

Occupancy Grid Updates for Autonomous Driving

Course 4, Module 2, Lesson 3

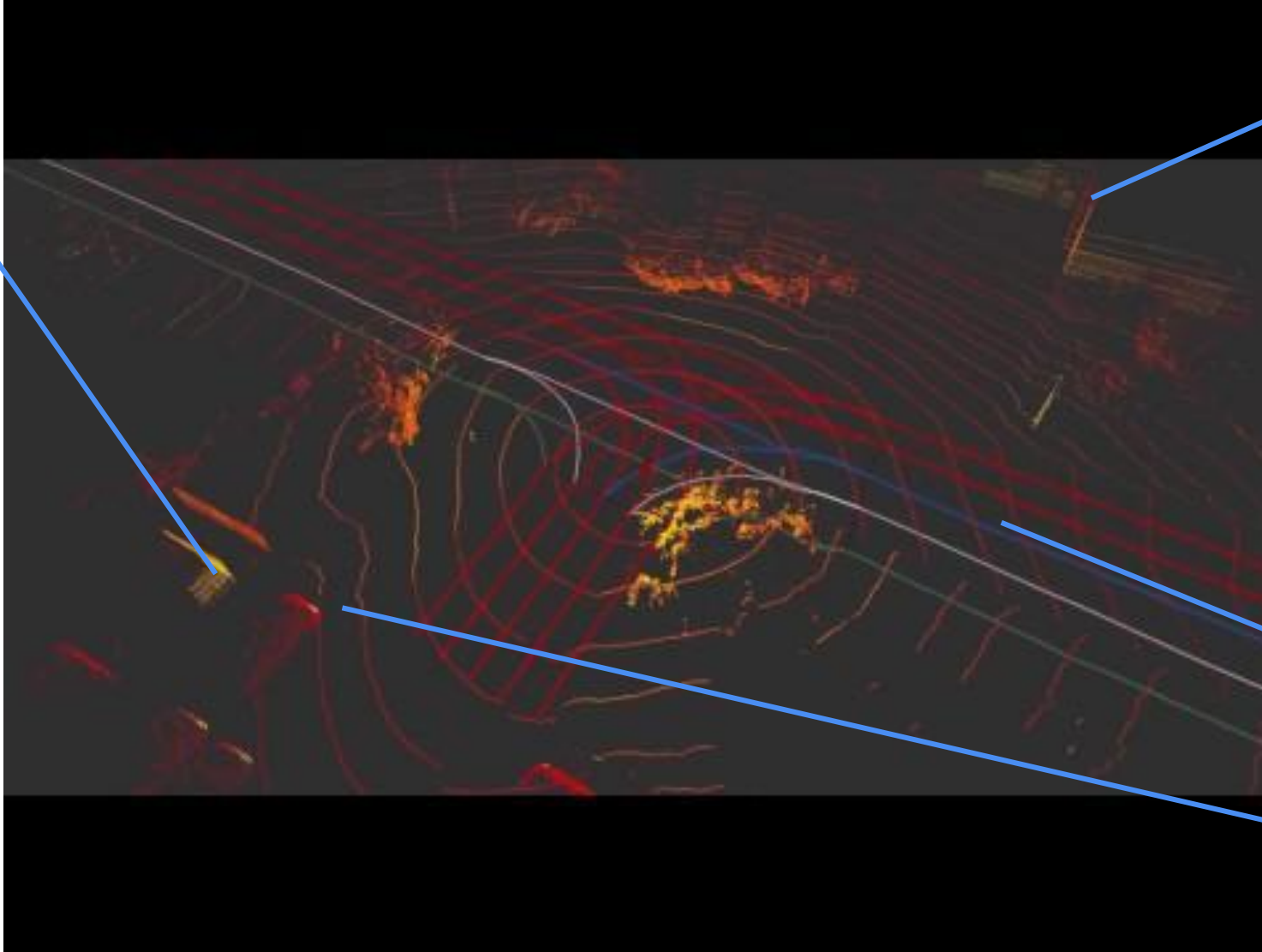


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Filtering of 3D LIDAR

Downsampling

