

Weekly Progress Report

Nov 01 - 05th, 2021


Presented by Yannis (Yiming) He 84189287

Noah's Ark | Autonomous Driving Lab
LiDAR Domain Adaptation

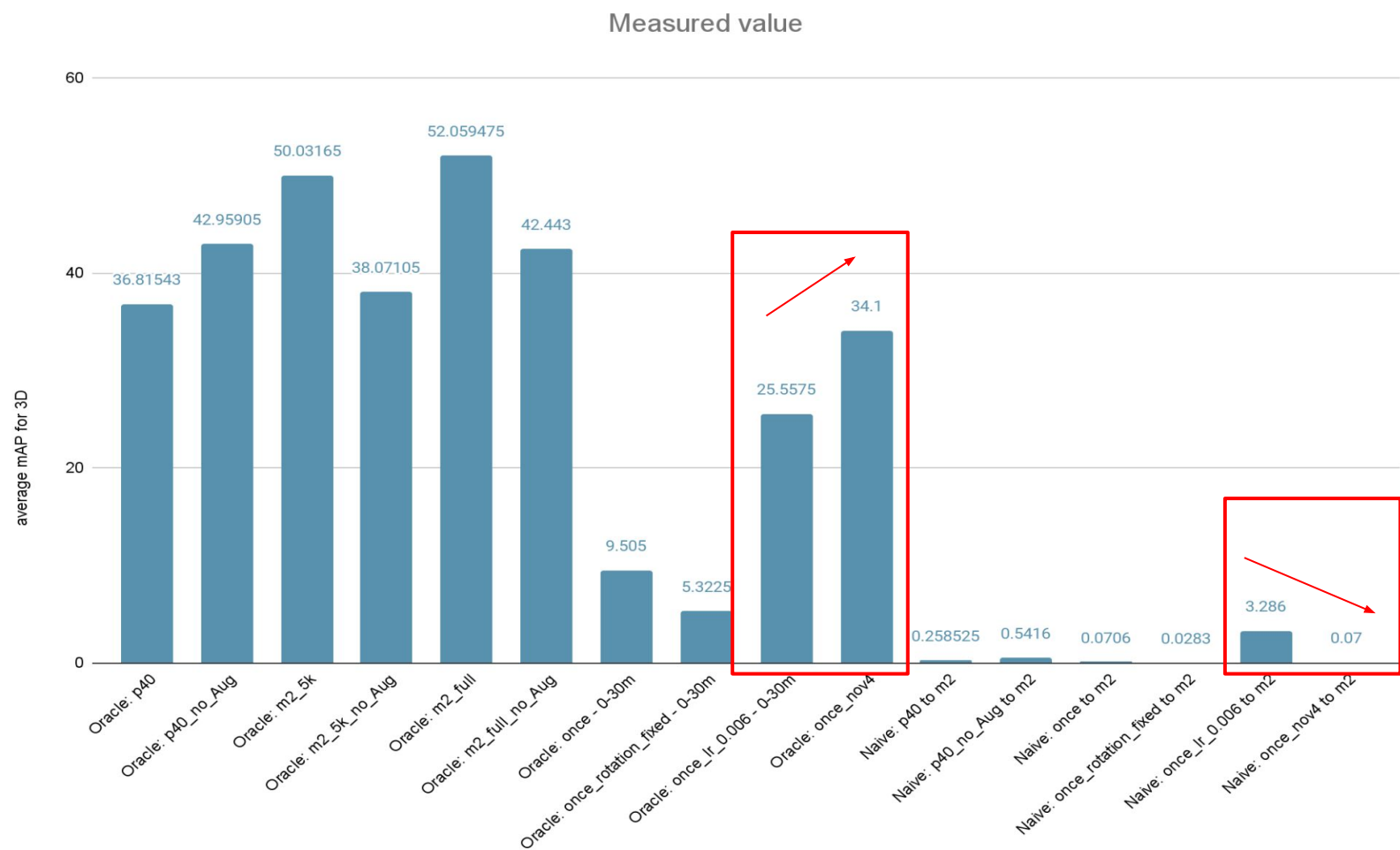
Manager: Bingbing Liu 00435285
Supervisor: Eduardo Corral Soto 00407762



