - Implement ROI
 - Plot mAP for all checkpoint for each class
 - Visualize frames having good and bad performances
 - Investigate correlation between performance & bbox (in progress)
 - Run entire pipeline with each frame individually (TODO)
 - Rank frames by AP (TODO)
 - Visualize frame with high & low AP (TODO)

Work Logs

- Oct 25 (Monday)
 - Evaluated m2_full_oracle_without_augmentation
 - Discovery:
 - ~10% performance drop comparing with “with augmentation”
 - Lower performance than m2_5k_oracle WITH augmentation
 - To train m2_5k_oracle WITHOUT augmentation
 - Best performance with checkpoint 38 (instead of 60 for full dataset WITH augmentation)
 - Expected, overfit easier without augmentation
 - Plotted result (next page)
 - Evaluating p40_without_augmentation → m2
 - Finding best checkpoint by evaluate p40 → p40 (in progress)
 - Use the best checkpoint to do naive DA on m2 (TODO)
 - Investigate testing pipeline:
 - Current issue: 3d not showing 100% when setting Detection = ground truth
 - Get Xingxin’s latest code
 - Rerun everything related to ONCE
 - Oracle, naive

Work Logs

- Oct 26 (Tuesday)
 - Modified Xingxin's newest pipeline to match gx9 setting
 - Evaluated P40_without_augmentation
 - Best checkpoint: 56 with $mAP = 42.96$,
 - better than with Augmentation, $mAP = 36.82$
 - Evaluated on m2 (naive) with $mAP = 0.5416$
 - Better than naive with augmentation, $mAP = 0.26$
 - Train p40_without_augmentation on new pipeline to ensure pipeline is working (in progress)
 - Trained m2_5k_without_augmentation (completed)
 - Evaluate m2_5k_without_augmentation (in progress)
 - Train once on new pipeline (in progress)
 - Evaluate once performance (oracle) and find best checkpoint to test on m2 (TODO)

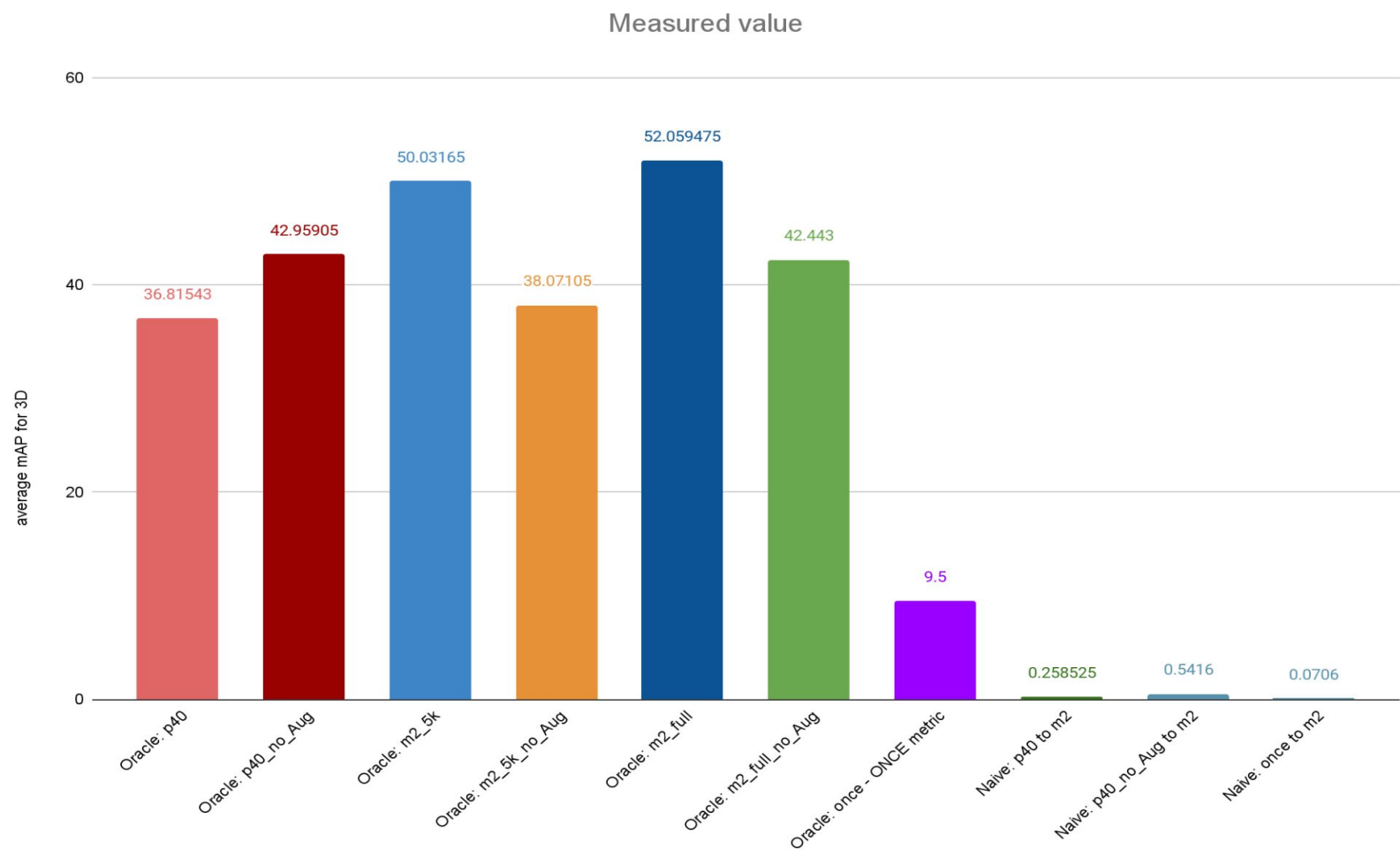
Work Logs



Oct 27 (Wednesday)

- Modify Xingxin's newest pipeline to match gx9 setting
- Train p40_without_augmentation on new pipeline to ensure pipeline is working (in progress)
- Evaluate m2_5k_without_augmentation (completed)
- Train once on new pipeline (in progress on GPU 456)
- Evaluate once performance (oracle) and find best checkpoint to test on m2 (TODO)

Work Logs



End of October 29th, Weekly Report