reduce
of points
of a lidar
→ can



Objects
above car
height

Do not want to
level the drivable
surface occupied

Ground
plane

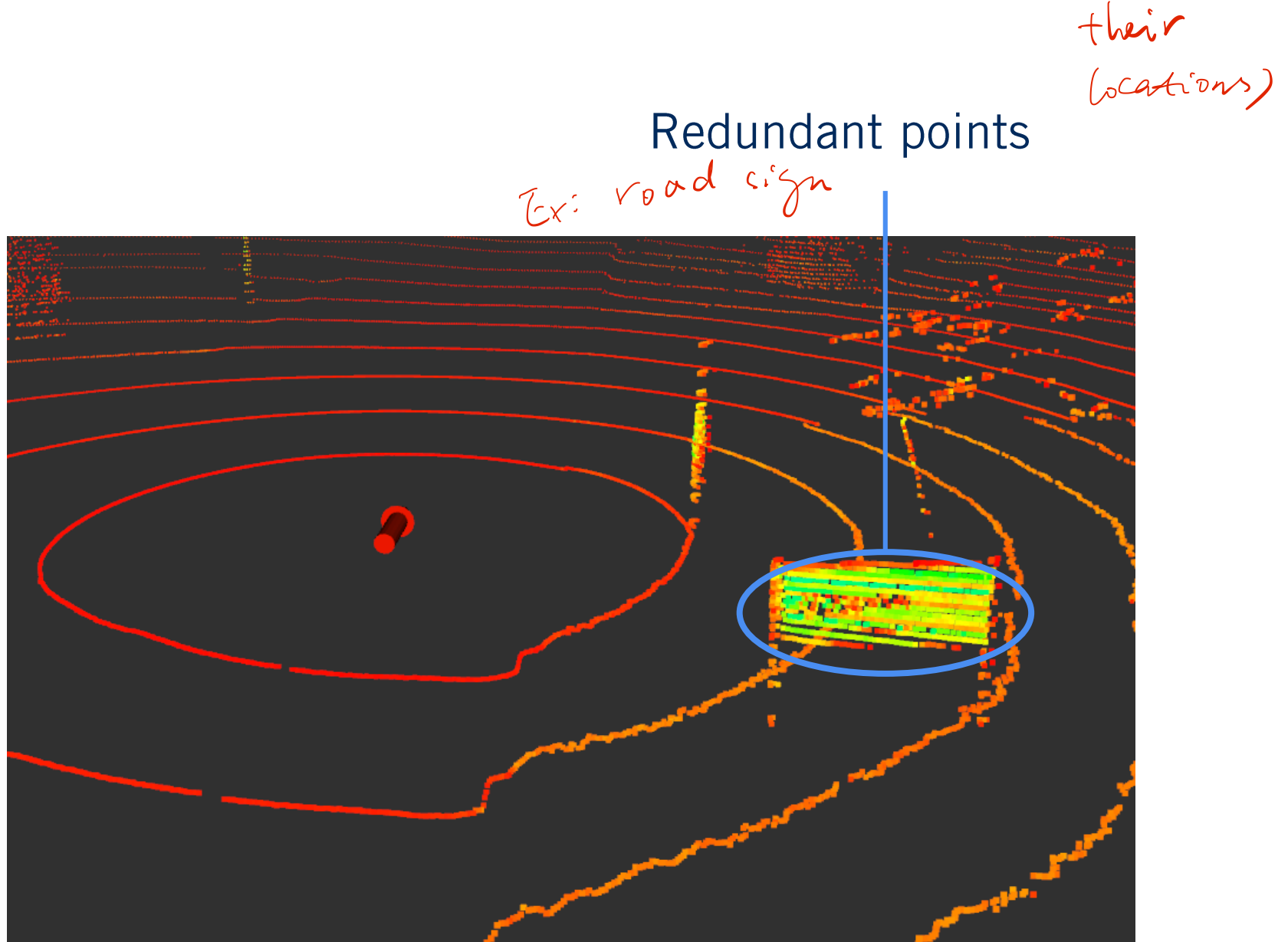
(will come
from
perception)

