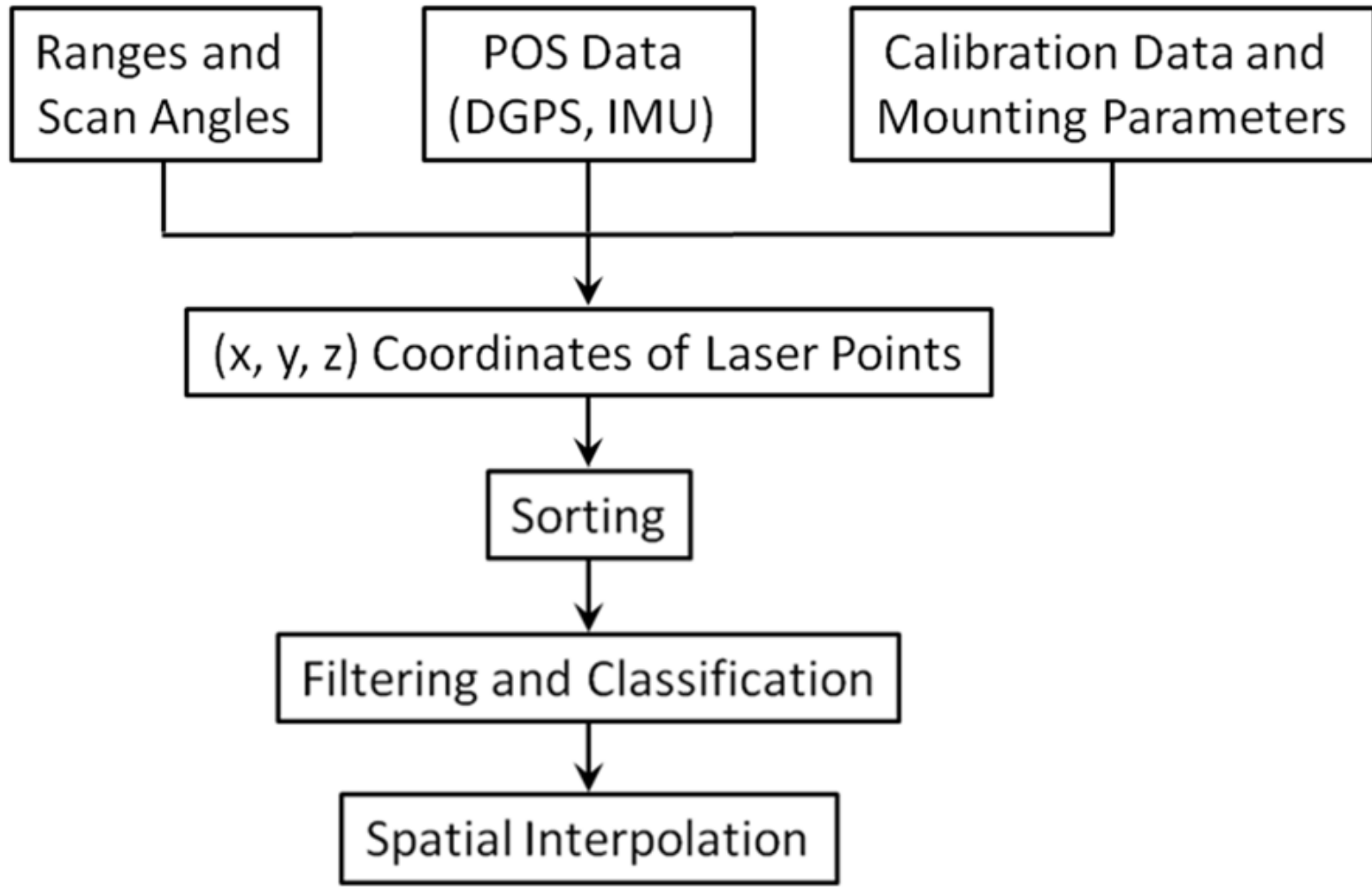


LiDAR Data Processing (2)

LiDAR Data Processing



Filtering

- **Definition:** To remove non-ground LiDAR points so that bare-earth digital terrain models can be created from the remaining ground LiDAR points.
- Over 20 filtering methods have been proposed in the past two decades (for example, Axelsson 2000, Sithole and Vosselman 2004, Tóvári and Pfeifer 2005, Chen et al. 2007, Liu 2008, Chang et al. 2008, Meng et al. 2010, Wang and Tseng 2010, Chen et al. 2013, Pingel et al. 2013, Zhang and Lin 2013, Zhang et al. 2016, Nie et al. 2017).
- Most filtering methods are unsupervised classifiers, which means that users do not need to collect training data. However, users may need to provide parameters for a classifier.

