**Write Up:**

* Write a short recap of the four tracking steps and what you implemented there (EKF, track management, data association, camera-lidar sensor fusion). Which results did you achieve? Which part of the project was most difficult for you to complete, and why?
* In EKF filter module, implementation of prediction step of states and update step of states has been carried out with the help of measurements and at the end of update step of the states and covariance matrix, these are used to update respective track’s states and covariance matrix.
* In Track management, initialization of tracks, transition of track states based on track scores and modification of track score ie deletion in case of low track score or large state error covariance values.
* In data association part, implementation was carried out to map uninitialized tracks with respective measurements based on nearest neighbors using Mahalanobis distance and gating technique for the squared distance so that computation happens only for less distant track and measurements.
* Camera-lidar sensor fusion: Implemented non linear camera measurement model and FOV model for both sensors.

Firstly,learnt how to initialize a track and perform tracking for single measurement with EKF. Data association part was little tricky as I was getting wrong output ie for a single object,multiple initialization of tracks had happened and no confirmed tracks.

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

Camera Lidar fusion can provide more accurate tracking results by combining strengths of both sensors.LIDAR has problem in low light conditions and low reflectivity but can provide precise distance measurements and 3D point cloud data of environment whereas camera sensors can provide very good visual information. Using LIDAR and camera measurements together can reduce the overall error covariance and resulting in improvement over our estimates and better tracking.

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

Update rate of both the sensors would be different and needs to be properly integrated into the tracking problem. In addition, if one of the sensor is faulty,and if sensor fusion is carried out,then it may lead to wrong object tracking.

* Can you think of ways to improve your tracking results in the future?
* We can use sensor fusion of other lidar sensors other than the top lidar and all the camera data on the car which will result in better estimates