Dynamic
objects

(relying on perception to
identify)

Downsampling

- Up to ~1.2 million points per second
- Removal of redundant points
- Improves computation



Removal of overhanging objects

- Removing all Lidar points that are above a given threshold of the height limit of the car

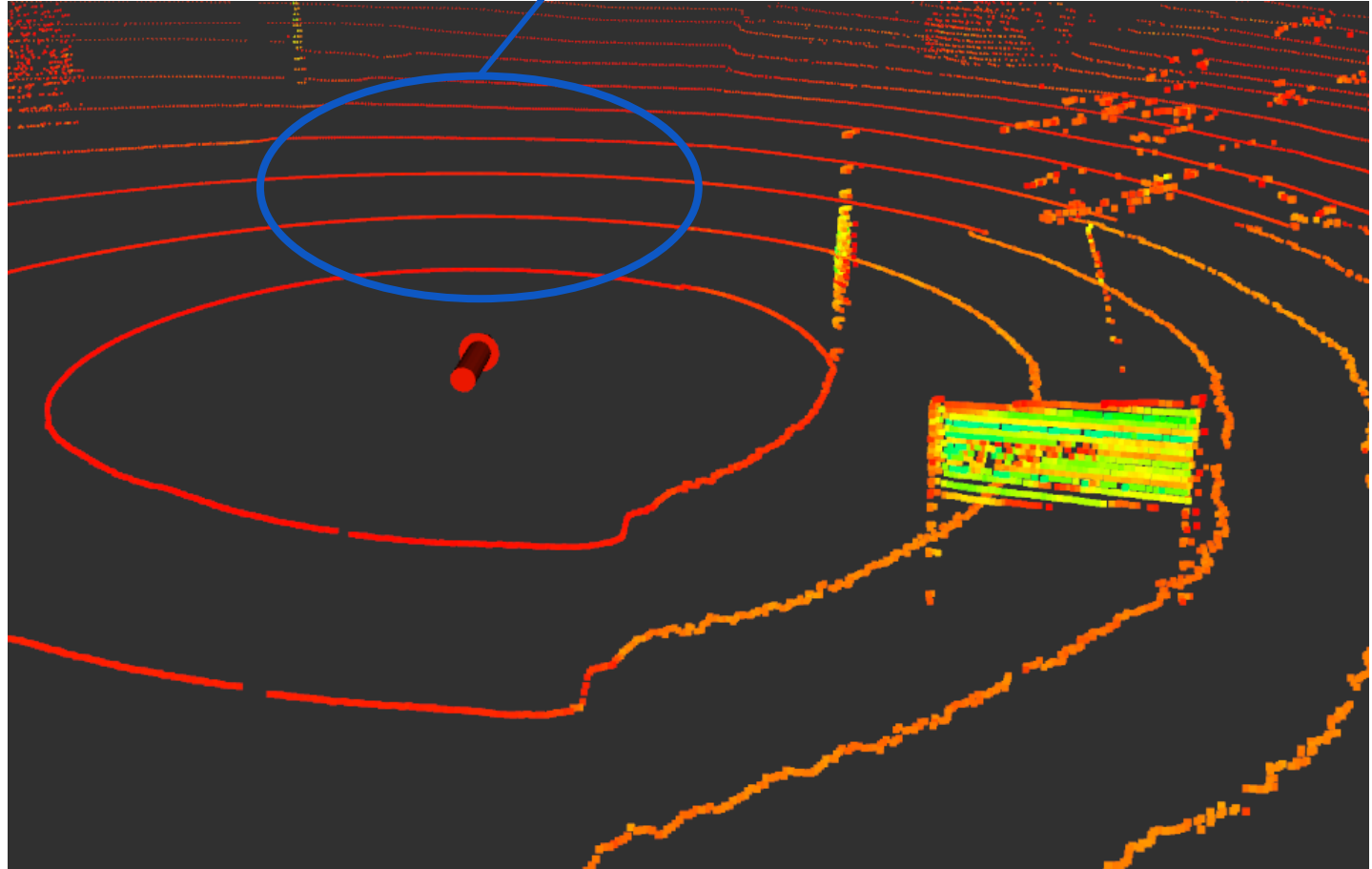


Removal of ground plane

- Difficult to estimate due to several complications
 - Differing road geometries
 - Curbs, lane boundaries
 - Don't want to miss small objects

