

# Weekly Progress Report

July 5-9th, 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



- July 5 (Monday)
  - Paper reading: *Depth Completion from Sparse LiDAR Data with Depth-Normal Constraints* (done)
  - Paper reading: *TSIT: A Simple and Versatile Framework for Image-to-Image Translation* (TODO)
  - Discuss depth completion normal vector with Thomas, Try add 3D vectors as input into lcpss
    - Thomas's comment, the im\_range's visualization has a wave shape, which doesn't seems right
      - Visualize proj\_mask & raw\_normal (TODO)
  - Meeting with Eduardo for cv2.inpaint delivery
    - Adding inpaint as an option for depth completion method
    - Visualize im\_xyz, with inpaint on nuscenese
    - Visualize im\_gt with inpaint
      - Compare the performance with current 3x3 method
    - For inpaint:
      - flag=TELEA
      - Radius = 3-5 (to be determined based on nuscenese's completion visualization)
  - Train model with completed depth on gx9 with gpu 0,1

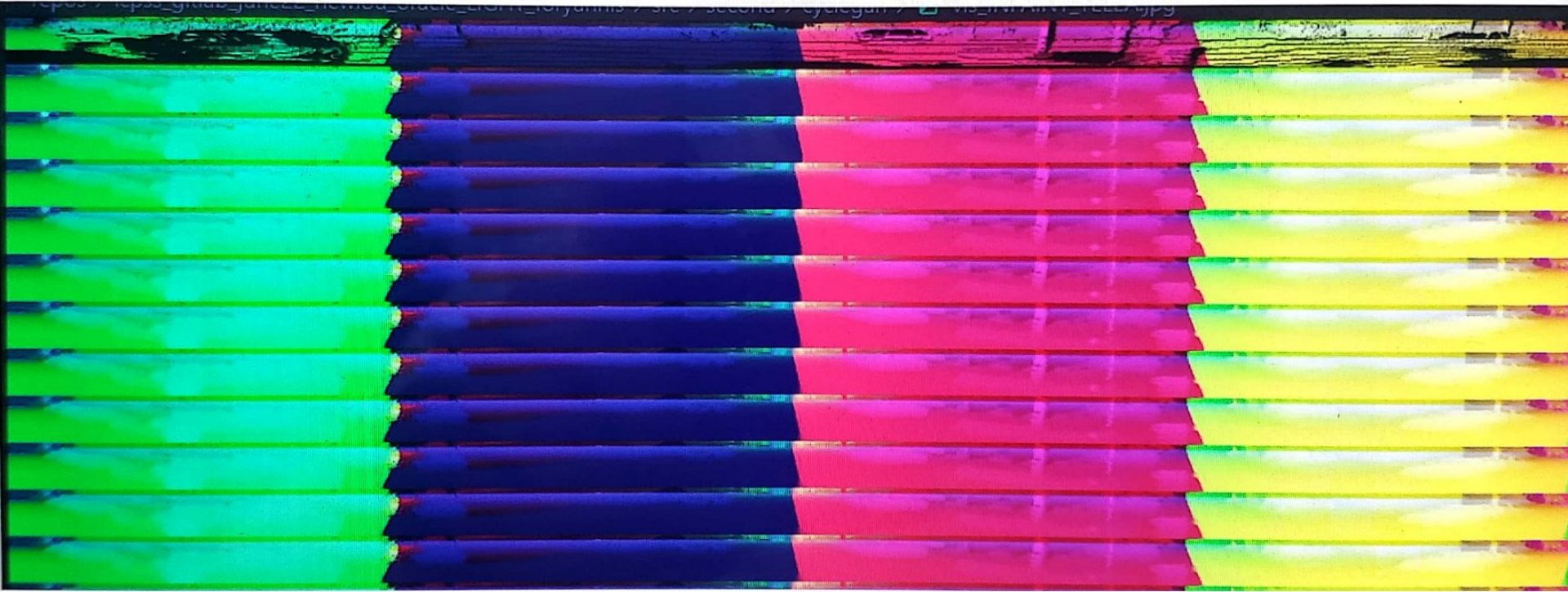
## Depth completion on x,y,z coordinate using cv2.inpaint

