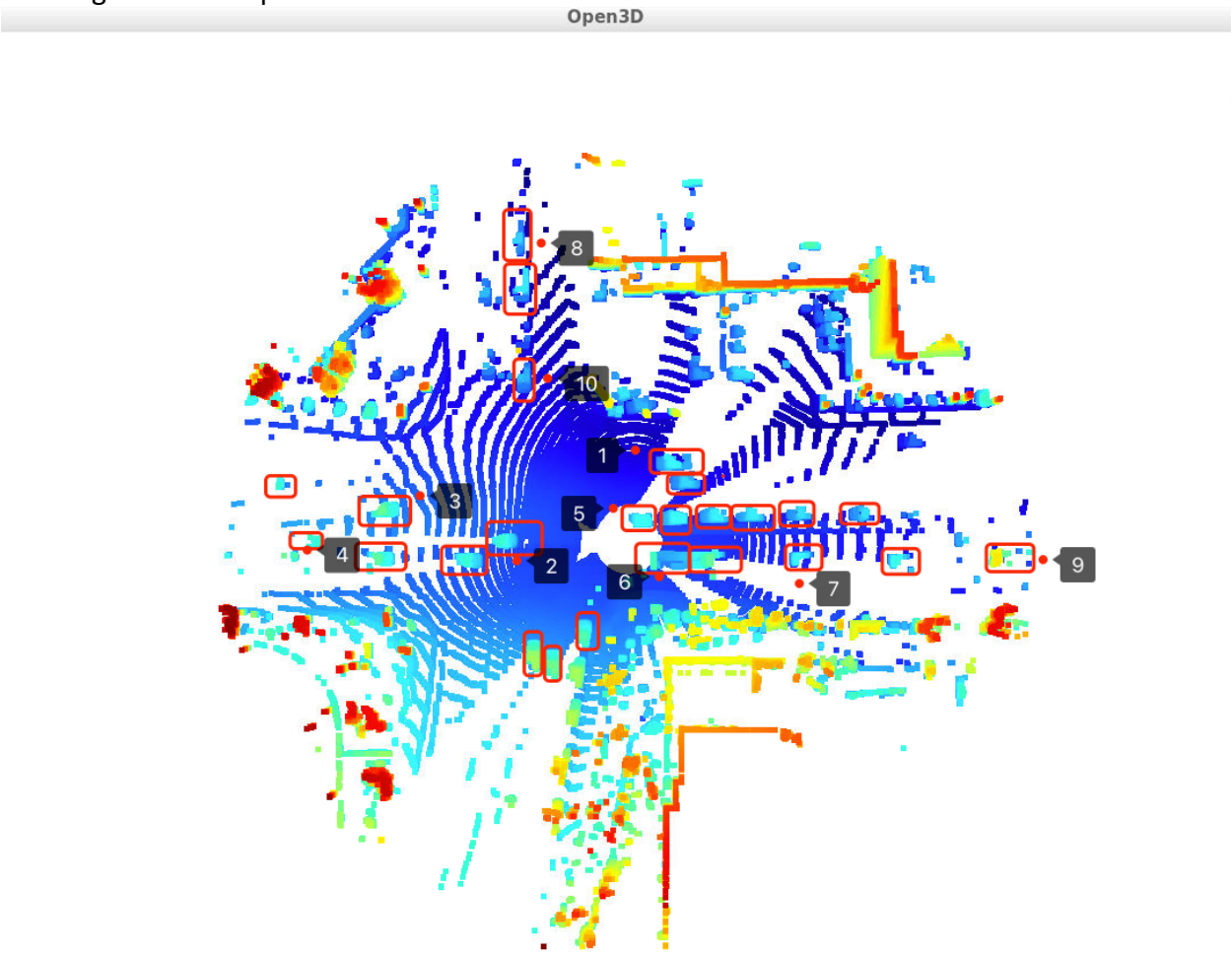
3D Object Detection

1. Find and display 10 examples of vehicles with varying degrees of visibility in the point-cloud.

   In the following image, all objects highlighted with red boxes are vehicles. 10 representative vehicles have been marked from 1 to 10. It can be observed that the closer the vehicle to the lidar car, the more complete point cloud it is, making it easier to recognize the shape of the vehicle.



2. 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.

   The stable features are: 1) The shape and size are generally similar to that of a car. 2) The intensity values are higher near the car's front, particularly around the windows and

headlights(In Figure 1). 3) The height values gradually increase from the edges to the center(In Figure 2).

