Assignment-3

LIDAR

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DSM

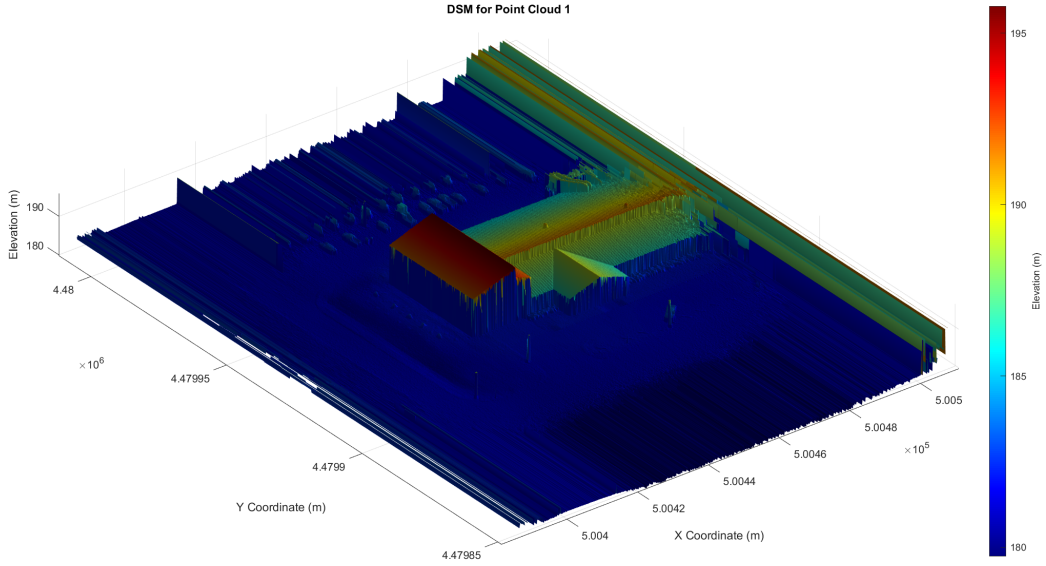

Figure 1: DSM-1-0.1

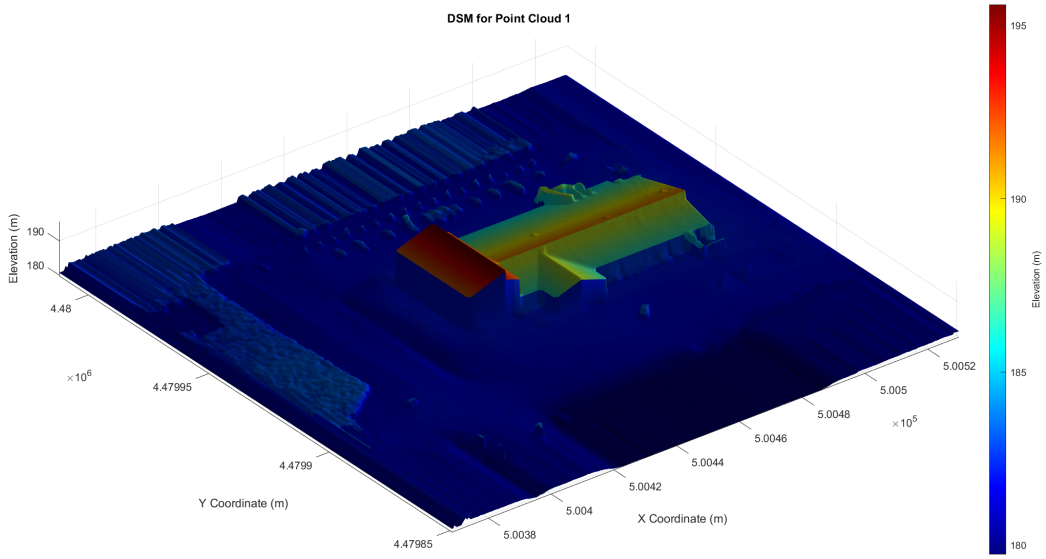

Figure 2: DSM-1-0.5

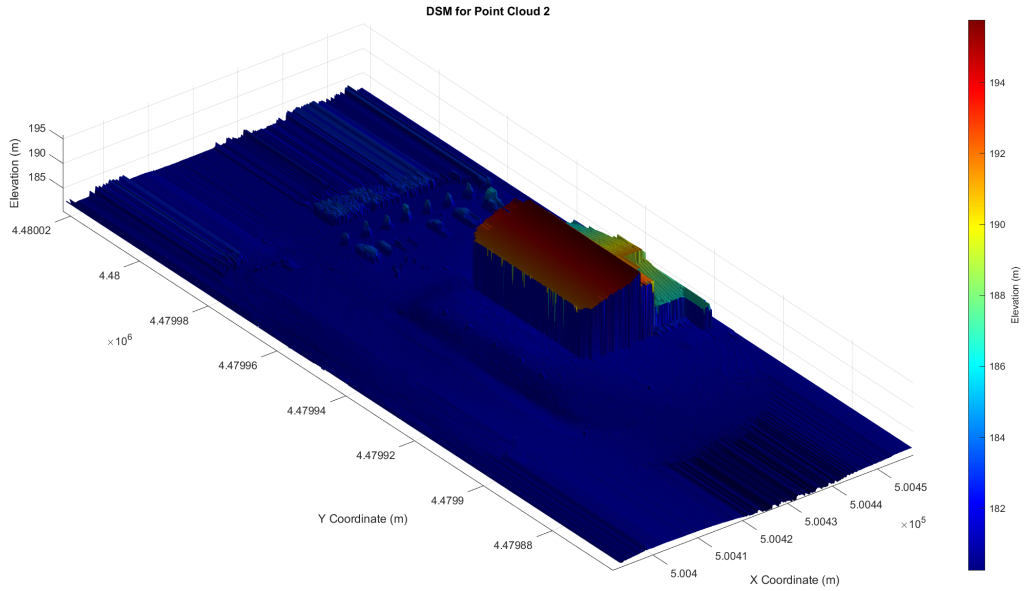

Figure 3: DSM-2-0.1

Differences Between DSMs Generated from Two LiDAR Units: Ranges: There may be differences in the elevation ranges captured by the two LiDAR units. These differences could be due to the inherent precision and accuracy of each LiDAR unit, the sensor technology they use, or the flight altitude during data acquisition.

Surface Detail: One DSM might show more detailed features of the landscape compared to the other, which might indicate a difference in the point density or scanning patterns of the LiDAR units.

Noise and Artifacts: If one DSM appears noisier or has more spikes, it could suggest that the respective LiDAR unit has more noise in its data, or it might be less effective at filtering out outliers.

Impact of Cell Size on the Resultant DSM:

Detail Resolution: A smaller cell size likely results in a DSM with higher spatial resolution, meaning you can observe finer details and subtler features of the landscape. Conversely, a larger cell size tends to smooth out those details, leading to a DSM that might look more generalized or less detailed.

Noise Sensitivity: DSMs generated with smaller cell sizes could be more sensitive to noise and outliers in the point cloud data because each cell represents a smaller area on the ground. The larger cell size may inherently average out these anomalies, producing a smoother appearance.