- Flag = **INPAINT\_NS**
- Radius: 0 - 11

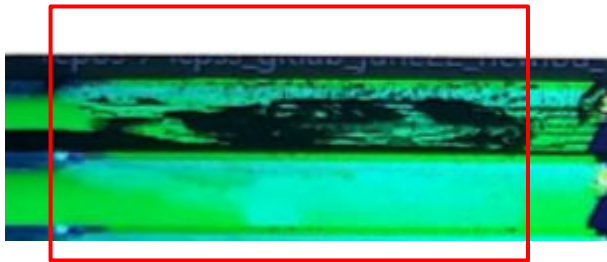


## Depth completion on x,y,z coordinate using cv2.inpaint

- Flag = `INPAINT_TELEA`
- Radius: 0 - 11



# Depth completion on x,y,z coordinate using cv2.inpaint - Discovery



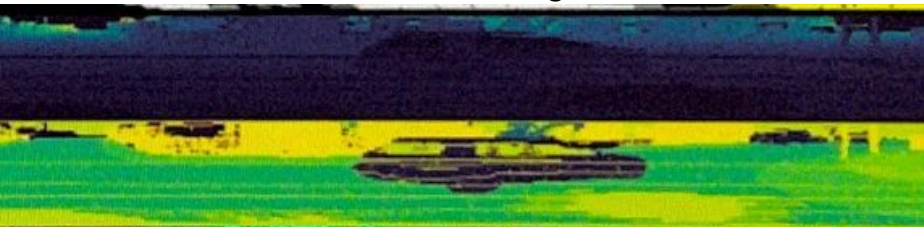
- If we are filling all holes, we could lose information such as windows.
  - We **are able** to select the region to fill and not fill by setting specific inpaint mask.
    - But how do we decide where to fill?



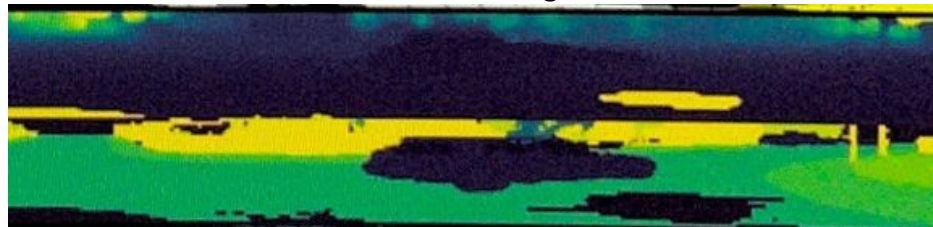
- July 6 (Tuesday)
  - Visualize proj\_mask & raw\_normal (done)
    - Found a bug in mask (solved)
  - Meeting with Thomas @ 2:30pm
    - Found a bug in the 3D normal generation (solved)
      - Clean up the code before sending to Eduardo (TODO)
    - Suggested his algorithm for im\_gt instead of inpaint.
  - Adding inpaint as an option for depth completion method (in progress)
- July 7 (Wednesday)
  - Adding inpaint as an option for depth completion method
  - Visualize im\_xyz, with inpaint on nusenes
  - Visualize im\_gt with inpaint
    - Compare the performance with current 3x3 method
  - Find inpaint's mechanism (make sure its not interpolation for ground truth)
  - Find the ideal radius for inpaint
    - Radius = 3-5 (to be determined based on nusenes's completion visualization)
  - Train model with inpaint

- July 8 (Thursday)
  - Merge code base: light weight(for debug) → actually code base (for training)
  - Modify Thomas's network (for im\_range) to work with ground\_truth\_label: im\_gt
  - Visualize the result
  - Meet with Eduardo for next step
    - Fix the im\_xyz visualization (currently have a channel shift, see below)
    - Further modify the hole filling pipeline to fill im\_xyz, im\_remission
    - Create cv.inpaint pipeline and compare performance
  - Request access for desktop for graphics interface for many visualization tasks
    - Waiting for Arash's Response