Weekly Summary

- **Done:**
 - Experiment on effect after ONCE_rotation_fixed (Oracle & naive DA on m2)
 - Drop in performance.
 - Investigation on configuration: learning rate is making a great difference
 - With lr: 0.072 \rightarrow 0.006
 - Oracle improved ~ 5 times (5.32 \rightarrow 25.6)
 - Naive DA on m2 improved (0.03 \rightarrow 3.3)
 - Experiment on Xingxin's code base (Oracle & naive DA on m2)
 - Current best performance on ONCE oracle, BUT got ~ 0 for naive DA to m2
 - Investigation on configuration: learning rate is making a great difference
 - Oracle: 25.6 \rightarrow 34.1
 - Naive DA on m2: 3.3 \rightarrow 0.07
- **In Progress:**
 -  - Investigate why the inverse performance (oracle vs naive) occurred
 - Code, configuration, etc.
 - Region of Interest (ROI):
 - Evaluate P40 with ROI_x_flip_prob = 0.5 on M2 dataset
 - Visualization every frame BEV
 - to understand the false positive/negative
- **Recent Goals:**
 - Development: Plot mAP for all checkpoint for each class
- **TODO:**
 - Understanding: once_metric vs kitti metric
 - Prepare a decision diagram & flowchart for testing pipeline
 - 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



Work Logs

- Nov 01 (Monday)
 - Investigation on training:
 - P40 new vs old code base:
 - Unstable training
 - Bug:
 - “Cannot perform reduction function max on tensor with no elements because the operation does not have an identity at ...”
 - Worse performance
 - ONCE before vs after rotation fixed:
 - Worse performance, not on the same scale with what Xingxin got
 - ROI:
 - dimension unmatched
 - Development: Plot mAP for all checkpoint for each class

Work Logs

- Nov 02 (Tuesday)
 - Investigation on training:
 - P40 new vs old code base:
 - Unstable training
 - Bug:
 - “Cannot perform reduction function max on tensor with no elements because the operation does not have an identity at ...”
 - Worse performance
 - Experiment on effect after ONCE_rotation_fixed (Oracle & naive DA on m2)
 - Got worse performance.
 - Investigation on configuration: learning rate is making a great difference
 - With lr: 0.072 \rightarrow 0.006
 - Oracle improved ~ 5 times (5.32 \rightarrow 25.6)
 - Naive DA on m2 improved (0.03 \rightarrow 3.3)
 - ROI:
 - dimension unmatched
 - Development: Plot mAP for all checkpoint for each class

Work Logs

- Nov 03 (Wednesday)
 - Investigation on training:
 - P40 new vs old code base:
 - Unstable training
 - Bug:
 - “Cannot perform reduction function max on tensor with no elements because the operation does not have an identity at ...”
 - Worse performance
 - Experiment on effect after ONCE_rotation_fixed (Oracle & naive DA on m2)
 - Got worse performance.
 - Investigation on configuration: learning rate is making a great difference
 - With lr: 0.072 \rightarrow 0.006
 - Oracle improved ~ 5 times (5.32 \rightarrow 25.6)
 - Naive DA on m2 improved (0.03 \rightarrow 3.3)
 - ROI:
 - dimension unmatched
 - Development: Plot mAP for all checkpoint for each class

Work Logs

- Nov 04 (Thursday)
 - Investigate the ROI
 - Modify the experimental set up to work with reverted rotation angle
 - Debug P40 for cuda error
- Nov 05 (Friday)
 - Create docker for ROI project and Xingxin's codebase
 - Run sample experiment on new docker to confirm consistent performances similar to previous environment