Filtering

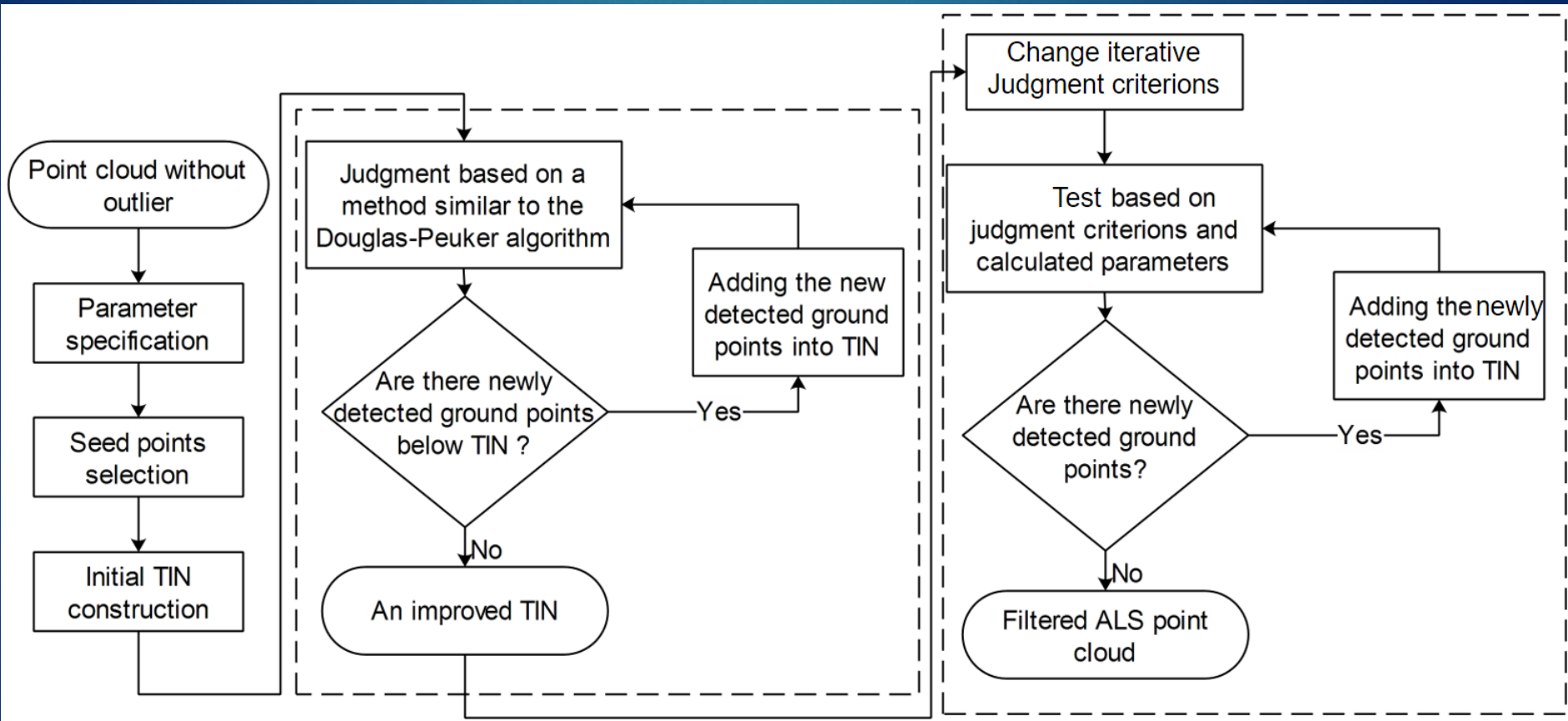