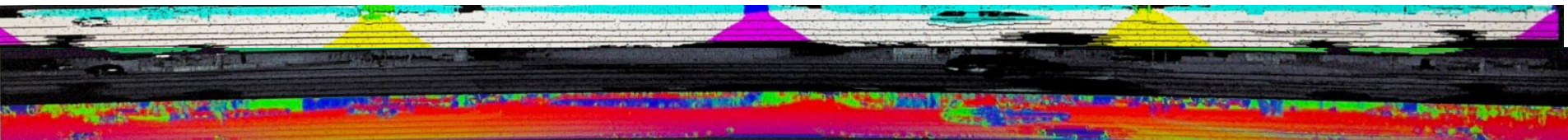
*Before Filling*



*After Filling*



*Im\_xyz, Remission & Surface Normal*



- July 9 (Friday)
  - Fix the im\_xyz visualization
  - Further modify the hole filling pipeline to fill im\_xyz, im\_remission
  - Create cv.inpaint pipeline and compare performance
  - Visualize the result for hole filling for the new modifications
  - Noah's Ark Lab Canada Forum @ 11am:
    - Generalizable Cross-graph embedding for GNN-based congestion prediction
  - Merge to a new code base (debugged by Eduardo)



# End of July 9th, Weekly Report

# Weekly Progress Report

July 12-16th, 2021

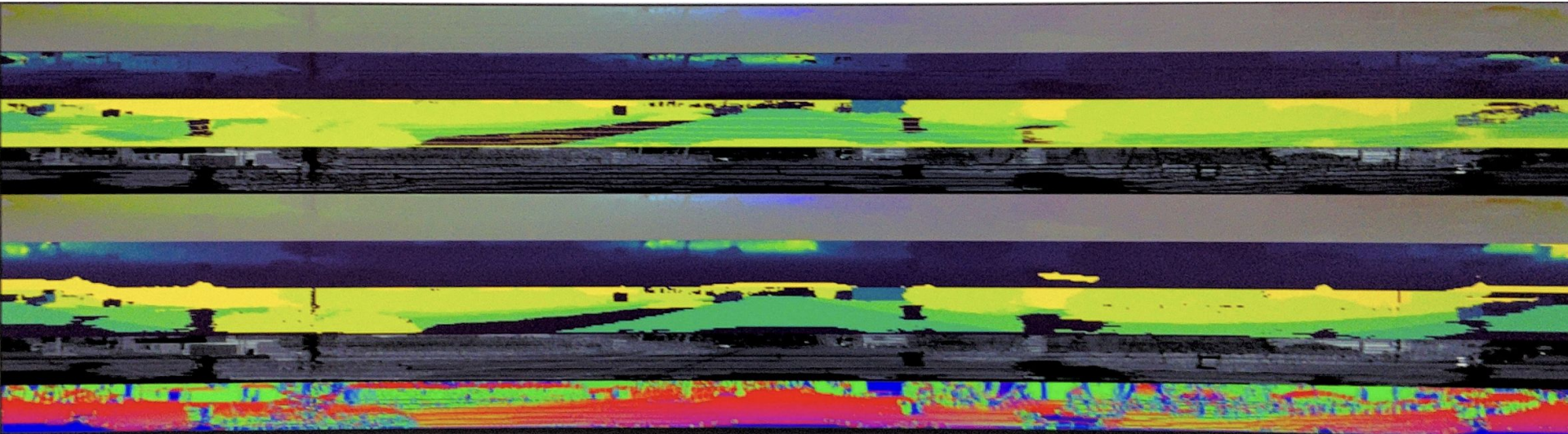
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- July 12 (Monday)
  - Further modify the hole filling pipeline to fill im\_xyz, im\_remission
  - Create cv.inpaint pipeline and compare performance
  - Visualize the result for hole filling for the new modifications
- July 13 (Tuesday)
  - Debug the hole filling pipeline: Issue with gpu 0, 1 on gx9
  - Milestone completed! deliver the code base to Eduardo