mixed together with the ground plane

Lidar Points Impacting Ground Plane



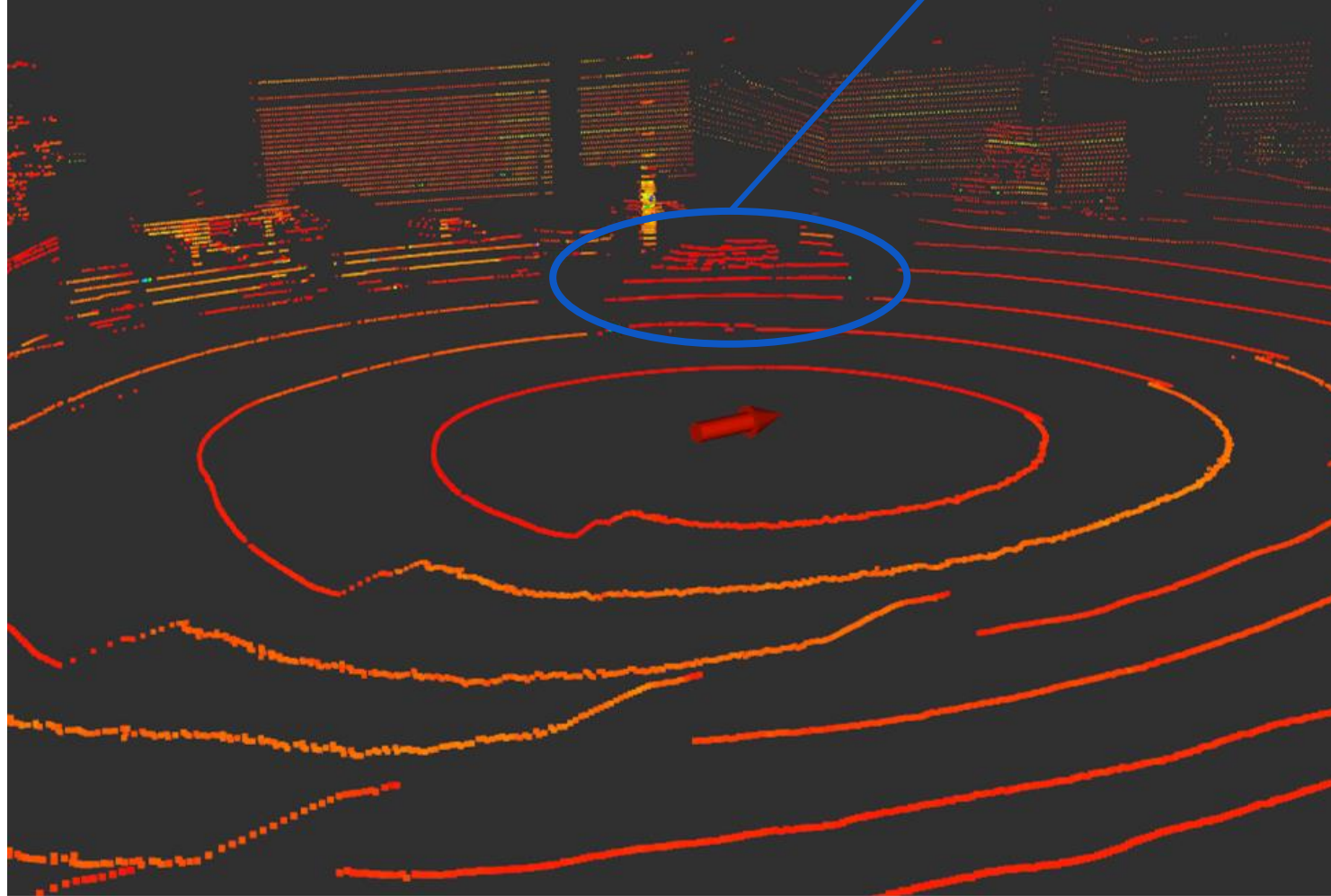
Ground plane Classification

- Utilize segmentation to remove points of road elements
- Keep points from no drivable surfaces