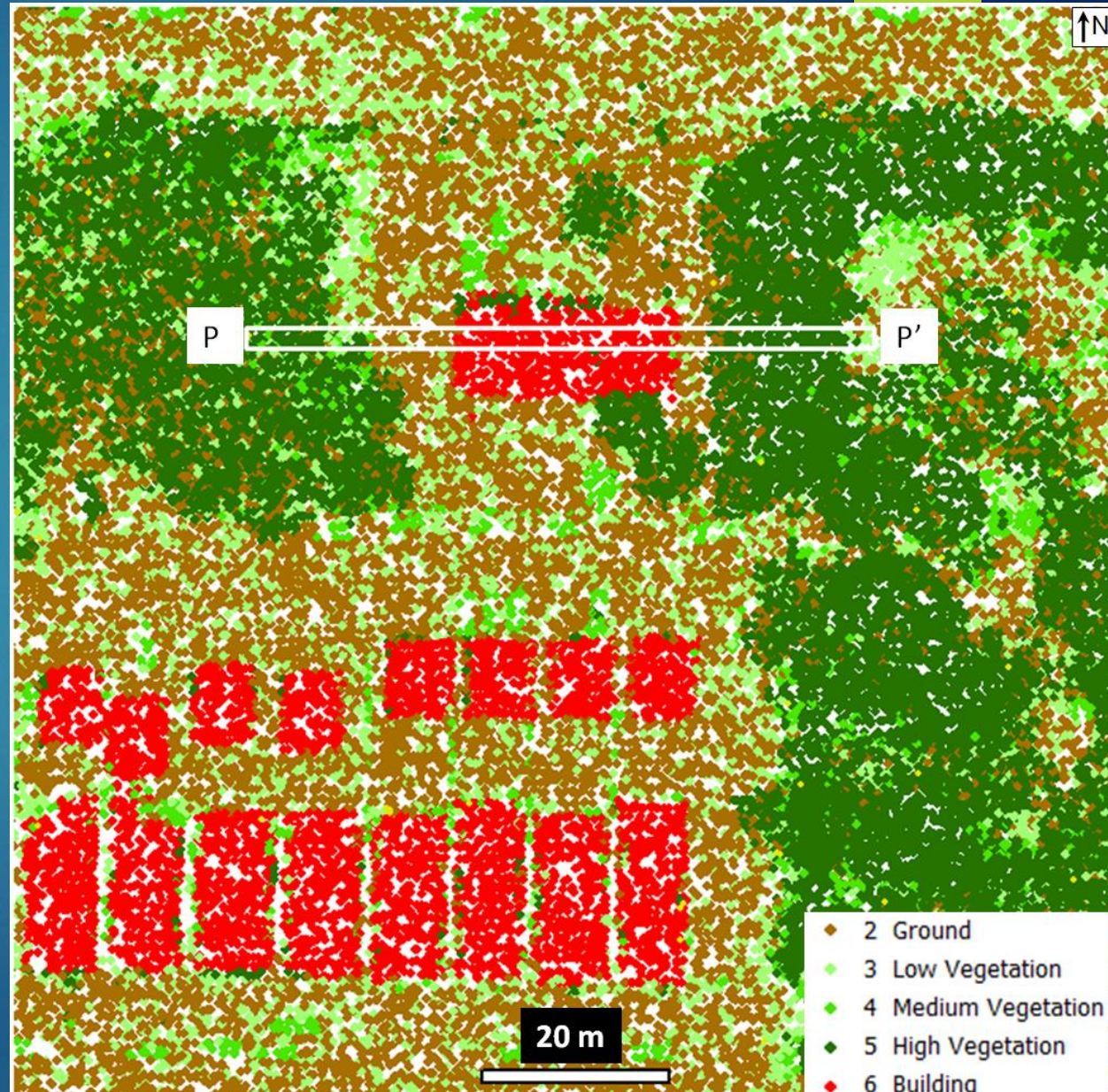


