Tools, Tips, and Workflows

QA/QC on LIDAR data using either LP360 Command line executables or the Point Cloud Statistics Extractor

LP360

B S A U | A W G

Support
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You can do general QA/QC on LIDAR data using either LP360 command line executables or the Point Cloud Statistics Extractor, which is one of the Point Cloud Tasks found within the LP360 GUI. Some general QA/QC information that can be gathered includes, but is not limited to, projection information, GPS time format, LAS version, point count, point count per class, and area.

LDDump

A quick and basic way to get information about projection information, GPS time and the number of points within an LAS file is to run the LDDump executable. The program is designed to pull the information directly from the public header block of the LAS file, provided the header has been correctly populated with the information by the generating software. The public header information can be displayed in the command prompt or exported to a text, CSV, or KML file.

Example: LDDump.exe -h E:\Warehouse\80298\59\ME_0032.las			
LDDump.exe Command Line Parameters			
-a	all (-v -p -c)	-p	dump point data
-f	display the indexing factor	-c	dump in CSV format
-h	dump public header block	-k	dump in KML format
-H	do NOT dump public header block	-s	start index for point data
-v	dump variable length records	-e	end index for point data

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C:\Program Files\Common Files\QCoherent>lddump.exe -h E:\Warehouse\80298\59\ME_0032.las
E:\Warehouse\80298\59\ME_0032.las
Public Header Block
    File Source ID                    = 0
    Global Encoding                   = 0 - GPS Week Time
    Project ID - GUID                 = {57dee2ac-5b71-4636-adb6-6ff684d09fd3}
    LAS Version                       = 1.2
    System Identifier                 = NIIRS10
    Generating Software               = GeoCue GeoCoder
    File Creation Date                = Day 122 of year 2013 (GPS Week 1738, day 4 - Thursday)
    Header Size                       = 227
    Offset to point data              = 7807
    Number of VLRs                    = 5
    Point Data Format ID              = 1
    Point Data Record Length          = 28
    Legacy number of point records    = 16209875
    Legacy number of points by return = 12637573, 3036142, 506291, 29869, 0
    X scale factor                    = 0.010000000
    Y scale factor                    = 0.010000000
    Z scale factor                    = 0.010000000
    X offset                          = 0.000
    Y offset                          = 0.000
    Z offset                          = -0.000
    X range                           = 375152.36 .. 378152.35
    Y range                           = 4831010.86 .. 4834010.85
    Z range                           = -333.13 .. 77.19
    Start of Waveform Data Packet     = 0
    Start of 1st EVLR                 = 0
    Number of EVLRs                   = 0
    Number of point records           = 16209875
    Number of points by return        = 12637573, 3036142, 506291, 29869, 0
    File definitely has projected projection information.
    File has projection information as follows:
      Key: 1024, value: 1
      Key: 2048, value: 4269
      Key: 2049, value: NAD83
      Key: 2050, value: 6269
      Key: 2051, value: 8901
      Key: 2054, value: 9102
      Key: 2055, value: 0.0174533
      Key: 2056, value: 7019
      Key: 2057, value: 6.37814e+006
      Key: 2059, value: 298.257
      Key: 2061, value: 0
      Key: 3072, value: 26919
      Key: 3073, value: NAD83 / UTM zone 19N|projection: Transverse Mercator
      Key: 3075, value: 1
      Key: 3076, value: 9001
      Key: 3077, value: 1
      Key: 3081, value: 0
      Key: 3082, value: 500000
      Key: 3083, value: 0
      Key: 3088, value: -69
      Key: 3092, value: 0.9996
      Key: 4097, value: NAVD88 - Geoid03 (Meters)
      Key: 4099, value: 9001
    OVERALL EPSG CODE: 26919
    with linear units: 9001
```

Figure 1 – Sample Results from LDDump.EXE