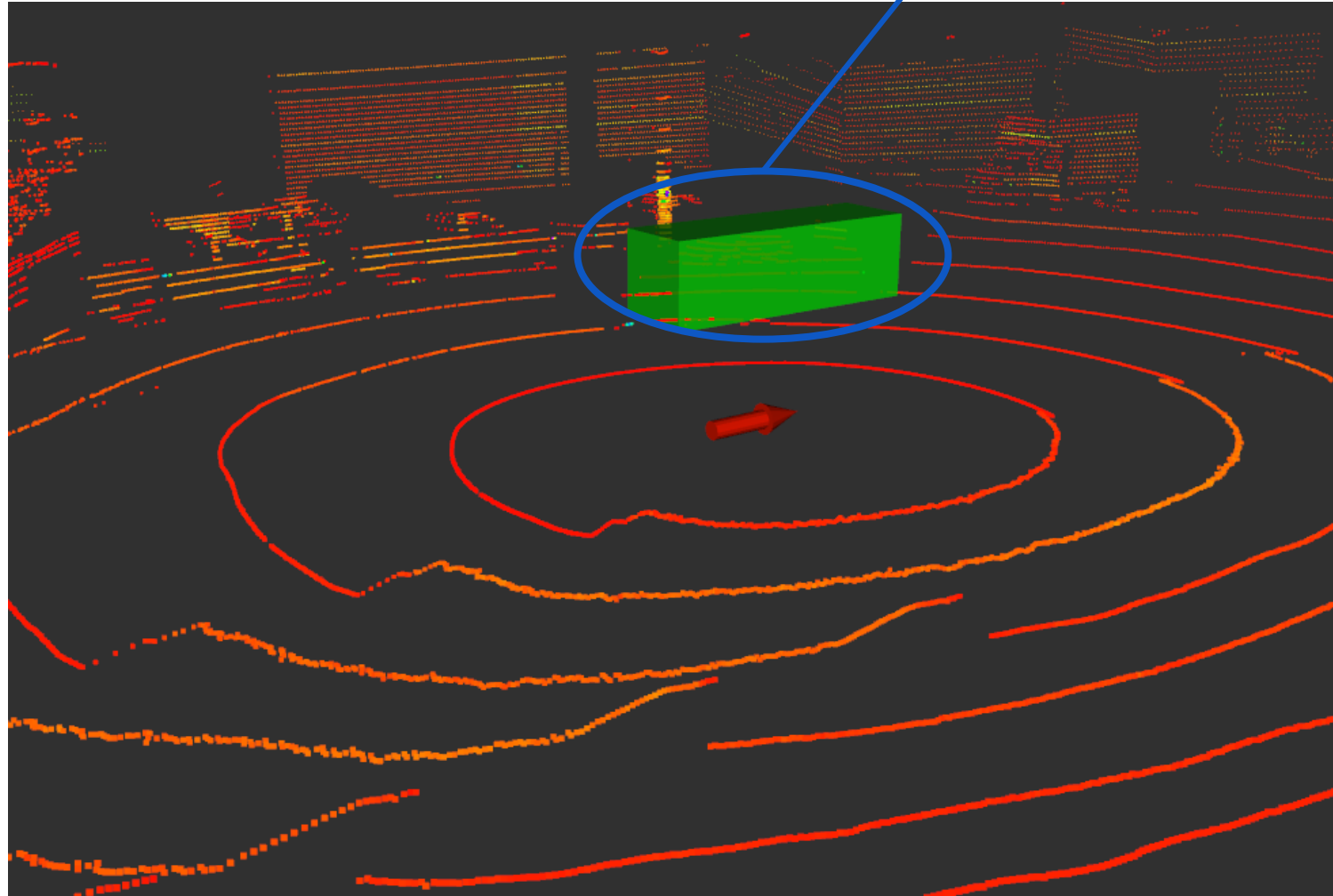
Removal of Dynamic Objects

Dynamic Object (Car)