# Holes Filling (Top: before vs Bottom: after)

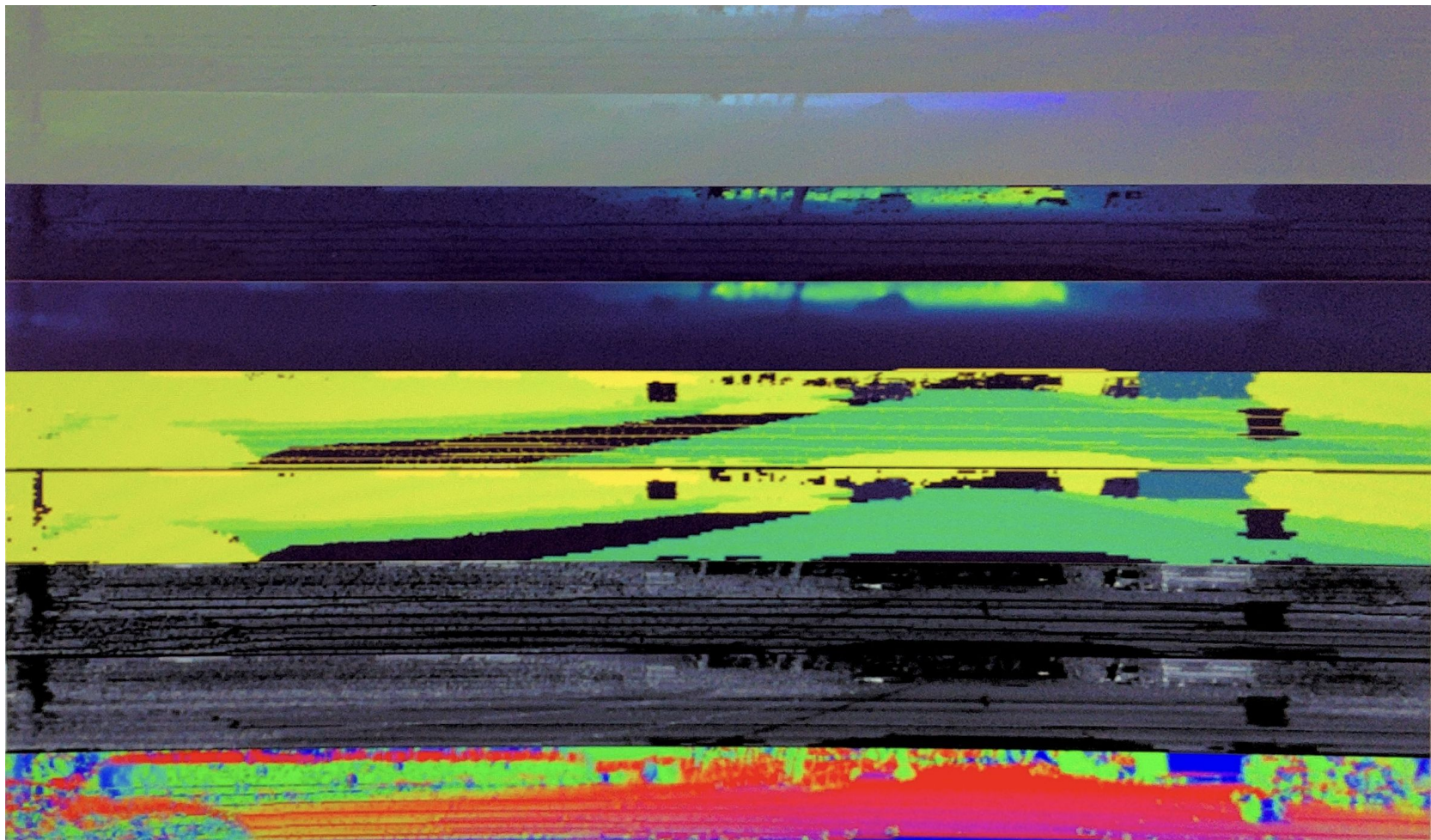
im\_xyz

im\_range

im\_gt

im\_remission

3D normal vector

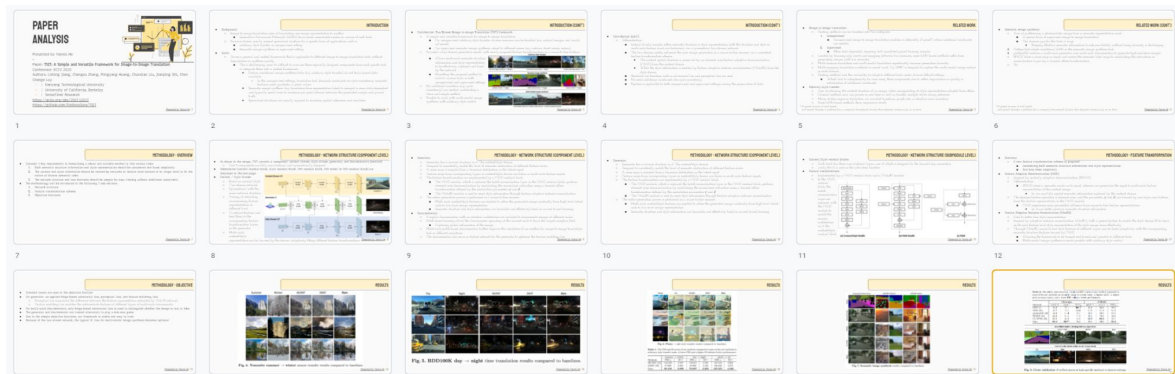


- July 14 (Wednesday)
  - Shift focus to TSIT
  - High level goal:
    1. Get TSIT to work on RGB images, reproduce numbers reported by paper & github repo
    2. Study code and decide if we
      - a. extract TSIT from that repo and integrate into our framework. So it consumes LiDAR data and sends its outputs to the semantic segmentation networks

OR

- b. Just add semantic segmentation network inside of TSIT

- Paper reading: *TSIT: A Simple and Versatile Framework for Image-to-Image Translation*
- Clone TSIT from github





- July 15 (Thursday)
  - Finished Paper analysis: *TSIT: A Simple and Versatile Framework for Image-to-Image Translation*
  - Replicate paper results on RGB images
    - Install required package to dockers
    - To replicate result of 3 RGB tasks in the repo:
      1. Arbitrary Style Transfer (AST): in progress
      2. Semantic image synthesis (SIS): used Cityscapes dataset (copying to gx9)
      3. Multi-modal image synthesis (MMIS): which needs BDD100K dataset (cannot download)
    - Tried to download pre-trained model (~~no access to Google drive, asked Bingbing, waiting for response~~) Asked Eduardo to download
    - Need GPU to train a TSIT model (~~all GPUs are currently occupied~~) training with gpu7
- July 16 (Friday)
  - Noah's Ark Lab Canada Forum @ 11am:
    - i. Knowledge distillation with noisy labels
  - Replicate paper results on RGB images (cont')
    - i. Tested the pre-trained model for AST (with visualization)
    - ii. Study the code
    - iii. Waiting for cityscapes dataset
      - Train a model
      - Test the pretrain model

# End of July 16th, Weekly Report

# Weekly Progress Report

July 19-23rd, 2021

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- July 19 (Monday)