End of November 05th, Weekly Report

Weekly Progress Report

Nov 08 - 12th, 2021

Presented by Yannis (Yiming) He 84189287

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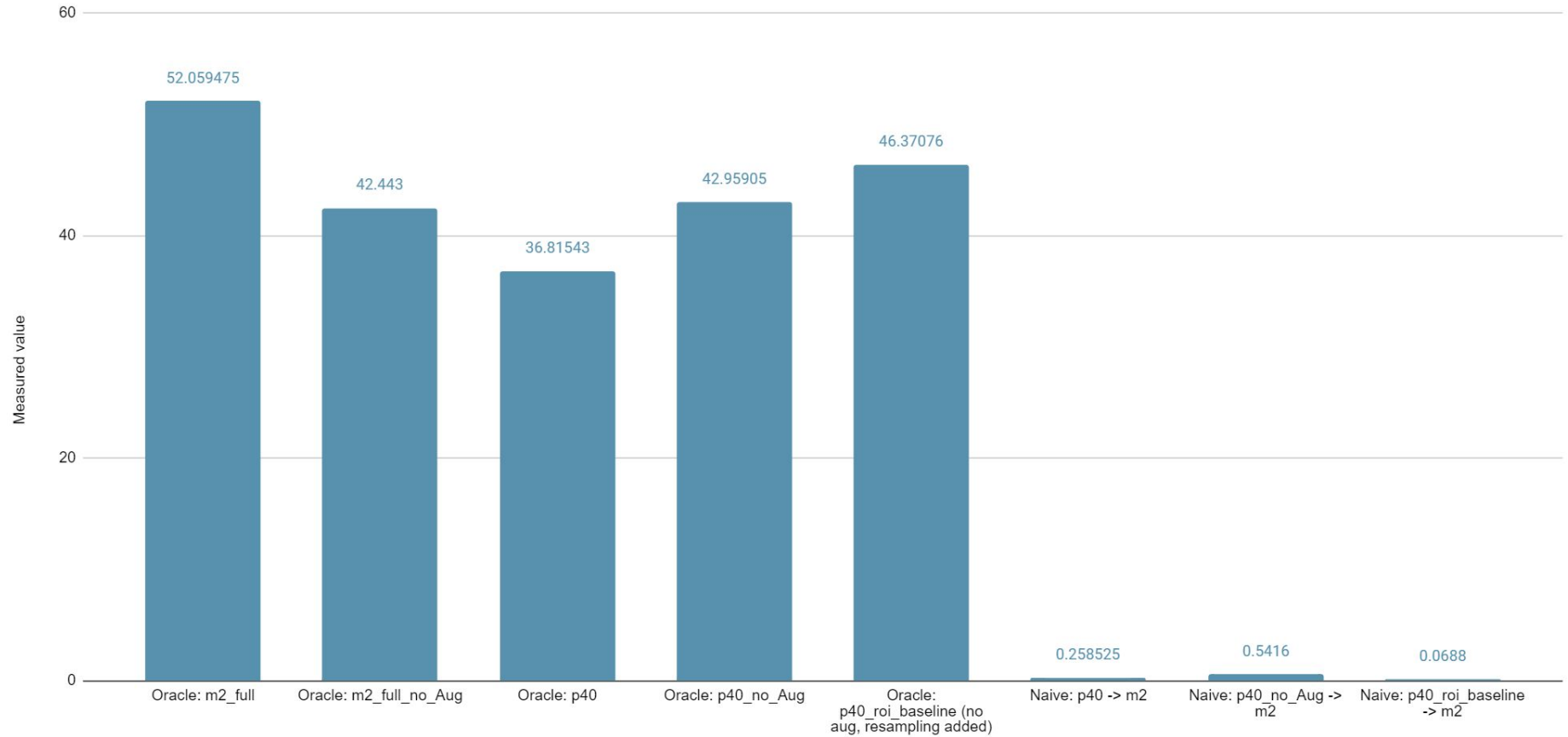
Manager: Bingbing Liu 00435285
Supervisor: Eduardo Corral Soto 00407762