Removal of Dynamic Objects

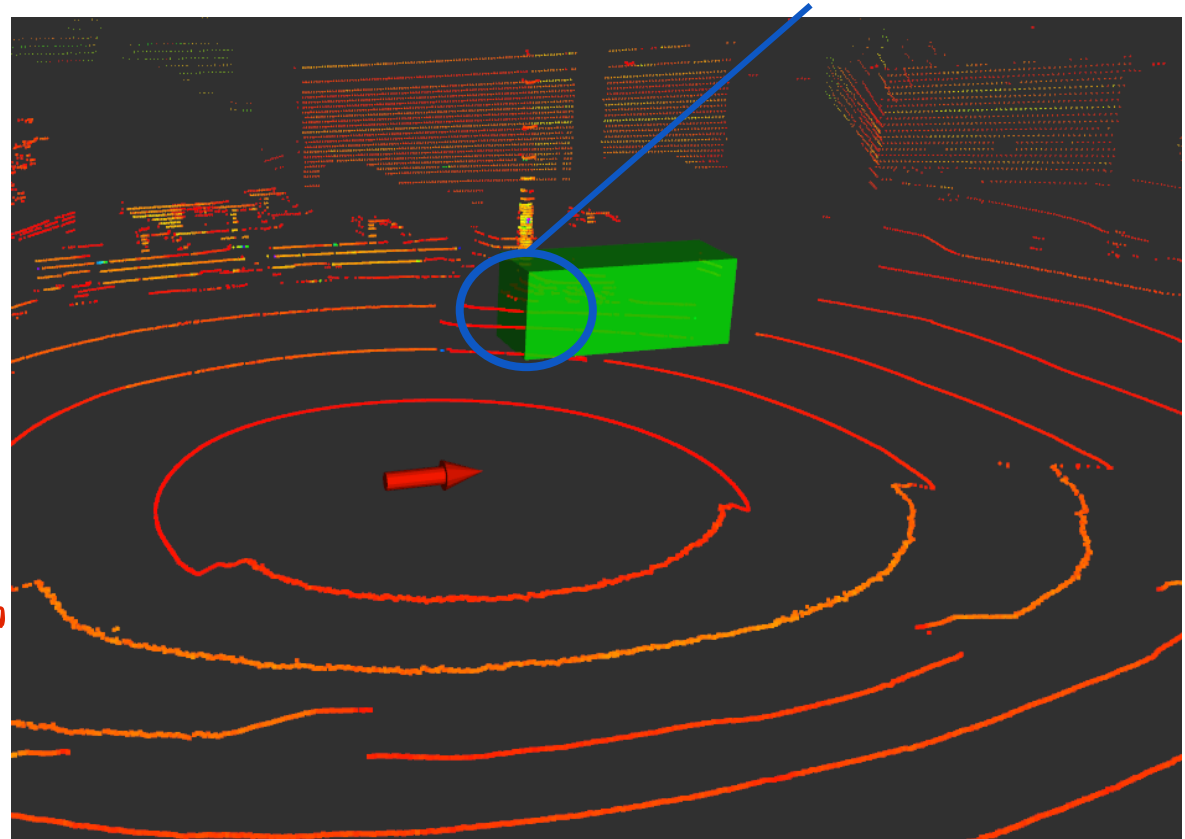
Remove 3D bounding
+ threshold



Removal of Dynamic Objects Improvement

- Not all vehicles are dynamic, so they should be included
- History of dynamic object location can be used to identify parked vehicle *perception needs to use*
- The dynamic objects are identified from the previous LIDAR frame *due to computation time of perception*
- Predicted future location improvement *stack*

LIDAR points of the car



Projection of LIDAR Onto a 2D Plane

Simple solution:

- Collapse all points by Zeroing the Z coordinate
- Sum up the number of LIDAR points in each grid location
 - More points indicated greater chance of occupation of that grid cell

*used as
measure of the
occupancy belief*