Figure 3.2. Flowchart of the revised progressive TIN densification method for filtering airborne LiDAR points (adapted from Nie et al. 2017).

Classification

Definition:

Identifying the type of earth surface materials or objects that generate the laser returns/points.

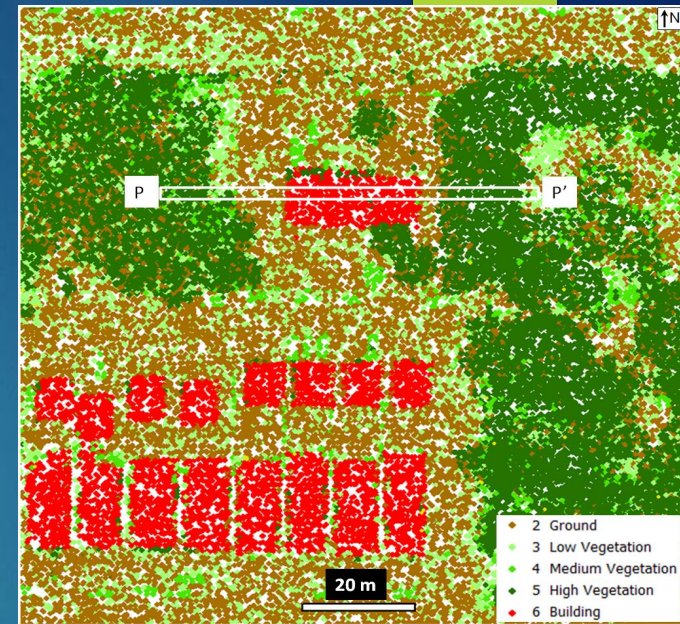


Classification

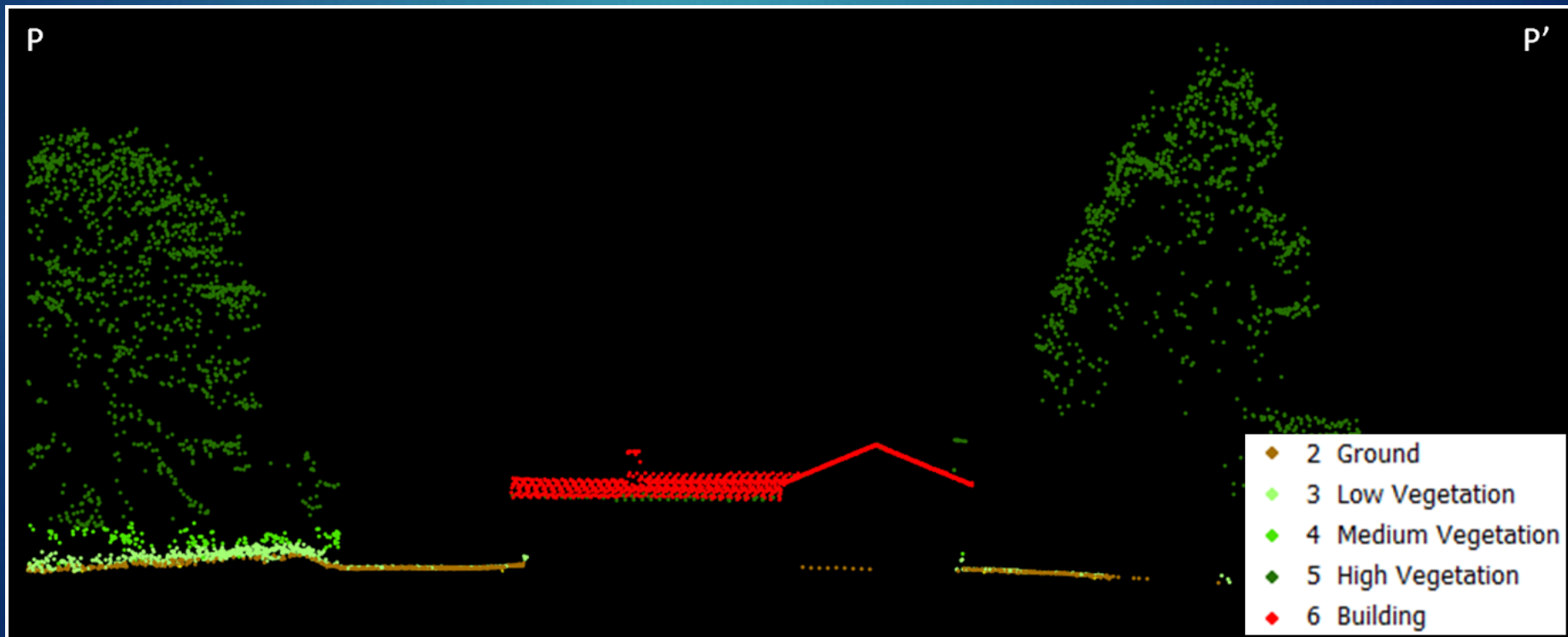
- Unsupervised classification (Haala and Brenner 1999, Vosselman 2000)
- Bayesian networks (Stassopoulou and Caelli 2000)
- Decision trees (Antonarakis et al. 2008)
- Support vector machines (SVMs) (Charaniya et al. 2004, Lodha et al. 2006, Secord and Zakhor 2007, Mallet et al. 2011, Lin et al. 2014)
- Machine learning and deep learning (Ramraz 2018, Wu et al. 2019, Kumar et al. 2019)

