Sensor Fusion Mid Term Project:

- Find and display 6 examples of vehicles with varying degrees of visibility in the point-cloud
- Identify vehicle features that appear as a stable feature on most vehicles (e.g. rear-bumper, tail-lights) and describe them briefly. Also, use the range image viewer from the last example to underpin your findings using the lidar intensity channel.

Illustration 1: Range (top) and intensity (bottom) images

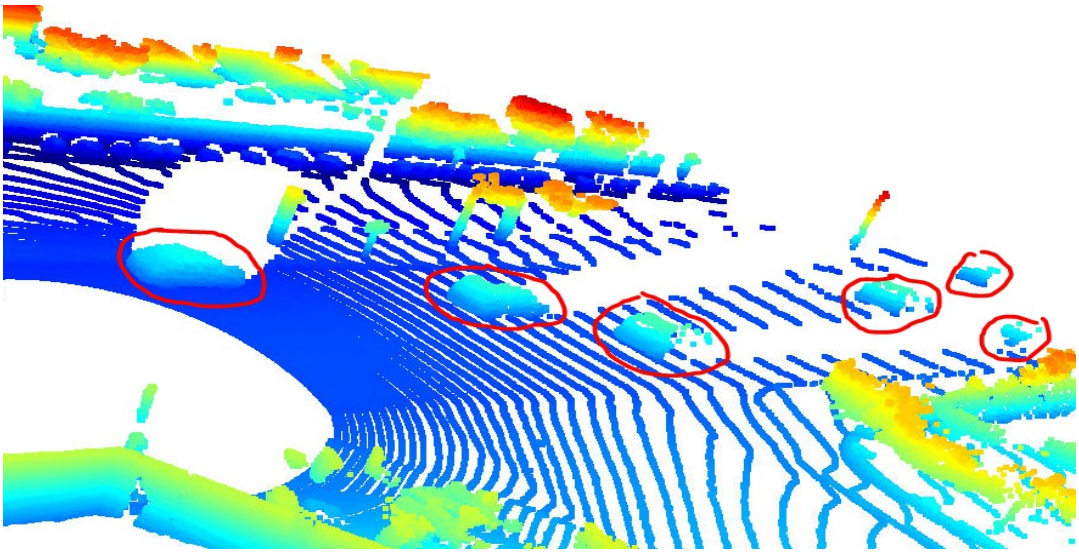

Illustration 2: PCL with 6 cars of different visibility (view 1)

Illustration 2 shows 6 cars with different levels of visibility in the pointcloud. The cars are marked with circles. It can be seen that some parts of the cars further away are occluded by the cars closer to the lidar sensor on top of the ego vehicle. Also, the cars located closer to the lidar sensor result in a biger area of occlusion behind the cars. Illustration 3 and 4 show the same scene as illustration 2 but with a different angle of view.

One stable feature for the vehicle class is the height range. All vehicles in the pointcloud have a range from dark blue to light blue. The bumbers are all located at the same height (dark blue). Another stable feature are the windows in the tailgate of the vehicles if the laser beams hit the car at its back. Also, these windows are all located at the same height which can be considered as a stable feature as well. All cars have a similar shape, dependig on the position relative to the ego vehicle: wide at the bottom and more narrow at the top. Also, the vehicle's hood is clearly visible if the cars are detected sidewise. Another feature visible in illustration 4 are the side mirros if the cars are detected from their backs.

The range image in illustration 1 undermines some of the features, for instance, the laser beams do net get reflected from the window glass, therefore intensity is low and the range gets cut of as the beam is not reflected properly by the window glass.