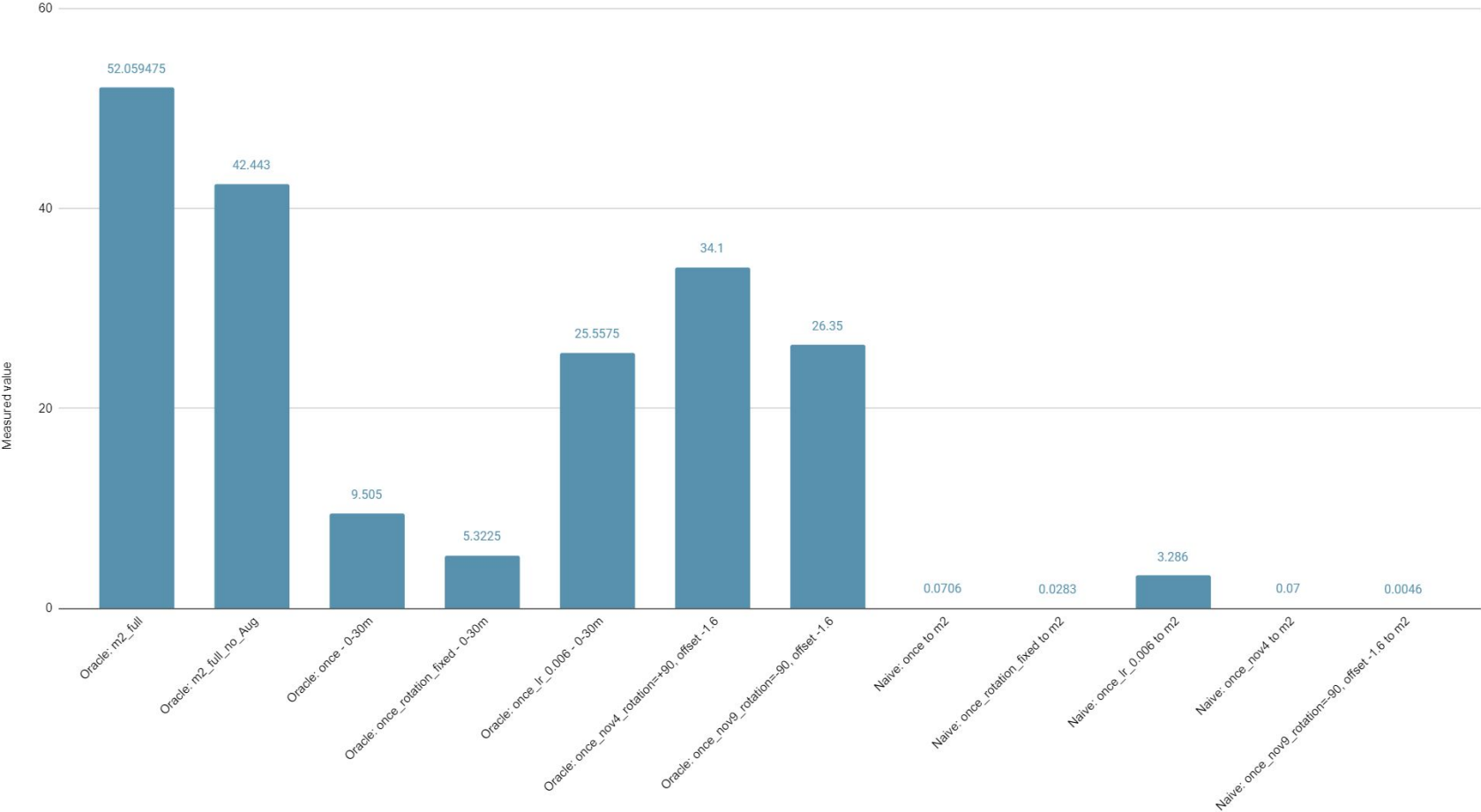
Weekly Summary

- **Done:**
 - Investigate why the inverse performance (oracle vs naive) occurred
 - Xingxin's codebase hasn't invert the rotation angle from 90 to -90 degree
 - Synced Xingxin's changes for p40
 - Investigated the inverse behavior for rotation → +90 degree is the correct one
 - Experiment: ONCE with ~~corrected~~ rotation angle (-90) and perform oracle and naive DA on m2
 - Experiment: ONCE with corrected rotation angle (+90) and offset = 0
 - Experiment: P40, original ROI + resampling for missing gt_box
- **In Progress:**
 - Region of Interest (ROI):
 - ➡ - Debug ROI, studying the code (half way through)
 - Evaluate P40 with ROI_x_flip_prob = 0.5 on M2 dataset
 - Visualization every frame BEV
 - to understand the false positive/negative
- **Recent Goals:**
 - Development: Plot mAP for all checkpoint for each class
- **TODO:**
 - Understanding: once_metric vs kitti metric
 - Prepare a decision diagram & flowchart for testing pipeline
 - 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)

P40 Measured value



ONCE dataset



Work Logs

- Nov 08 (Monday)
 - Investigate why the inverse performance (oracle vs naive) occurred: code, configuration, etc.
 - Trained function (no difference)
 - Configuration
 - Data processor
 - Xingxin:
 - Offset: [0, 0, -1.6]
 - Rotation: 1.5708
 - Yannis:
 - Offset: [0, 0, 0]
 - Rotation: -1.5708
- Nov 09 (Tuesday)
 - Trained once with “Offset: [0, 0, -1.6] & Rotation: -1.5708” (GPU 4,5,6)
 - Result: worse performance in oracle when having -90 degree
 - Discussing with group, +90 should be the correct one
 - Experiment on the effect of offset
 - Run p40 with resampling embedded

Work Logs

- Nov 10 (Wednesday)
 - Get project comparison software
 - Experiment: ONCE with ~~corrected~~ rotation angle (-90) and perform oracle and naive DA on m2
 - Experiment: P40, original ROI + resampling for missing gt_box
- Nov 11 (Thursday)
 - Investigate the effect of offset:
 - Experiment with offset = 0 vs -1.6 for each rotation setting (+- 90)
 - Experiment ROI baseline
 - Oracle & naive on m2
- ➡ Nov 12 (Friday)
 - Debugged ROI POINT_CLOUD_RANGE from crashing caused by dimension unmatched
 - Experiment on modifying POINT_CLOUD_RANGE and learn the pattern
 - Go through code base and check computation
 - Research on original repo
 - Paper selection for Next Friday's paper reading session

