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# Question 1

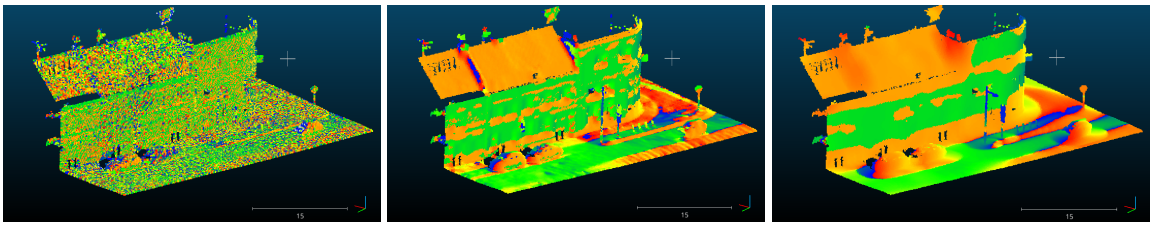

Figure 1: From left to right: 10cm, 50cm, 2m radiuses used to compute normals

If the neighborhood radius is too small, we get noisy normals. If the neighborhood radius is too large, we get smoothed normals (makes edges curvy).

# Question 2

Picking the right radius is a tradeoff between noisy normals and smoothing.

# Question 3

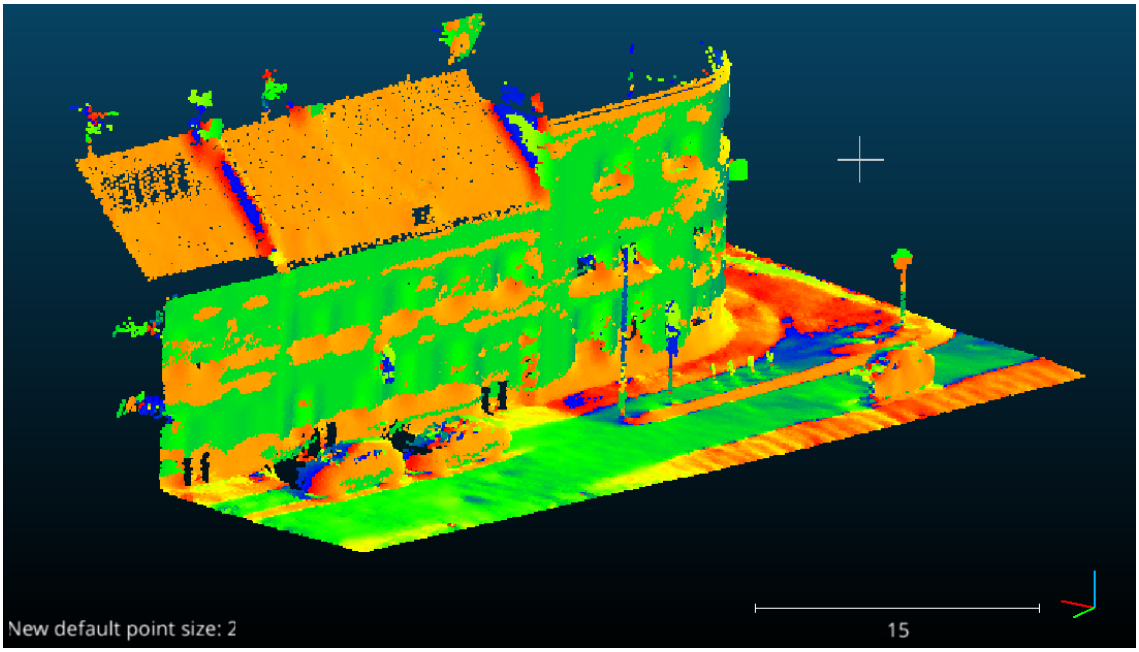


Figure 2: 50cm, radiuses local PCA used to compute normals

# Question 4

The combination of lidar acquisition and the use of a fixed amount of nearest neighbors to compute normals leads to an anisotropic distribution of samples among each query. Fitting a plane on such a set is not suited, a plane cannot be properly fitted with nearest neighbors.
The effect is also midly apparent when using a fixed radius because the radius may integrate other ”beams” of the lidar.