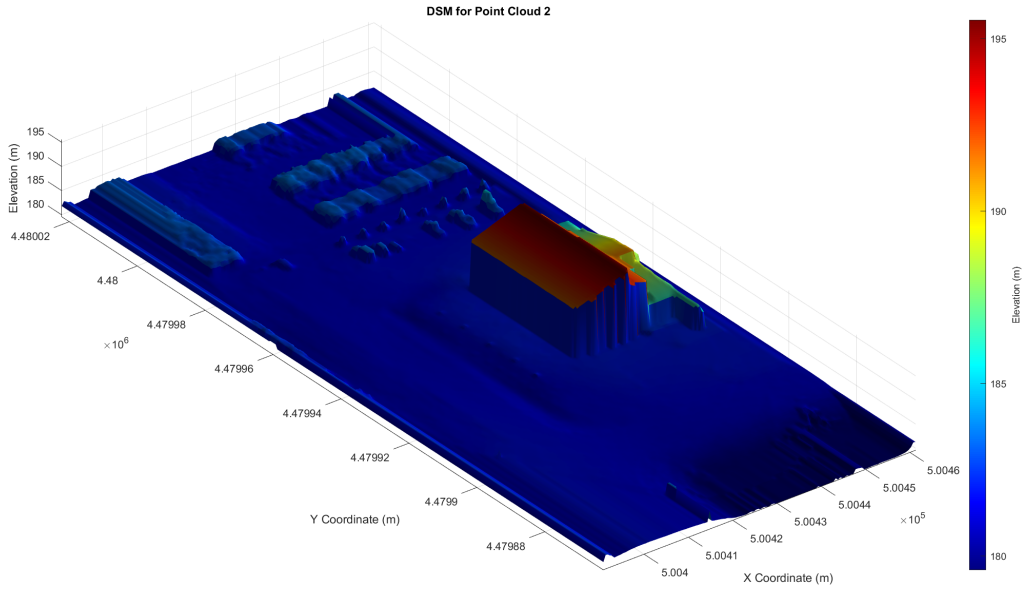

Figure 4: DSM-2-0.5

Computational Load: DSMs with smaller cell sizes involve a higher number of cells and, thus, greater computational effort to generate. This is not directly visible in the final images but is important when considering processing times.