End of November 12th, Weekly Report

Weekly Progress Report

Nov 15 - 19th, 2021


Presented by Yannis (Yiming) He 84189287

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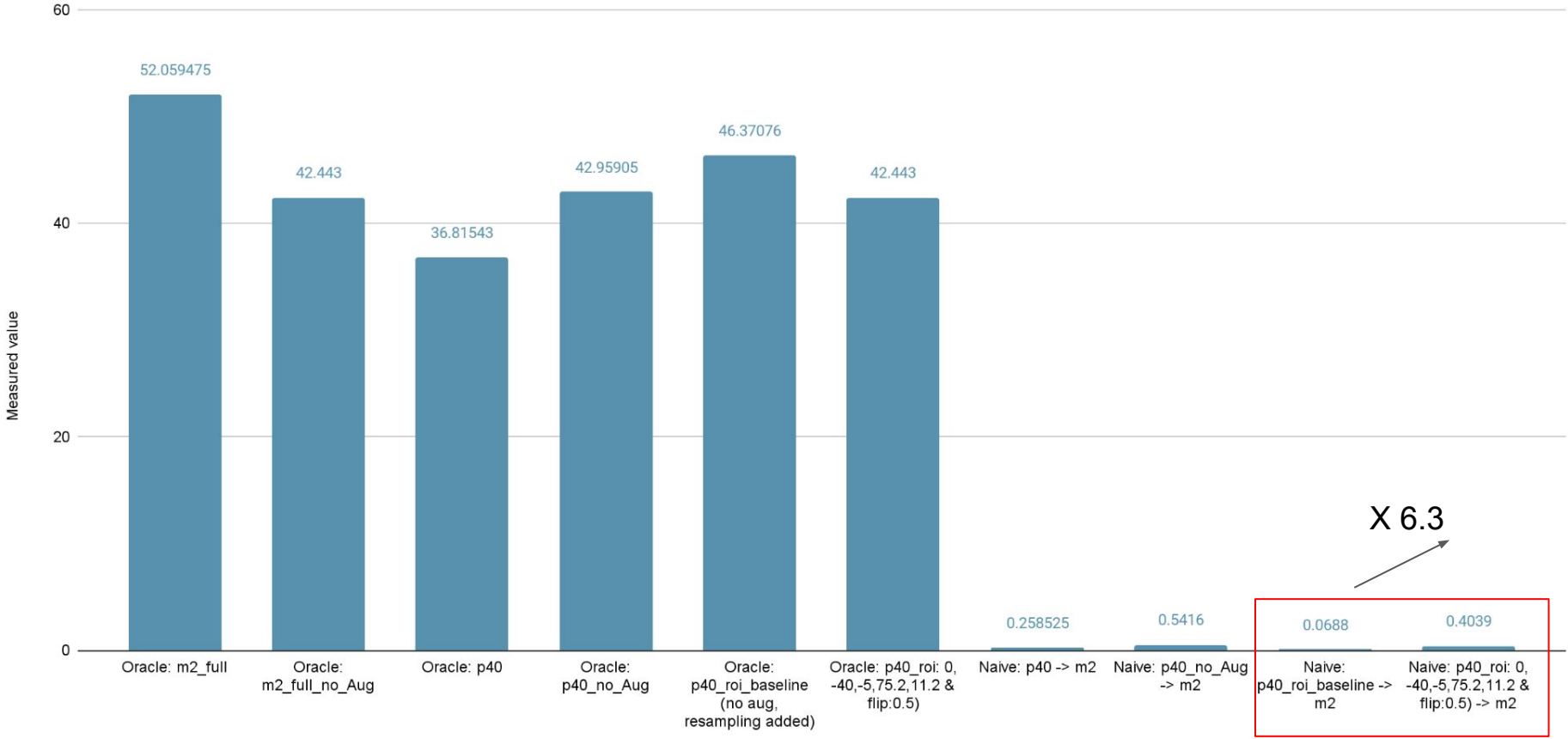
Manager: Bingbing Liu 00435285
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Weekly Summary

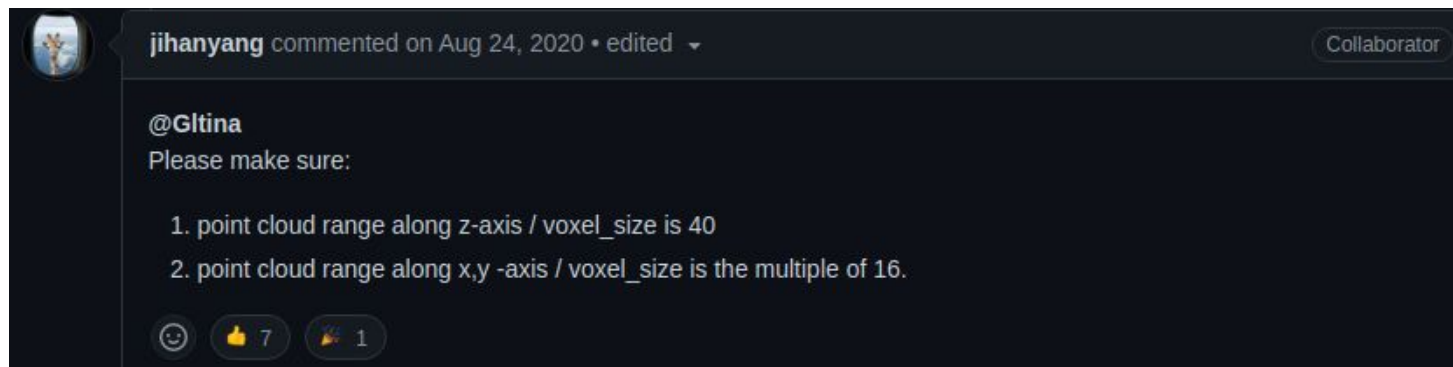
- **Done:**
 - Investigate why the inverse performance (oracle vs naive) occurred
 - Code, configuration, etc.
 - Debugged ROI POINT_CLOUD_RANGE from crashing caused by dimension unmatched
 - Selected 2-3 papers for paper reading session on Nov 19
 - Oracle & Naive experiment for P40 with ROI_x_flip_prob = 0.5 on M2 dataset (gpu 0,1,2,3)
 - Analyze papers and Create slides for paper reading session
- **In Progress:**
 -  - Region of Interest (ROI):
 - Train P40 with densified point clouds with new ROI with/without augmentation
- **Recent Goals:**
 - Visualization every frame BEV
 - to understand the false positive/negative
- **TODO:**
 - Understanding: once_metric vs kitti metric
 - Prepare a decision diagram & flowchart for testing pipeline
 - Development: 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)

