# Weekly Progress Report

Dec 6th - Dec 10th, 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

HUAWEI

**Weekly Summary**

- **Done:**
    - Reproduced the results from Xingxin's once_kitti-format_z_offset=1.2
    - Compare performance for once-z_offset=1.2 vs 1.25 → 1.25 is better
    - Verifying the effectiveness of densified pointcloud on ONCE
        - Generate ONCE info files for **densified** pointcloud with z_offset=1.25
        - Experiment on kitti-style-densified(MFD)-z_offset1.25-Naive DA
        - Densified M2 validation set and repeat the Naive DA on M2_MFD
- **In Progress:**
    - Fine-tuning (train on ONCE_MDF → test on M2)
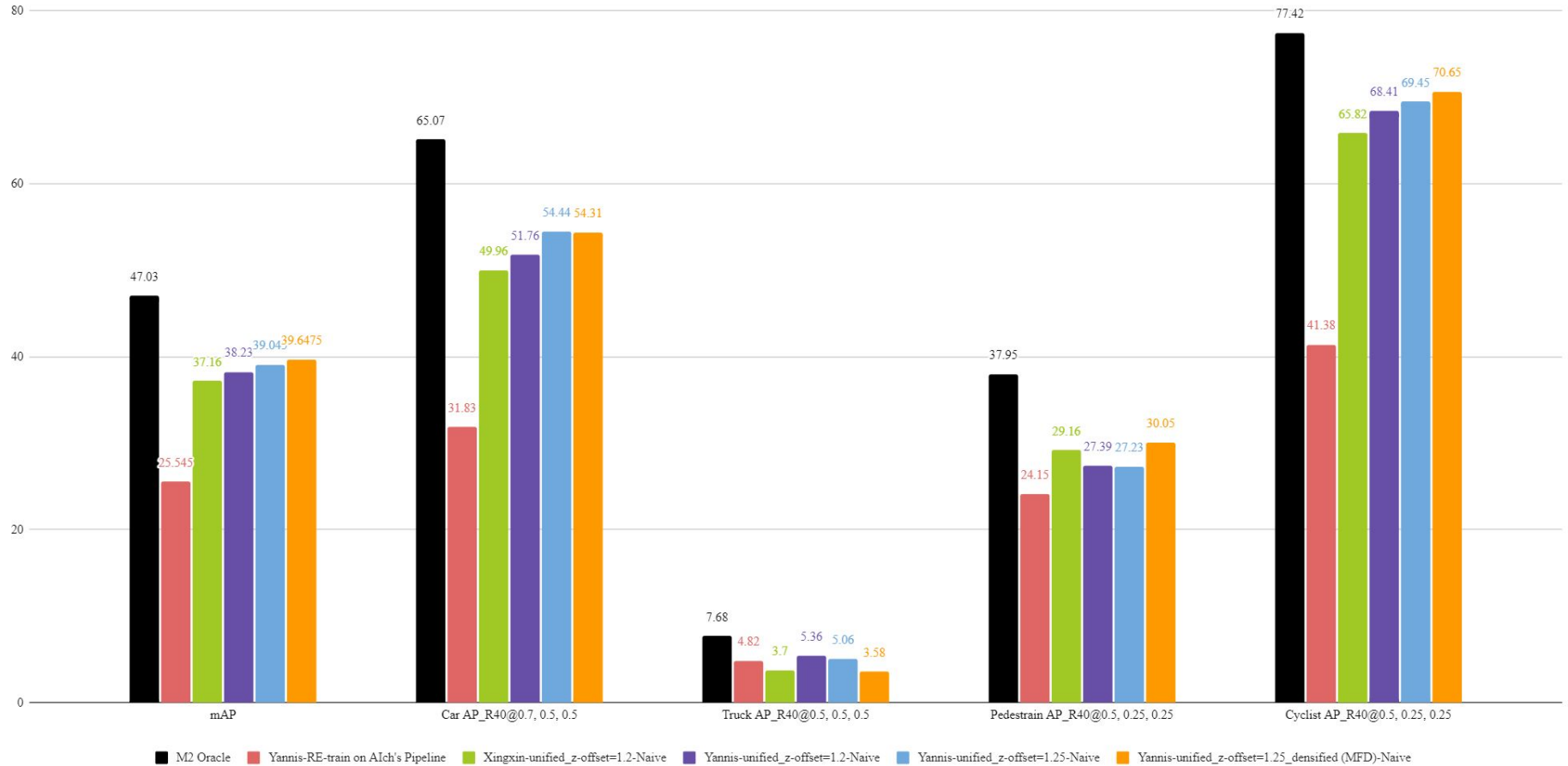    - MFD parameter experiment (optimize the hyper-parameters)
- **Recent Goals:**
    - Incorporate Mrigank's DSBN
    - MFD range experiment
        - No need to densified nearby object. Only densify far-away objects
- **TODO**:
    - Implement densification on P40 (if densification is working)
    - P40 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)

