

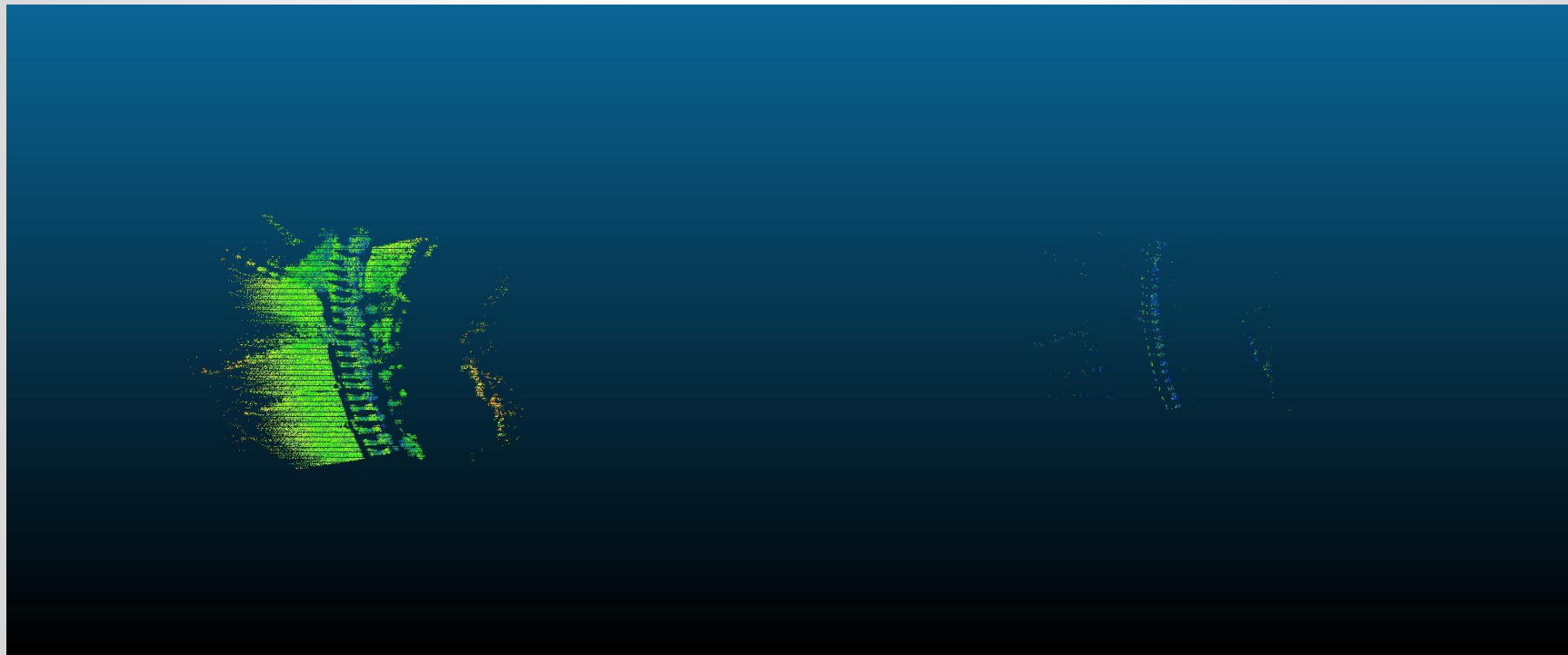
# **Automatic Road Feature Extraction from LIDAR**

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# General Approach

- [Point Cloud Library \(PCL\)](#) (C++)
  - Open source project for point cloud processing
  - Note: [CloudCompare](#) was used to visualize
- Convert raw LIDAR data to .pcd format
  - Allows processing with PLC and easier to manipulate
- Strip out unnecessary points
  - Filter based on intensity and reduce noise
- Analyze remaining point data

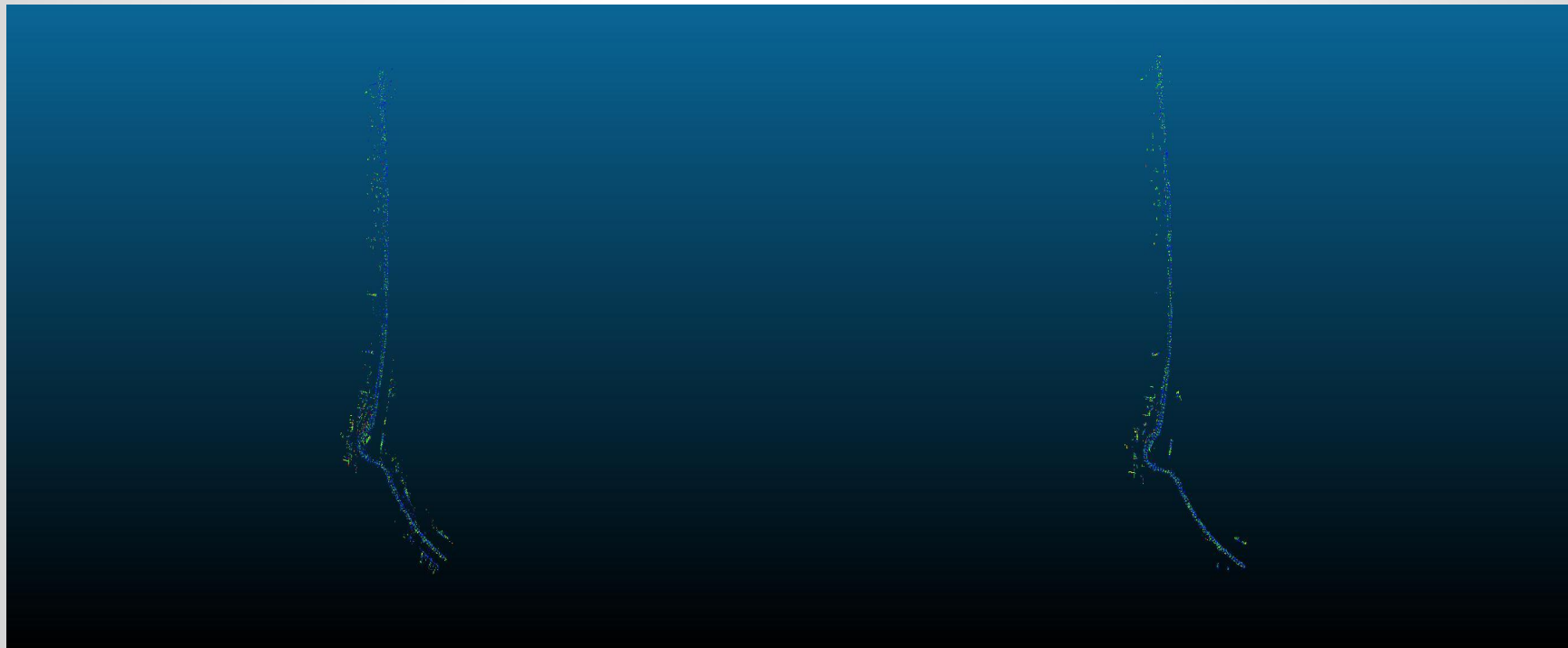
# Filter by Intensity (intensity > 150)