P40 Measured value



Work Logs

- Nov 15 (Monday)
 - Debugged ROI POINT_CLOUD_RANGE from crashing caused by dimension unmatched
 - POINT_CLOUD_RANGE: [0, -40, -5, 75, 10, 7]
>>
 - POINT_CLOUD_RANGE: [0, -40, -5, 75.2, 11.2, 7]



- Selected 2-3 papers for paper reading session on Friday
- Met Eduardo after meeting for next step discussion

Work Logs

- Nov 16 (Tuesday)
 - Papers selection, with official code:
 - Self-Supervised Pillar Motion Learning for Autonomous Driving
 - Visualizing Adapted Knowledge in Domain Transfer
 - Regressive Domain Adaptation for Unsupervised Keypoint Detection
 - Towards Semantic Segmentation of Urban-Scale 3D Point Clouds: A Dataset, Benchmarks and Challenges

Work Logs

- Nov 17 (Wednesday) (cont')
 - Papers selection, No official code:
 - DRANet: Disentangling Representation and Adaptation Networks for Unsupervised Cross-Domain Adaptation
 - Continual Adaptation of Visual Representations via Domain Randomization and Meta-learning
 - Source-Free Domain Adaptation for Semantic Segmentation
 - GeoSim: Realistic Video Simulation via Geometry-Aware Composition for Self-Driving
 - Informative and Consistent Correspondence Mining for Cross-Domain Weakly Supervised Object Detection
 - Generalized Domain Adaptation
 - Self-adaptive Re-weighted Adversarial Domain Adaptation
 - DA-DETR: Domain Adaptive Detection Transformer by Hybrid Attention
 - Next step:
 - Eduardo will use his model-free python code to densify p40 point cloud (To be received)
 - Train p40 on the densified point cloud without augmentation (except for vertical flipping)
 - Train p40 with augmentation (only insertion of GT object)
 - Need to run python script to generate object database

Work Logs

➡ Nov 18 (Thursday)

- Experiment: Naive DA: p40 (roi: 0,-40,-5,75.2,11.2 & flip:0.5)
 - Improvement:
 - Baseline mAP: 0.0688
- Current mAP: 0.4039 (626%)
- Papers selection:
 - ✓ - Unsupervised Domain Adaptation in Semantic Segmentation via Orthogonal and Clustered Embeddings
 - Self-Adversarial Disentangling for Specific Domain Adaptation
 - Semi-supervised Domain Adaptation based on Dual-level Domain Mixing for Semantic Segmentation
 - ✓ - Target-targeted Domain Adaptation for Unsupervised Semantic Segmentation
- Analyze papers and Create slides for paper reading session
- Met with Yang to discuss Carla's vs P40&ONCE's performance for M2 Naive DA

Work Logs



Nov 19 (Friday)

- Slides & Paper sharing presentation
- Region of Interest (ROI):
 - Train P40 with densified point clouds with new ROI with/without augmentation