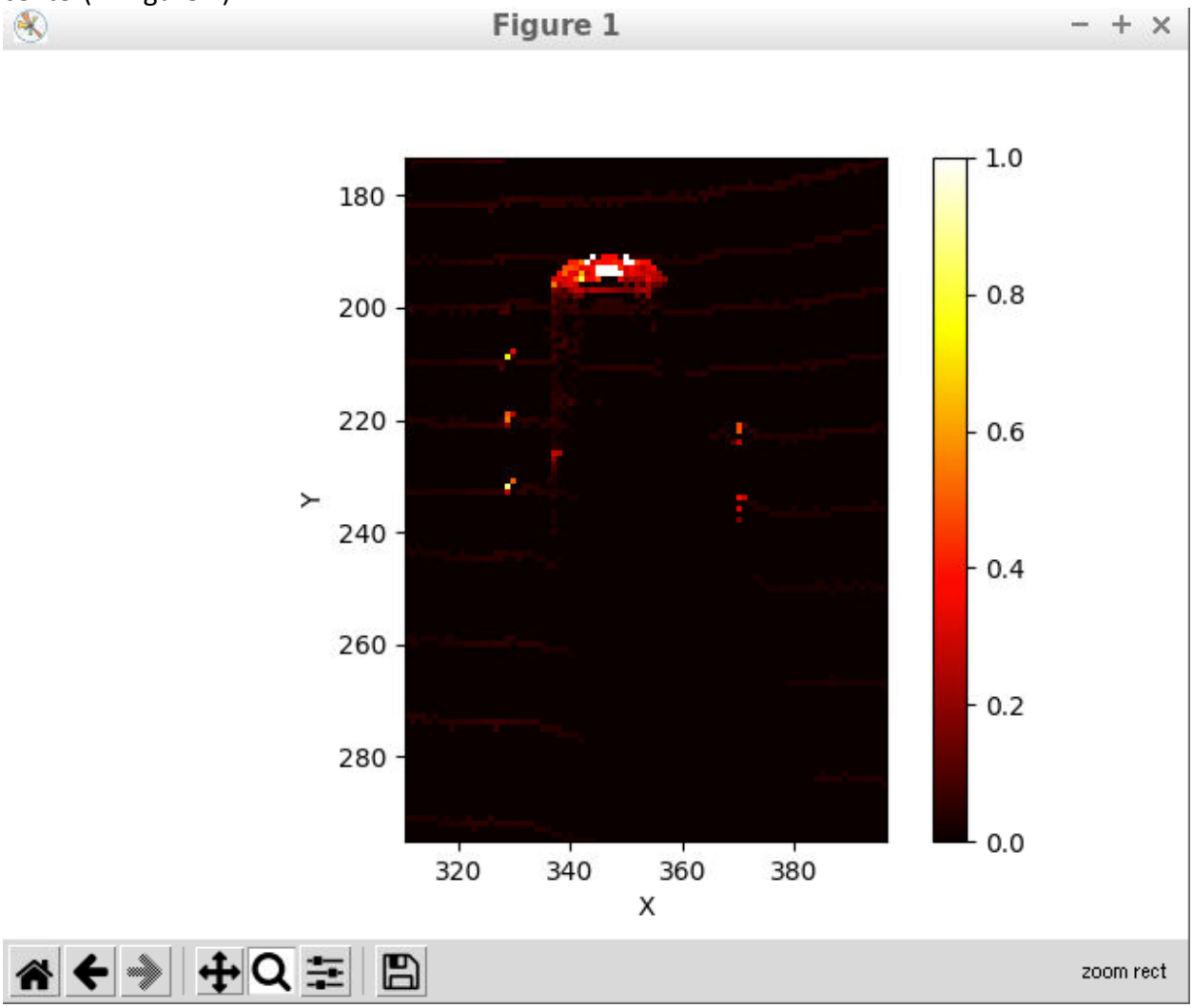


Figure 1. Intensity map of vehicle

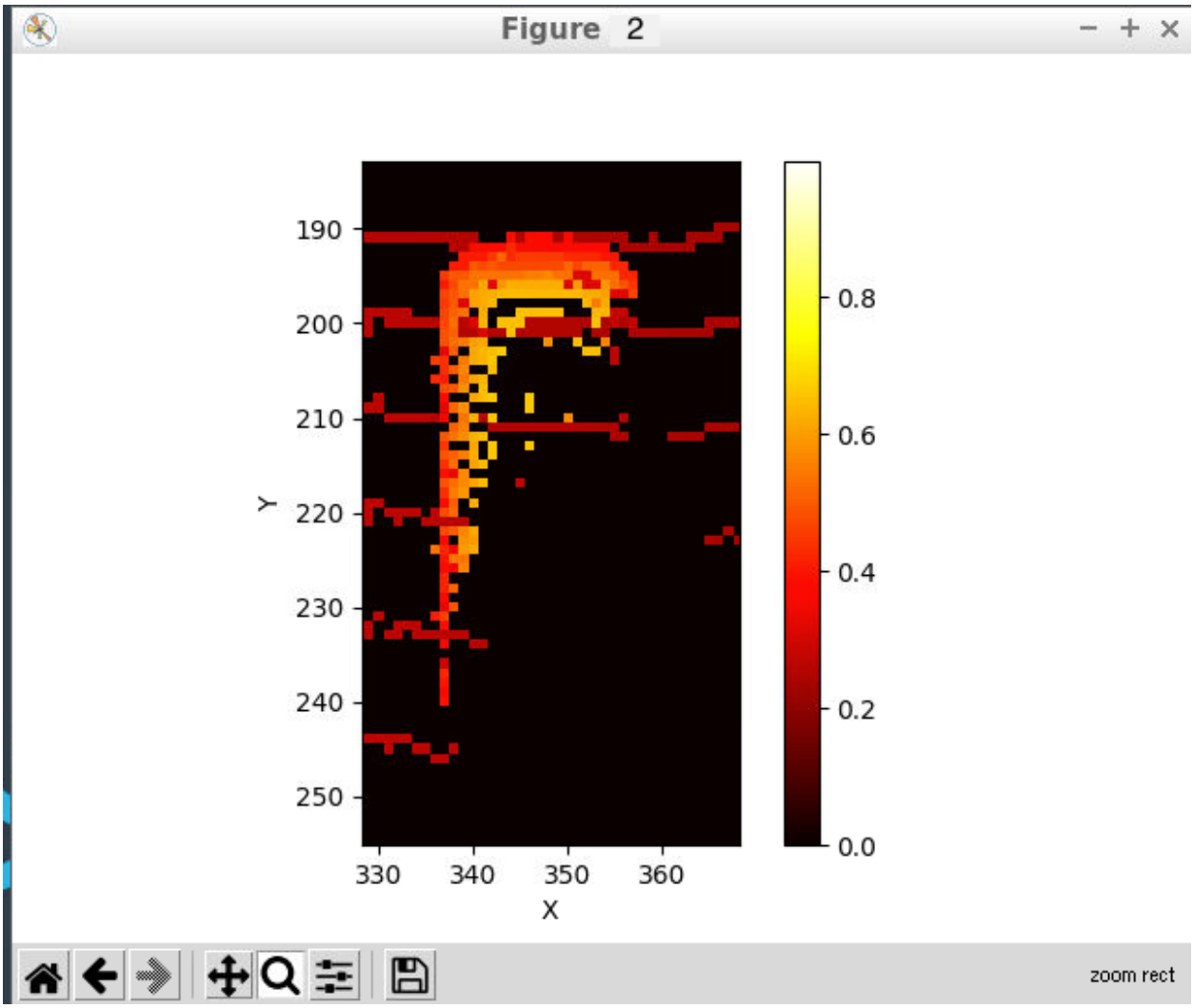


Figure 2. Height map of vehicle

3. Other visualizations during the mid-term projects.

Figure 3. Crop range image to +/- 90 deg. left and right of the forward-facing x-axis