Point cloud classification

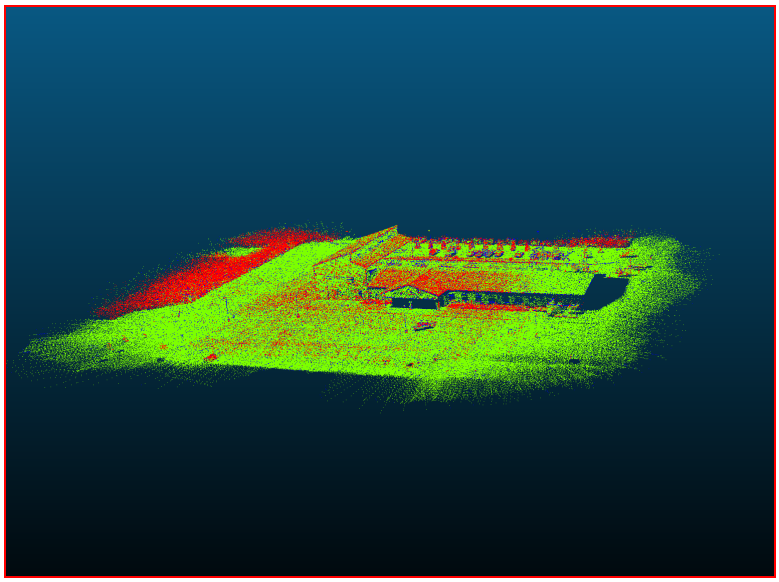

Figure 5: a

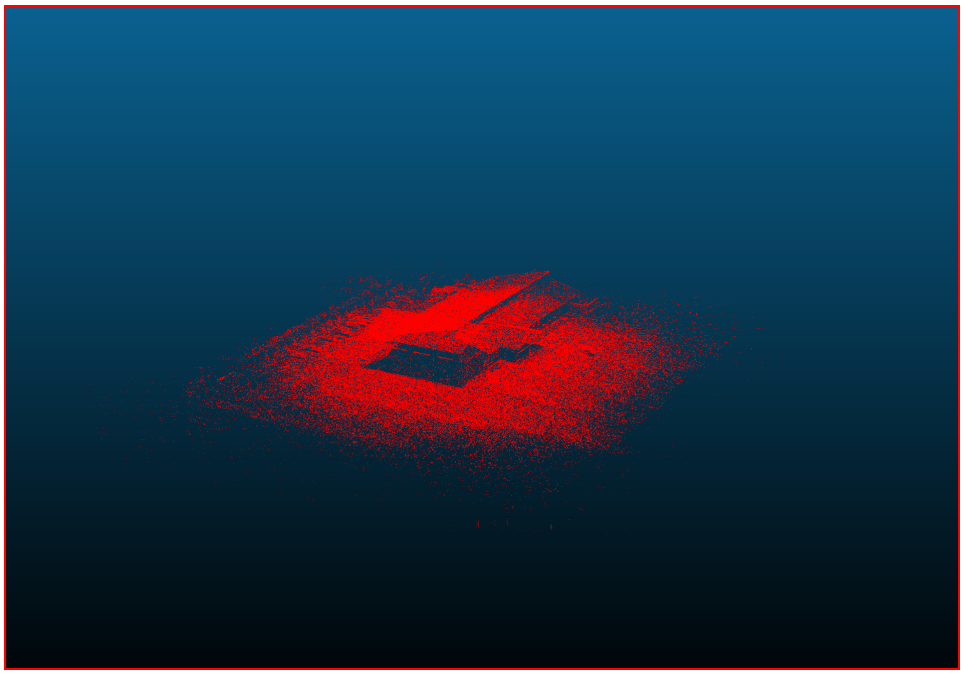

Figure 6: b

Differences Between Classification Results for the Two LiDAR Units:

Variability in Feature Detection: The classification images may reveal differences in how the two LiDAR units capture and resolve features in the point cloud data. For instance, one LiDAR might be better at delineating linear features like edges and ridges, while the other might capture smoother, planar areas more effectively.

Density and Distribution of Classified Features: Differences in point density and distribution between the two datasets can lead to variability in the classified features. For example, one LiDAR unit might classify a larger number of points as belonging to a particular feature class (e.g., linear/cylindrical) due to its scanning resolution or method.

Accuracy and Precision: The classification results could suggest that one LiDAR unit provides more accurate or precise data, which is evident in the consistency of classification within known feature types (e.g., buildings, vegetation, ground).

Impact of Neighborhood Size on the Classification Result:

Sensitivity to Local Variations: A smaller neighborhood size may lead to higher sensitivity to local variations, which might cause more fragmented classification results, as seen with the increased noise and color variability in the second image. This can be beneficial for capturing small features but may also introduce noise.