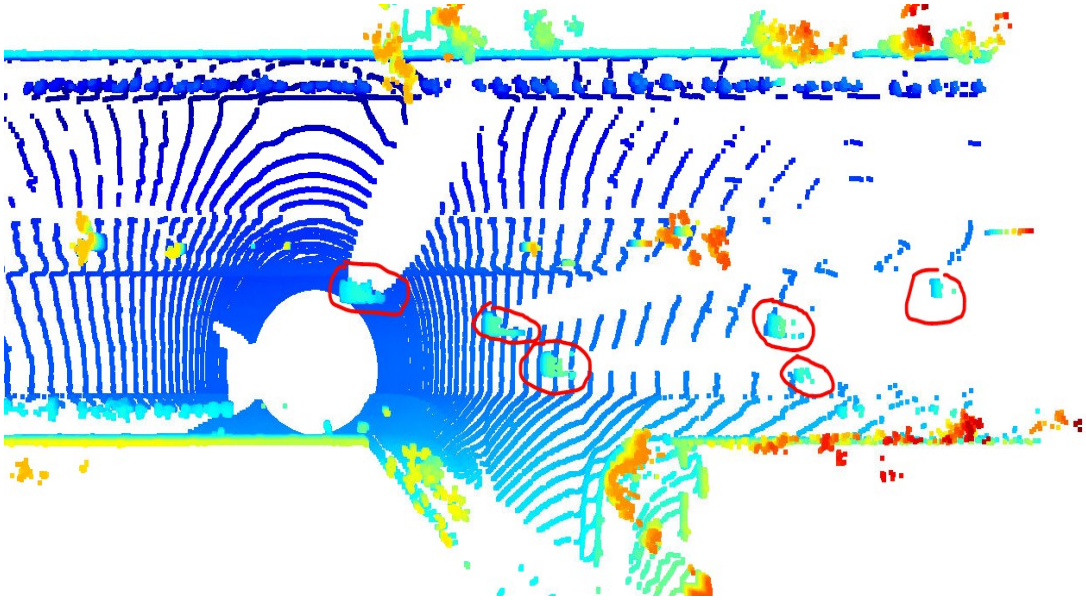

Illustration 3: PCL with 6 cars of different visibility (view 2)

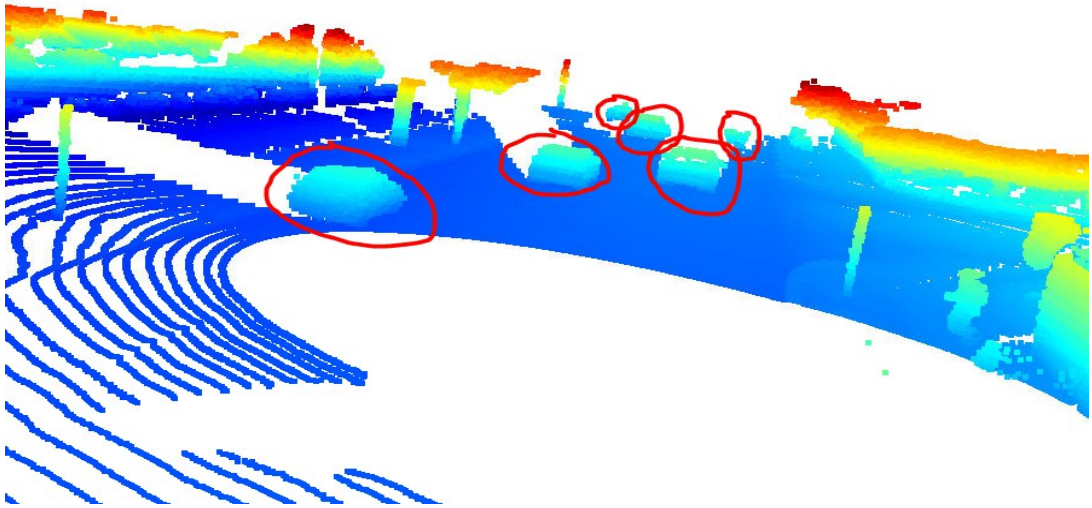

Illustration 4: PCL with 6 cars of different visibility (view 3)