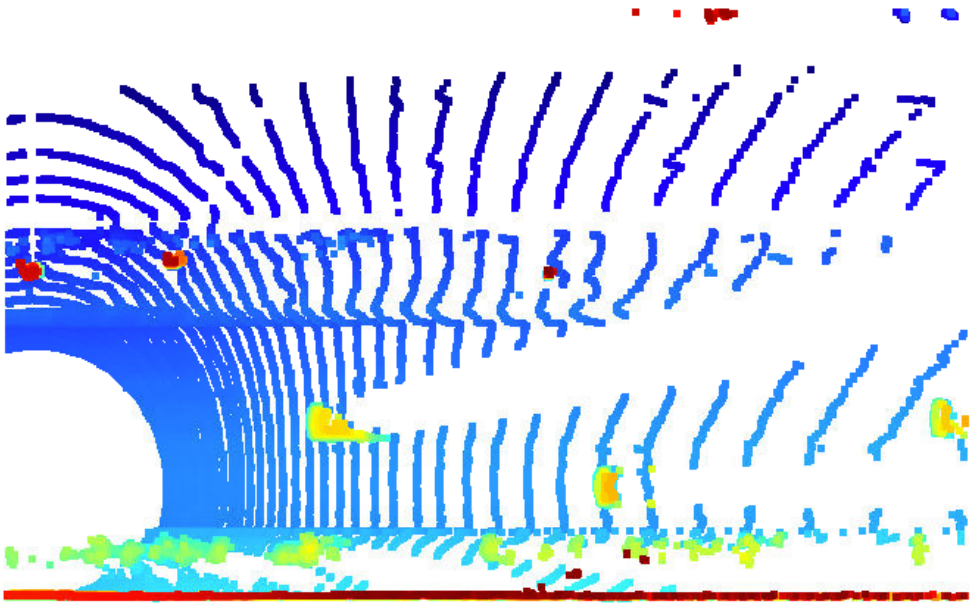


Figure 4. BEV map

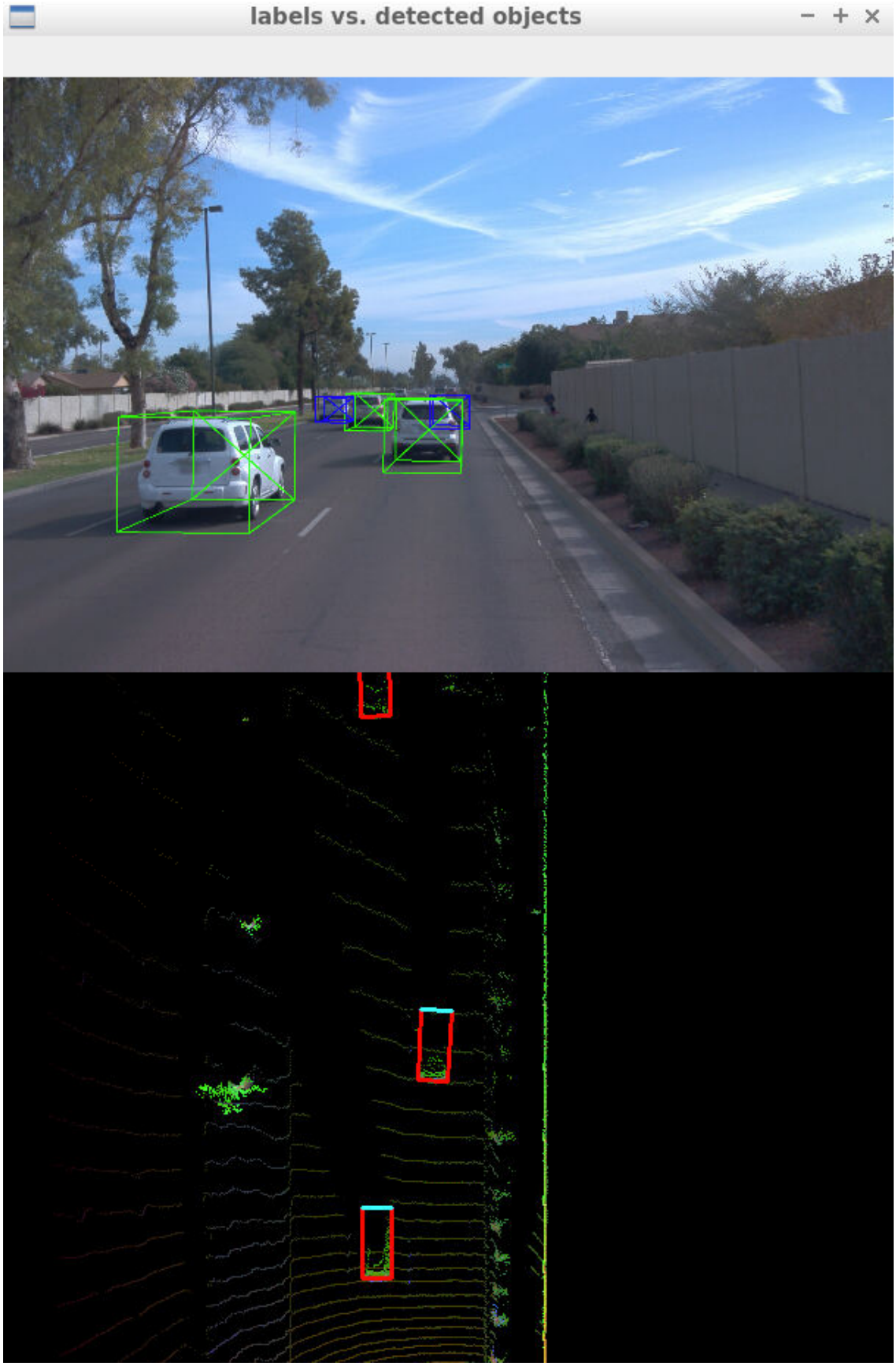

labels vs. detected objects

Figure 5. fpn-resnet detection result

Figure 6. Precision and Recall of darknet