Raw Data

Filtered By Intensity

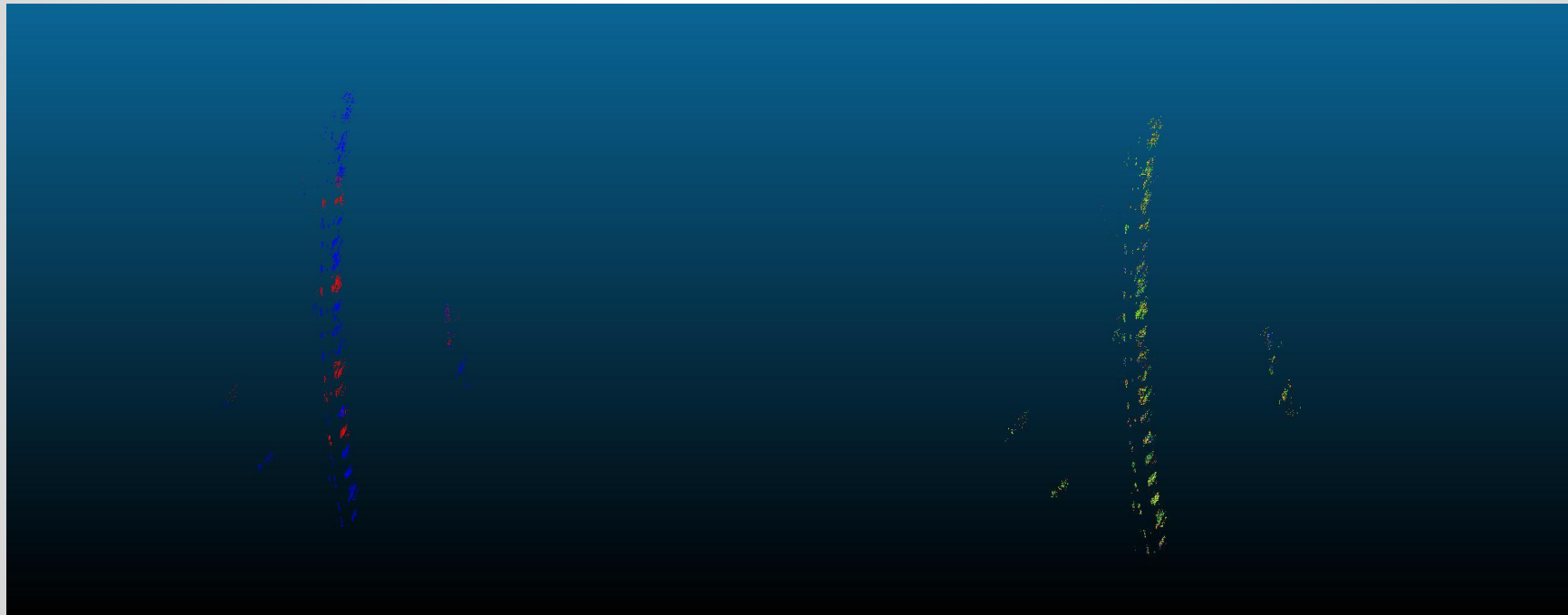
# Reduce Noise



Filtered By Intensity

Reduced Noise

# Experiment for Refining



Using normals and intensity to refine  
The image on the right is more selective in grouping points  
(red points to be removed)

# Future Steps

- More clearly mark the lane markings and road edges
  - I attempted this, but could not find a way to automate it (up until this point, all progress was automated - snapshots are from in-progress pcd files)

I'm not sure if this is easily done in the point cloud format, or if I would be forced to automate a way to capture the point cloud as an image, and then detect the lines

# Future Steps

- Improve time performance
  - The program currently takes a significant amount of time to run. This most likely can be improved with more efficient algorithms

# Challenges

- Visualizing Data

- The programs I used to visualize the data would become sluggish and unresponsive when I tried to view large sections of it. This was frustrating when trying to mark my progress.