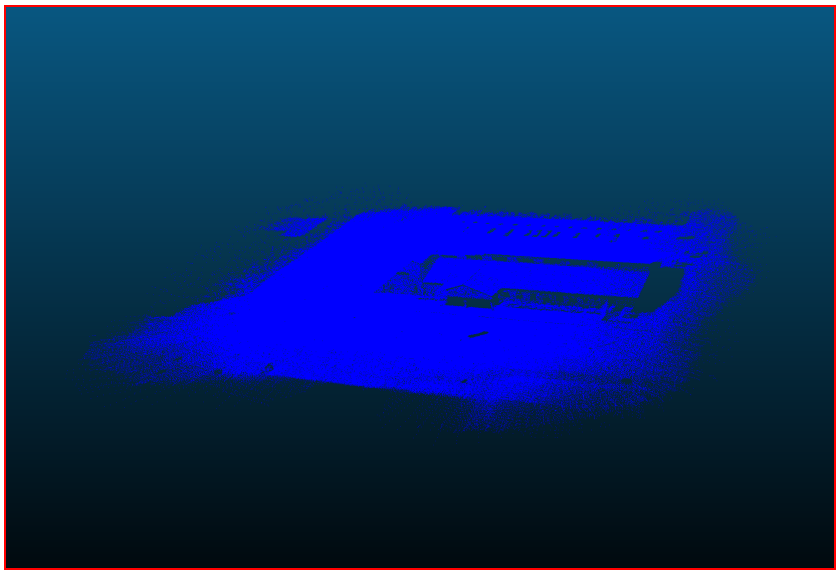

Figure 7: c

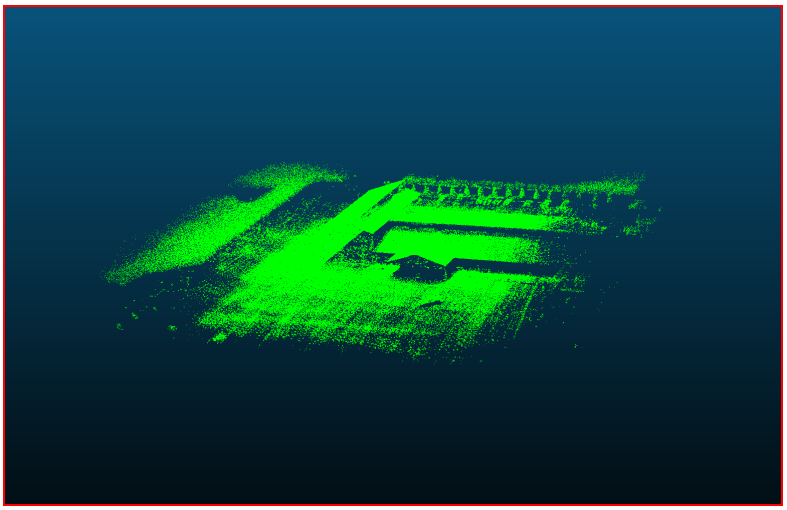

Figure 8: d

Generalization of Features: A larger neighborhood size tends to generalize features, which can be observed in the smoother and more homogenous classification areas. This can help with identifying larger structures but may overlook smaller details.

Consistency in Classification: A larger neighborhood size might produce more consistent classification results across larger areas, as the classification for a point is influenced by a greater number of surrounding points. This can lead to better delineation of larger features at the expense of fine detail.

Balance Between Detail and Noise: The choice of neighborhood size is a balance between capturing detailed features and avoiding noise. The classification results reflect this trade-off, where a smaller neighborhood size captures more detail but may introduce noise, and

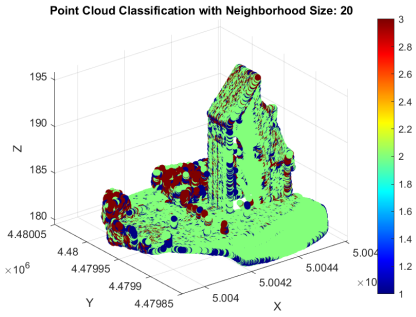

Figure 9: N1-20

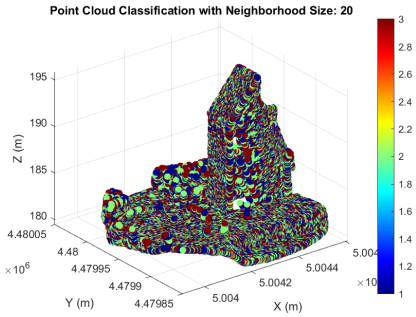

Figure 10: N1-200

a larger neighborhood size smooths out detail, potentially missing smaller features.

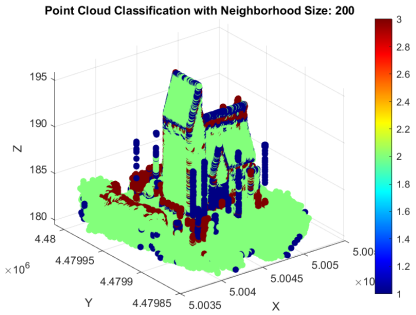

Figure 11: N2-20

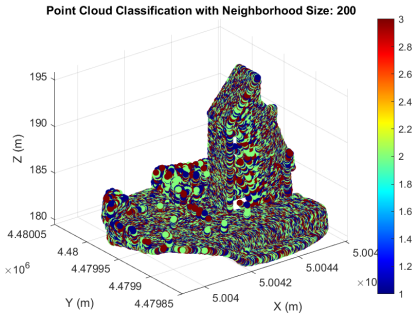

Figure 12: N2-200