  - Visualize TSIT results (AST, SIS)
  - Work on the ICRA report and re-style into Huawei Format
  - Request access to computer-15
- July 20 (Tuesday)
  - Copy checkpoints & datasets (cityscapes) from gx9 to computer-15
  - Finished re-styling the ICRA report into Huawei Format
  - Huawei iLearning: *Mission and Responsibilities of the Strategic Reserve Team of Smart Car Solutions*
    - Finished Unit 1 (3 in total)
- July 21 (Wed)
  - Received access to my desktop
  - Compare their pretrain vs the one I trained
  - Look into replacing lcpss with TSIT
- July 22 (Thursday)
  - Docker set up (different from gx9)
    - Waiting for no machine set up
  - Learning the code: how to visualize training progress
    - Look into the method to visualize it in the webpage
- July 23 (Friday)
  - Find out the connection point for the pipeline:
    - Look into input (checkout difference between dataloader of HYLDA and TSIT)
    - Look into output (how to connect TSIT to the SALSA)
  - Is there a paper session today?



# End of July 23rd, Weekly Report



# Weekly Progress Report

July 26-30th, 2021

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- July 26 (Monday):
  - Compare the difference between lcpss vs TSIT
  - Look into TSIT dataloader
    - i. What information is contained
    - ii. How to use this dataloader
- July 27 (Tuesday):
  - Meeting with Richard (learn about his experience with developing a dataloader for a new model)
  - Read through the dataset.py, trainer.py, iter\_counter.py, train.py for TSIT
    - i. Map-style dataset, same as HYLDA, which is good
- July 28 (Wednesday):
  - Start building dataloader for Semantic KITTI for TSIT
    - i. Load data, projection
- July 29 (Thursday):
  - Start building dataloader for nuScenes for TSIT
    - i. Load data, projection
- ➡ - July 30 (Friday):
  - Get 5 inputs (x, y, z, range, remission) into TSIT
  - Test Performance of TSIT working with LiDAR projected images

# End of July 30th, Weekly Report