ONCE -> M2 DA

Legend: M2 Oracle; Yannis-RE-train on AIch's Pipeline; Xingxin-unified_z-offset=1.2-Naive; Yannis-unified_z-offset=1.2-Naive; Yannis-unified_z-offset=1.25-Naive; Yannis-unified_z-offset=1.25_densified (MFD)-Naive

**Work Logs**

- Dec 6 (Monday)
    - Reproduced Xingxin's result on "once_kitti-format_offset1.2"
    - TODO:
        - Generate info files for "once_not-densified_kitti-format_offset1.25"
        - Train on "once_not-densified_kitti-format_offset1.25" and compare performance with offset 1.2
            - Test on m2 to compare
        - $X$ = max (performance of offset=1.2, performance of offset=1.25)
        - Prepare dataset from
            - "once_densified_once-fotmat_offset0_wo_info" → "once_densifed_**kitti**-format_offset$X$_w_info"
        - Train on the "once_densifed_**kitti**-format_offset$X$"
            - Test on m2

**Work Logs**

- Dec 7 (Tuesday)
    - Generated info files for "once_not-densified_kitti-format_offset1.25"
    - Experiment: "once_not-densified_kitti-format_offset1.25"
        - compared performance with offset 1.2 → **z_offset 1.25 is better**
    - 1.25 = max (performance of offset=1.2, performance of offset=1.25)
    - Prepared dataset (Thanks to Xingxin's help):
        - From:      "once_densified_once-fotmat_offset0_wo_info"
        - generated: "once_densifed_**kitti**-format_offset**1.25_w**_info"
    - Experiment: "once_densifed(MFD)_**kitti**-format_offset1.25" → **current best** Naive DA

Model Free Densification

**Work Logs**

- Dec 8 (Wednesday)
    - Add bar for once without rotation (from Aich's slides)
    - Densified M2 validation set and repeat the Naive DA on M2_MFD
    - MFD range experiment
        - No need to densified nearby object. Only densify far-away objects
    - MFD parameter experiment (optimize the hyper-parameters)
    - Fine-tuning (train on ONCE_MDF → test on M2)
    - Incorporate Mrigank's DSBN

**Work Logs**

Dec 9-10 (Thursday & Friday)
- To compare with results from Mrigank, we repeat Experiments using Best Checkpoint:
    1. Train on ONCE_MFD                                    | evaluate on M2
    2. Train on ONCE_MFD , finetune on M2          | evaluate on M2
    3. Train on ONCE_MFD , finetune on M2_MFD | evaluate on M2_MFD
    4. Train on ONCE_MFD , finetune on M2_MFD | evaluate on M2_MFD