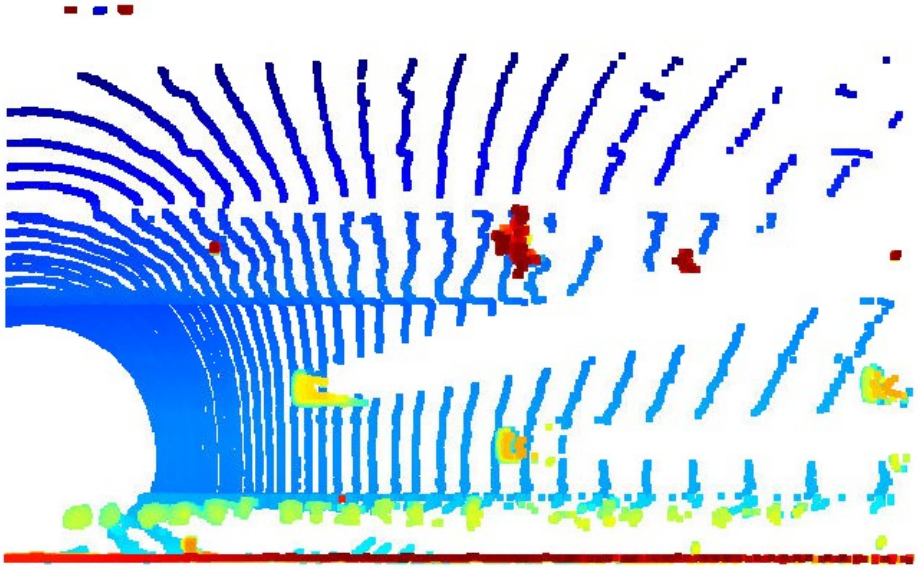

Illustration 4: BEV map

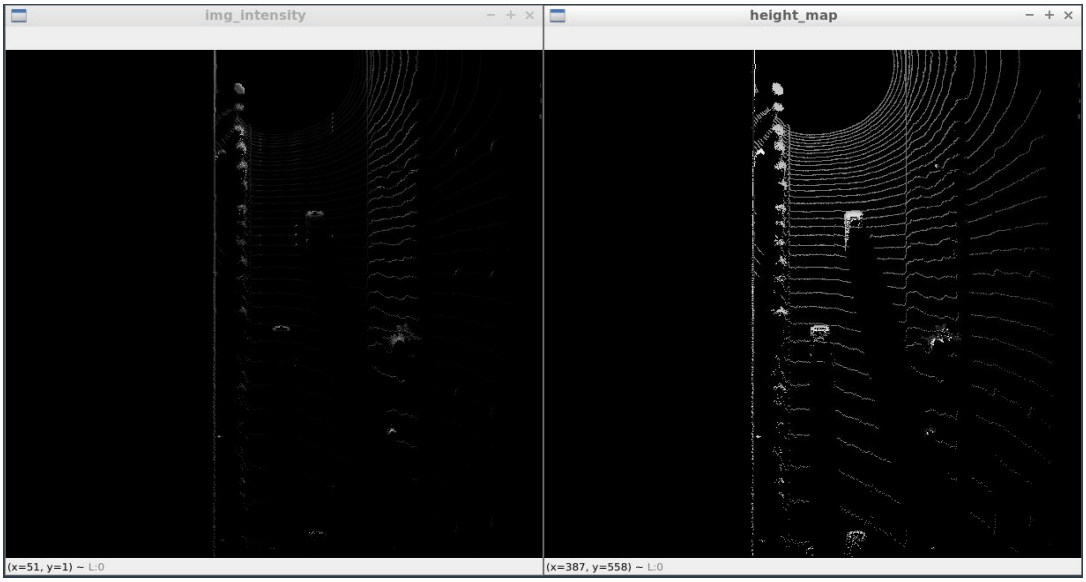

Illustration 5: intensity and height map