Classification

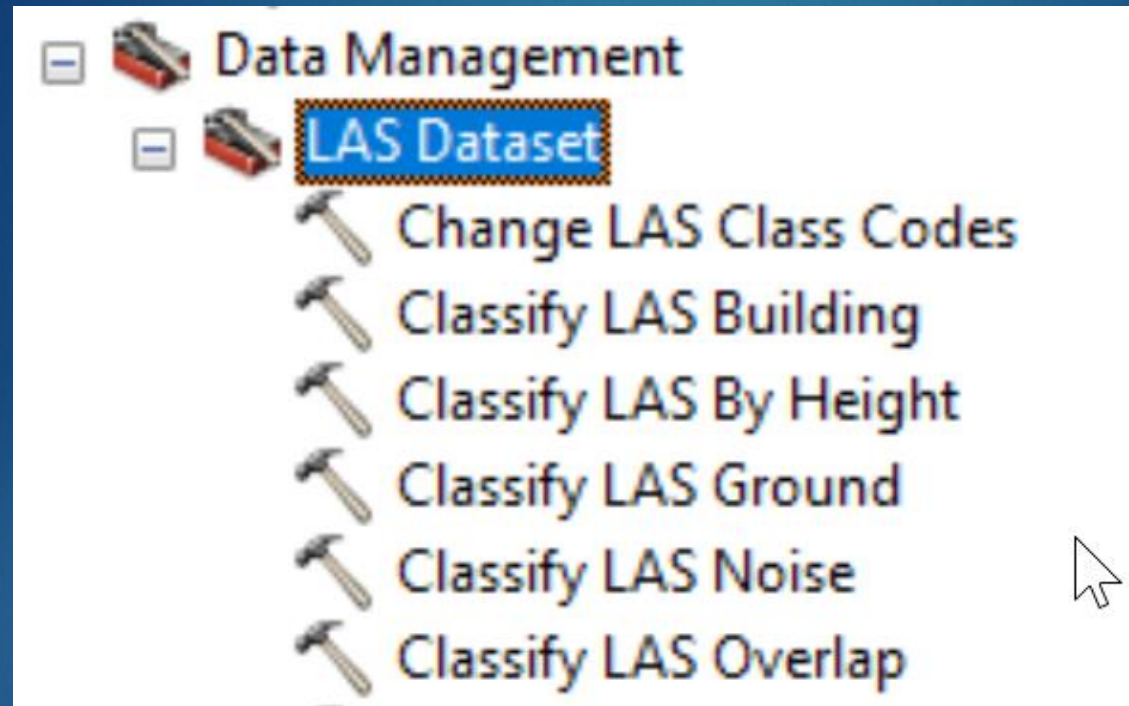
2D



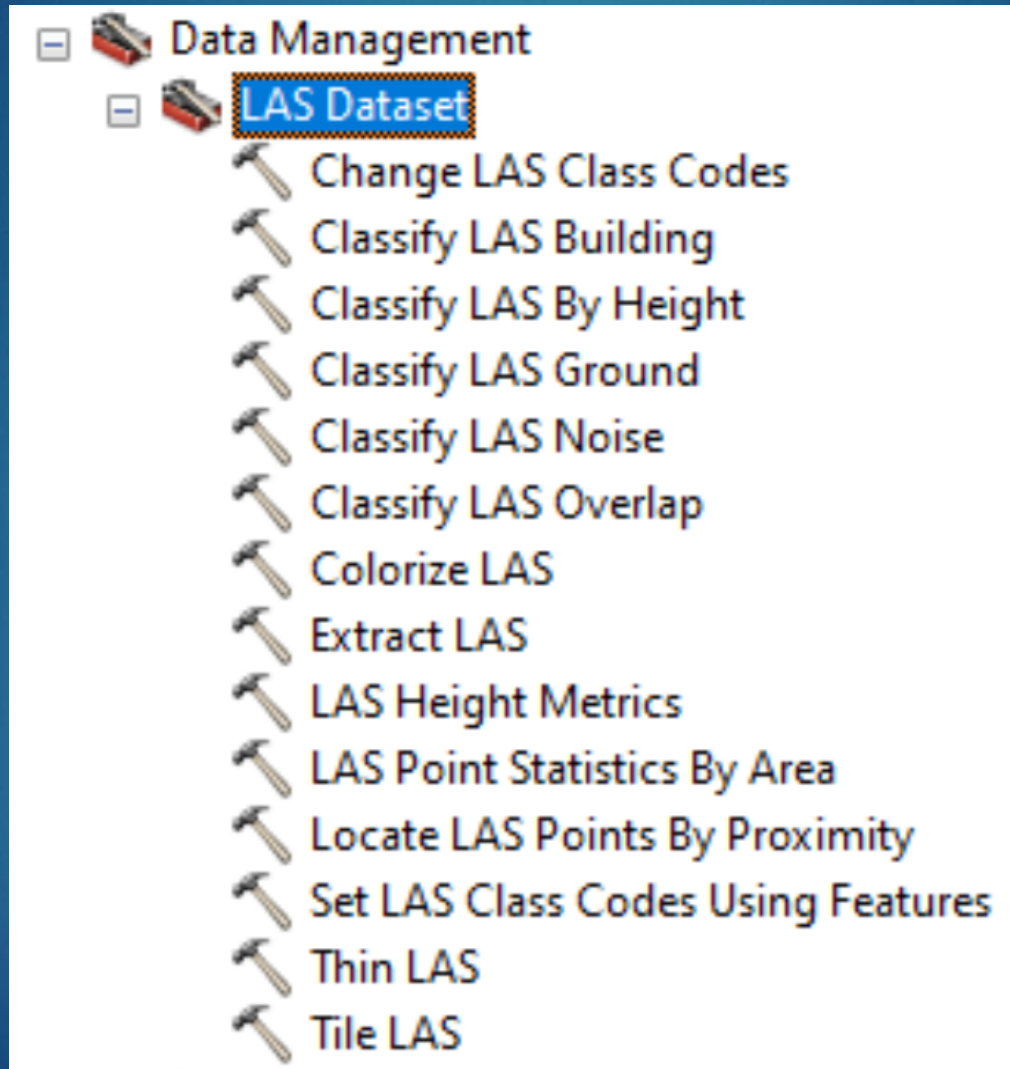
Profile



LAS Classification Tools in ArcGIS 10.6.1



LAS Classification Tools in ArcGIS 10.7.1 and ArcGIS Pro



LAS Classification Tools in ArcGIS 10.6.1

Change LAS Class Codes

Input LAS Dataset

C:\temp\Denton2011.lasd



Class Codes

Current Class	New Class	Synthetic	KeyPoint	Withheld	Overlap
6	1	NO_CHA	NO_CHA	NO_CHA	NO_CHA



☐ Compute Statistics (optional)

Processing Extent

Class Codes

Specify the current class code value in the input field, then press the + button to add the number to the reclassification table. Once the current class code has been added, the new class code can be written directly into the corresponding cell on the table.

OK

Cancel

Environments...

<< Hide Help

Tool Help

LAS Classification Tools in ArcGIS 10.6.1

Classify LAS Building

Input LAS Dataset

Denton2011

Minimum Rooftop Height (optional)

2

Meters

Average Point Spacing (optional)

0.43

Meters

Minimum Area (optional)

4.25

Square Meters

☐ Compute Statistics (optional)

Processing Extent

Processing Extent (optional)

Default

Top

Left

Right

Bottom

Processing Boundary (optional)

☐ Process entire LAS files that intersect extent (optional)

Classify LAS Building

Classifies building rooftop points in aerial lidar data.

OK

Cancel

Environments...

<< Hide Help

Tool Help

In-class Exercise 1:

1. Download “Denton2011.las” from:
<http://geography.unt.edu/~pdong/LiDAR/Chapter5/Project5.1/>
2. Create a LAS Dataset “Denton1” from “Denton2011.las”
3. Change LAS class code from 6 to 1.
4. Classify LAS buildings.