End of November 19th, Weekly Report

Weekly Progress Report

Nov 22 - 26th, 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:**
 - Region of Interest (ROI):
 - Trained P40 with densified point clouds with new ROI without augmentation
 - Investigated m2 evaluation performance difference with different configuration (Yang's configuration vs mine)
 - Region of Interest (ROI):
 - Evaluate P40 with densified point clouds with new ROI without augmentation
 - Train P40 with pointcloud $z_offset = -0.6$
- **In Progress:**
 - Region of Interest (ROI):
 - Comparing performance with Aich's code base
 - Generate info files for non-augmentation training
 - Research state-of-the-art domain adaptation technique for potential individual research direction
- **Recent Goals:**
 - Train p40 with augmentation (only insertion of GT object)
 - Visualization every frame BEV
 - to understand the false positive/negative
- **TODO:**
 - Understanding: once _metric vs kitti metric
 - Prepare a decision diagram & flowchart for testing pipeline
 - Development: 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

- Nov 22 (Monday)
 - Region of Interest (ROI):
 - Train P40 with densified point clouds with new ROI without augmentation (gpu: 0-3)
 - Generate info files for augmentation training
 - Need to run python script to generate object database
 - Research state-of-the-art domain adaptation technique for potential individual research direction
 - Meeting Yang
- Nov 23 (Tuesday)
 - Meeting with Yang to discuss difference in m2 evaluation
 - Meeting with Thomas:
 - Rank board model
 - Runtime (10Hz)
 - Performance
 - Find a topic
 - Innovation:
 - Training technique, data augmentation, loss function, module, etc
 - Find a baseline
 - Code

Work Logs

- Nov 24 (Wednesday)
 - Region of Interest (ROI):
 - Train P40 with densified point clouds with new ROI without augmentation (gpu: 0-3)
 - Train P40 with pointcloud `z_offset = -0.6`
 - Generate info files for augmentation training
 - Compare Aich's configuration
 - Study code for info file generation
 - Research paper reading
- Nov 25 (Thursday)
 - Region of Interest (ROI):
 - Test previous p40 model on `roi_dense` codebase
 - Download Aich's codebase
 - Evaluate P40 with `z_offset = -0.6`
 - Debug `nms_min_radius` → the hyper-parameter itself doesn't get called. However, changing the value causes parameter loading error
- Nov 26 (Friday)
 - Meeting with Aich, Eduardo, Xingxin, Yang for reproducing Aich's result
 - Train ONCE Oracle
 - Generate info files for dense p40 dataset (Thanks Xingxin for helping)

End of November 26th, Weekly Report

Weekly Progress Report

Nov 29 - Dec 3rd, 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:

- Generated info files for dense p40
- Get Aich's codebase to produce ONCE → M2 result
 - Compared Oracle performance with Aich's code base
 - Test naive performance
 - 80th epoch generated by trained
 - vs 80th epoch trained by Aich
 - vs 80th epoch RE-trained by Aich
 - vs 80th epoch RE-trained by Yannis
- Backed up ONCE & M2 dataset on gx9
- Run script to generate the infor files for ONCE and make sure the new info file can produce the same results
 - Evaluate 80th epoch & plot the bar chart
- Wiki for the *info generation branch* & *ONCE_Benchmark branch*

- In Progress:

- Generate ONCE info files for **densified** pointcloud (pointcloud to be given by Eduardo)
- Get the newest merged codebase from Xingxin and configure towards gx9

- Recent Goals:

- Train densified ONCE on Xingxin's new codebase

- TODO:

- P40 oracle training on undensified data (to make sure it's working)
- Train p40 with augmentation (only insertion of GT object)
 - to understand the false positive/negative
- Experiment on p40 densified pointcloud (baseline, ROI, z_offset, etc)

Work Logs

➡ Nov 29 (Monday)

- Use ONCE checkpoint epoch 80th given by Yang (trained by Aich) to evaluate on ONCE using ONCE metric
 - Compare results: Yang's vs Mine
 - Oracle:
 - Cannot perform since no one else has done oracle testing
 - Naive:
 -
 - Evaluate ONCE checkpoint s on m2 for naive DA for both checkpoint
 -

End of December 3rd, Weekly Report