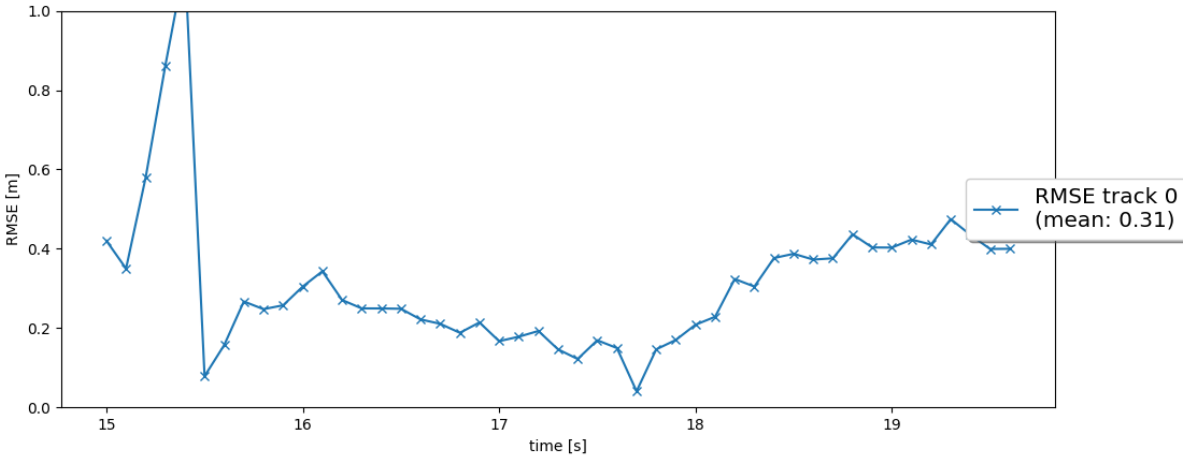
Writeup: Track 3D-Objects Over Time

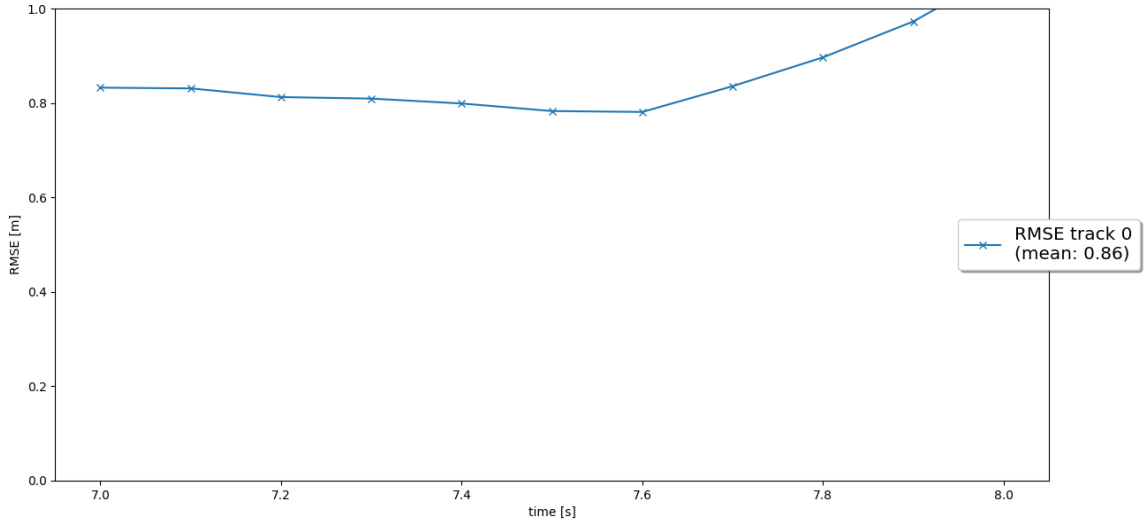
Please use this starter template to answer the following questions:

1. Write a short recap of the four tracking steps and what you implemented there (filter, track management, association, camera fusion). Which results did you achieve? Which part of the project was most difficult for you to complete, and why?