At a quick glance, a user can determine the information about the file such as the following:

- The GPS time format for this file is GPS Week Seconds.
- The horizontal projection information is NAD83 UTM Zone 19N, while the vertical is NAVD88 Geoid03 (Meters).
- There are a total of 16,209,875 points in the file.

LDDump may be run in batch on multiple files with the dump information exported to individual text files. This executable does not require an LP360 nor an ArcGIS license.

A more in-depth analysis using the command line can be accomplished using LP360Stats.exe. This command line executable is designed to calculate specific predefined statistics about the data in the LAS files. The information comes from both the header and the LIDAR points themselves. LP360Stats.exe does require an LP360 license and the resulting information can be exported to either an ASCII file or a shapefile.

LP360Stats

Statistics may be extracted for the dataset as a whole (group), or individually for each LAS file. Both methods provide the user different information.

Example: LP360Stats.exe /f E:\Evaluation\622758_4858800.las /s i /ft ascii /o E:\Evaluation\stats.txt
LP360Stats.exe Command Line Parameters
/p or /f: Use '/p' to run on all LAS files within the specified folder, or '/f' to run on the specified LAS file.
/s: Use '/s' to define how the summary will be collected by individual LAS file (i) or as a group (a).
/c: Use 'c' to define a comma-delimited list of classification numbers that define the points used in the summary.
/r: Use 'r' to specify the return combinations that define the points that are exported.
/g: Use 'g' to define how the summary will be grouped.
/ft: Use '/ft' to specify the file format to write results to (i.e., shp or ascii).
/o: Use '/o' to specify the file to write results to.

By choosing the group output option, the user may obtain both general information about the file as well as cumulated point attribute information. Examples of available general information includes the Point Count, Number of classes used, individual class counts, the number of point sources used, the number of returns used, and the number of points per return. Compiled point attribute information includes the elevation minimum/maximum, intensity minimum/maximum, and scan angle minimum/maximum.

If the individual file option is chosen, then, in addition to the information about the point attributes listed above, information about the public header block is also extracted. This is similar to the information that is available when using the LDDump executable.

LP360Stats may be run in batch on multiple files with the information exported to individual text files. This executable requires a Basic Level LP360 license, but does not require an ArcGIS license.

Point Cloud Statistics Extractor

A user may review similar information that one extracts using the LP360Stats and LDDump executables by executing the Point Cloud Statistics Extractor in the LP360 GUI. This tool requires the use of a basic-level license of LP360 and requires that the data be loaded into the program. The results from executing this Point Cloud Task (PCT) is a shapefile that contains the desired information within the attribute table.

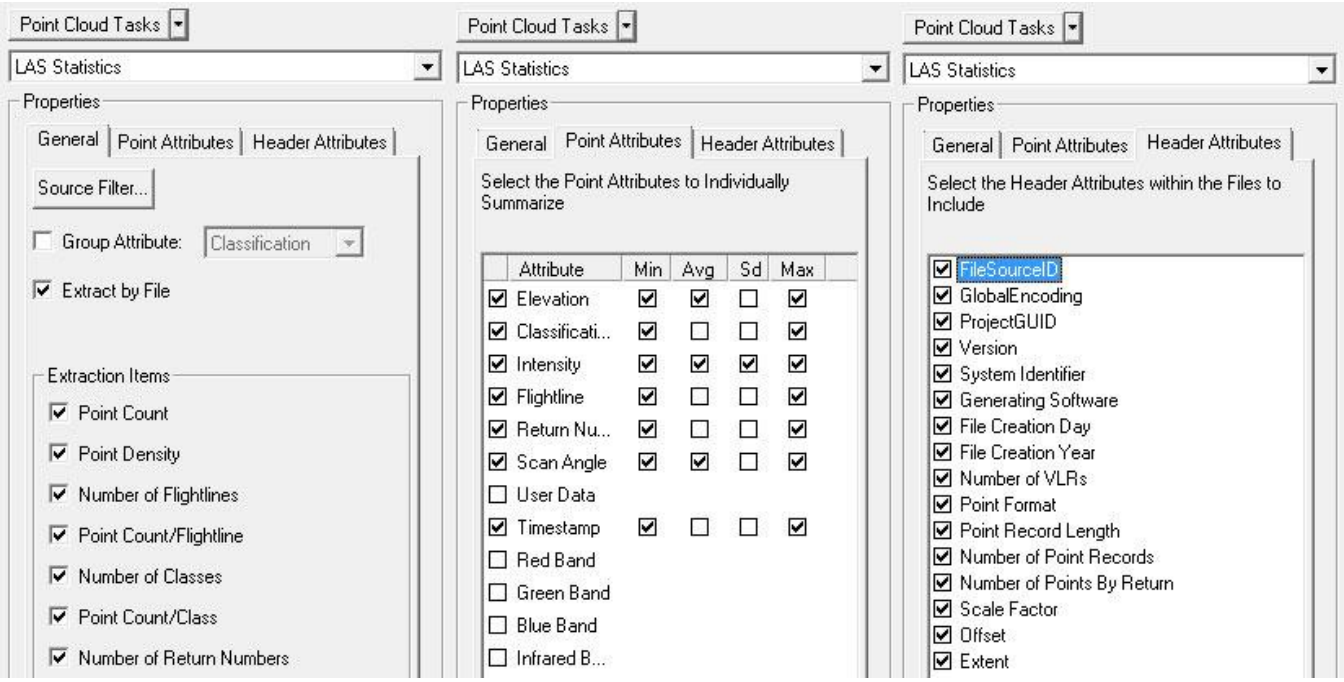

Figure 2 - PCT: Point Cloud Statistics Extractor

There are additional statistics that can be calculated using the PCT option that are not available within the LP360Stats executable. Some additional general information that can be obtained includes the point density, point count per flight line, and area. Additional point attribute information includes the ability to extract the average and standard deviation for attributes, in addition to minimum and maximum.

Using a combination of the command line executables and the GUI interface gives users more options when completing file analysis dependent upon their specific needs. A final step in the process is exporting the data using a combination of LP360 command line executables and the GUI. Look for more information in a future edition of *LP360 News*.