# End of December 6th, Weekly Report

# Weekly Progress Report

Dec 13th - Dec 17th, 2021

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

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LiDAR Domain Adaptation

Manager: Bingbing Liu 00435285
Supervisor: Eduardo Corral Soto 00407762

**Weekly Summary**

- **Done:**
    - Experiment on ONCE_offset & Naive DA on M2
    - Fine-tuning (train on ONCE_MDF → test on M2)
- **In Progress:**
    - MFD parameter experiment (optimize the hyper-parameters)
        - Max_Point_Per_Voxel (MPPV) = 5, 10
        - Finetunne_Learning Rate (FTLR)= 3e-4, 3e-5
    - Experiments on new ONCE-dataset (currently generating by Eduardo, to be copied to gx9)
- **Recent Goals:**
    - Incorporate Mrigank's DSBN
    - MFD range experiment
        - No need to densified nearby object. Only densify far-away objects
- **TODO**:
    - Implement densification on P40 (if densification is working)
    - 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)
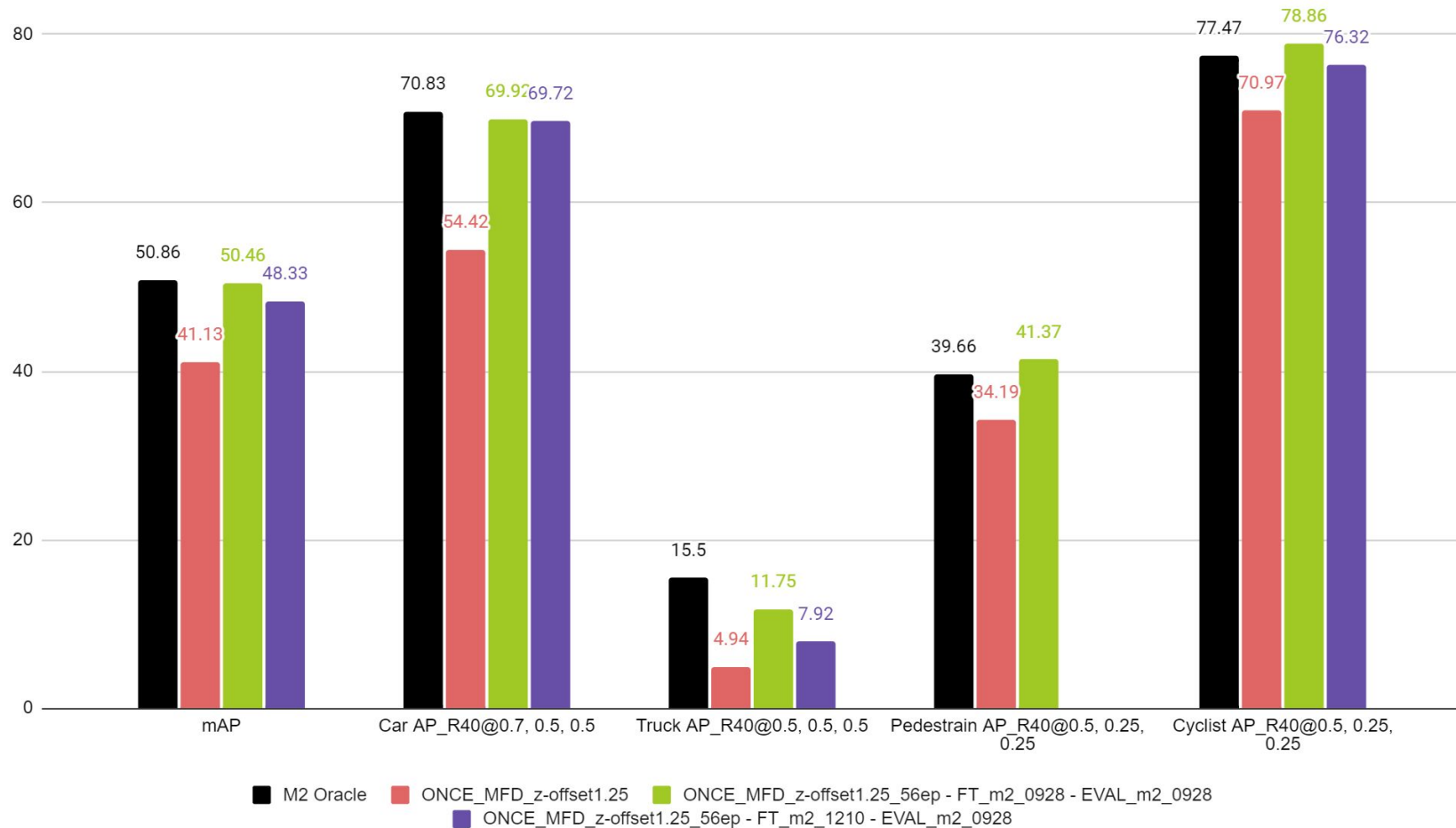
**ONCE -> M2 Naive DA (all using 80th epoch)**
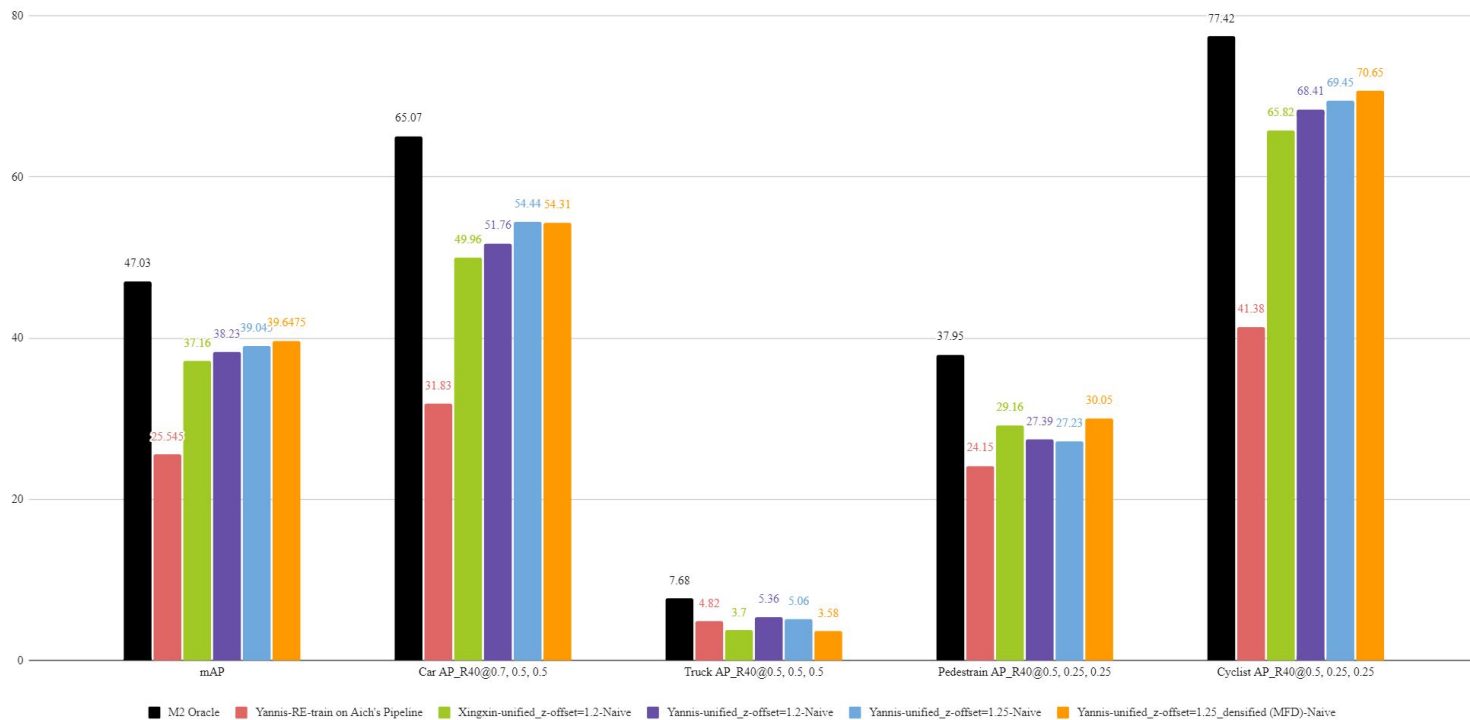
**Conclusion:**