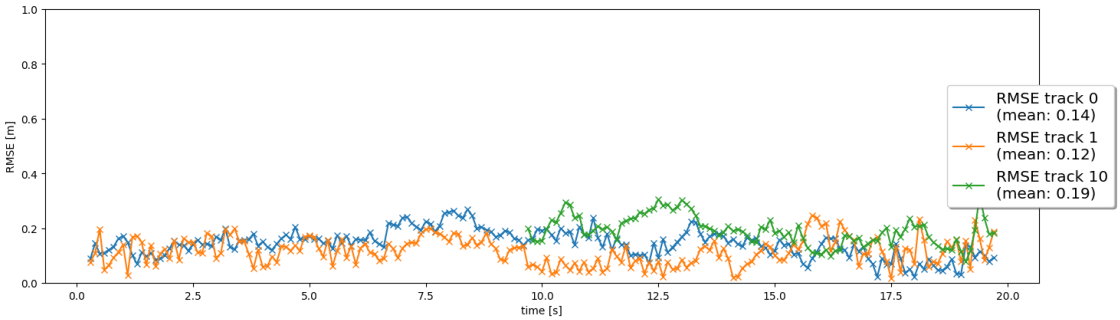
1. Filter: implemented an EKF filter to track a single object over a period of time, using LiDAR measurements. Achieved a mean rmse of 0.31



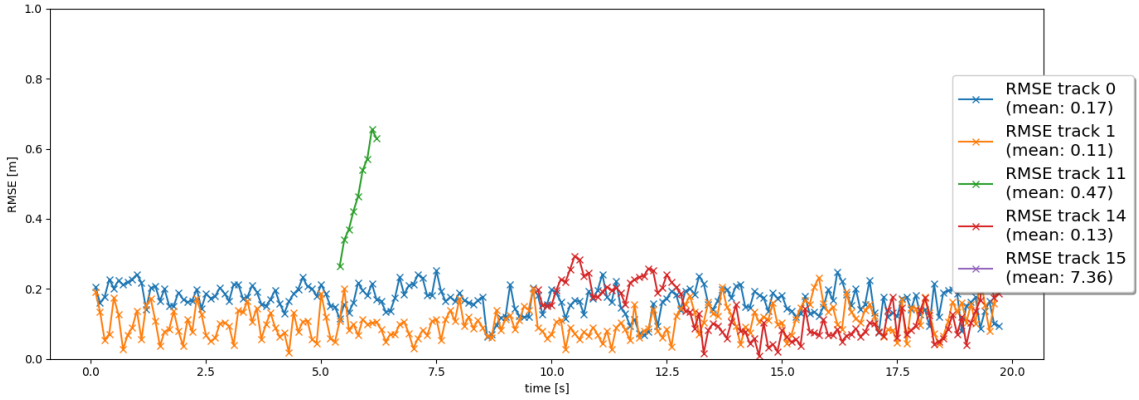
2. Track management: implemented methods to initialise, delete and update the scores and states of tracks. Achieved a mean rmse of 0.86



3. Association: implemented single nearest neighbor data association to associate LiDAR measurements with tracks. Detected 3 tracks and achieved mean rmse of 0.14, 0.12 and 0.19



4. Camera fusion: implemented a camera measurment model to fuse the camera and LiDAR measurements. Detected 4 tracks and achieved mean rmse of 0.17, 0.11, 0.47 and 0.13



The track management part was the most difficult, because I was initially struggling to assign/update the appropriate values for the tracks' scores.

2. Do you see any benefits in camera-lidar fusion compared to lidar-only tracking (in theory and in your concrete results)?

In theory, fusing these two sensors should reduce the detection error and reduce variance in the results. In practice only 2 of the 3 tracks had a better mean rmse.

3. Which challenges will a sensor fusion system face in real-life scenarios? Did you see any of these challenges in the project?

Some of the real-life challanges include:

1. Sensors synchronisation: data from various sensors must be time synced to avoid erroneus detections.
2. Limitations of different sensors in different operation conditions: cameras are likely to struggle in dark conditions.

Given that the data was already provided in this project and that there were no unfavourable conditions, neither of these challenges were met.

4. Can you think of ways to improve your tracking results in the future?

Incoroprating other sensors could yield even better results.