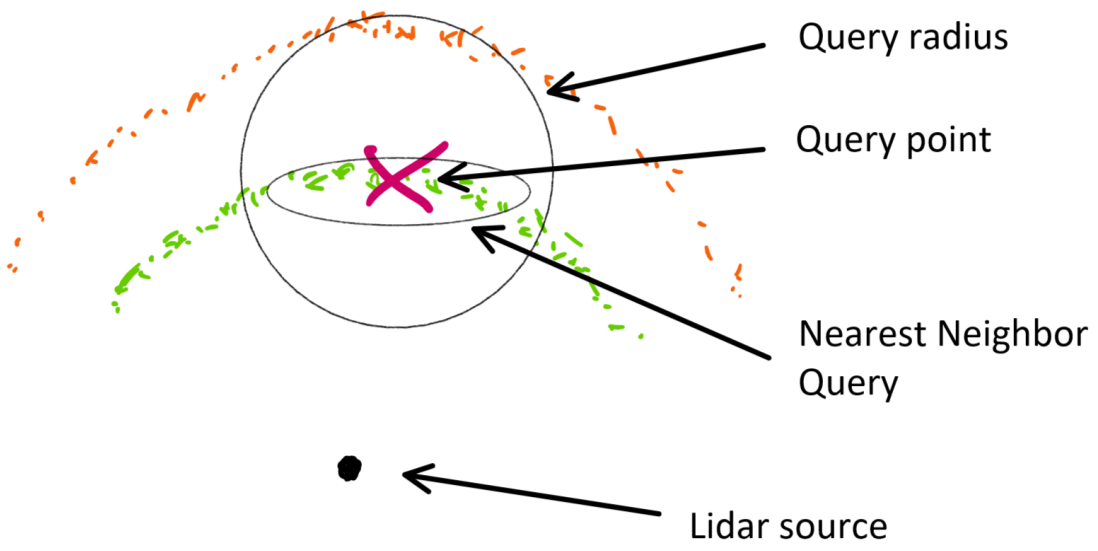


Figure 3: Lidar acquisition leads to a specific points distribution. when combined with a fixed amount of nearest neighbors used to compute normals, this leads to visible artficats in the normal maps.

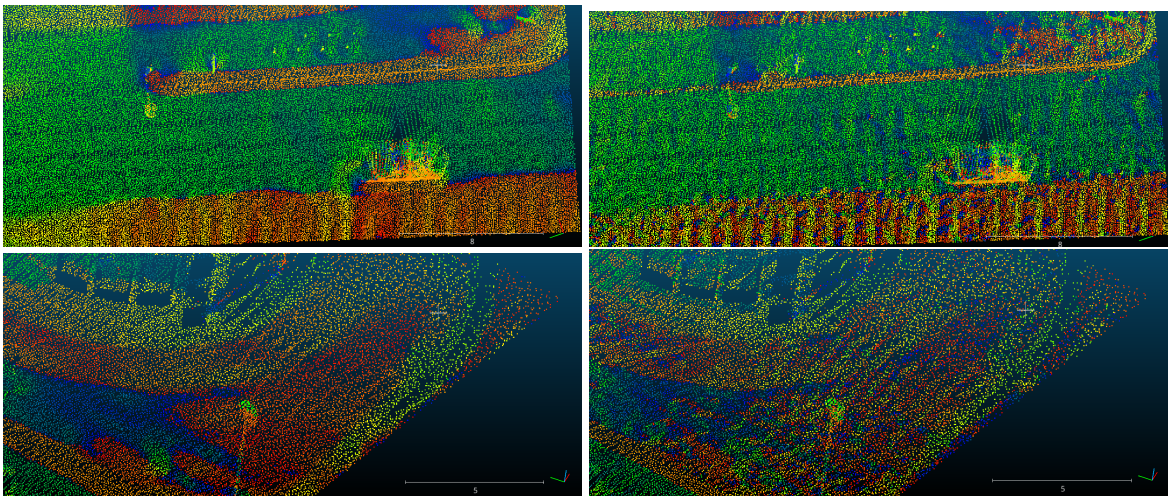

Figure 4: Left: 50cm radius local PCA used to compute normals. Right: 30 nearest neighbors used to compute normals.