1. For ONCE → M2: add z_offset=1.25 is the best
2. Densification on source dataset increase performance (specially for small objects, i.e. pedestrian & cyclist)

ONCE -> M2 Finetune

Legend:
- M2 Oracle (black)
- ONCE_MFD_z-offset1.25 (red)
- ONCE_MFD_z-offset1.25_56ep - FT_m2_0928 - EVAL_m2_0928 (green)
- ONCE_MFD_z-offset1.25_56ep - FT_m2_1210 - EVAL_m2_0928 (purple)

| Metric | M2 Oracle | ONCE_MFD_z-offset1.25 | FT_m2_0928 | FT_m2_1210 |
|---|---|---|---|---|
| mAP | 50.86 | 41.13 | 50.46 | 48.33 |
| Car AP_R40@0.7, 0.5, 0.5 | 70.83 | 54.42 | 69.92 | 69.72 |
| Truck AP_R40@0.5, 0.5, 0.5 | 15.5 | 4.94 | 11.75 | 7.92 |
| Pedestrain AP_R40@0.5, 0.25, 0.25 | 39.66 | 34.19 | 41.37 | |
| Cyclist AP_R40@0.5, 0.25, 0.25 | 77.47 | 70.97 | 78.86 | 76.32 |

**Work Logs**

| Max_Point_Per_Voxel | LR = 3e-4 | LR = 3e-5 |
|---|---|---|
| 5 | in-progress | TBD |
| 10 | TBD | TBD |

# End of December 6th, Weekly Report