UTILIZACIÓN DE DATOS LIDAR Y SU INTEGRACIÓN CON SISTEMAS DE INFORMACIÓN GEOGRÁFICA

Aurelio Castro
Cesar Piovanetti
Geographic Mapping Technologies Corp. (GMT)
Overview

- Introduction to LiDAR
- Advantages of using LiDAR
- Applications
- LiDAR tools Overview
- LiDAR examples
- Live Demo
Introduction to LiDAR

- Acronym for Light Detection and Ranging
- Collection sensor uses laser with transmitter and receiver, GPS receiver, inertial measurement unit (IMU) and a scanner
- Uses light waves
- Usually operated at 532 to 1550 nm in electromagnetic spectrum
- Provides 3D information for an area of interest
- Can be collected through aerial, terrestrial, or mobile methods
Advantages of using LiDAR

- Can be used day or night
- Fast, accurate and generally affordable
- Tailor collection needs, such as point density, for a particular project from county or statewide projects with aerial scanners, to very limited focus projects with terrestrial scanners
  - Flood plain mapping requires 1.4 points per meter
  - Power line mapping can require 20 to 40 points per meter
  - Vegetation mapping requires 8 to 12 points per meter
- Highly accurate elevation information for DEM creation
Advantages of using LiDAR

- Great for mapping man-made features
- Can emit pulses through vegetation canopy, best for leaf-off
- Can process data to create contours, GIS features and 3D images
- Saves time and money – combined with imagery it is the next best thing to being there
Limitations of LiDAR

- Can’t “see” through clouds or fog or smoke
- Moisture affects the collection of points
- Like all remotely sensed data, must be calibrated and corrected properly to provide good accuracy in results
Useful LiDAR Applications

- Surface mapping
  - Geology
  - Oil and Gas
  - Road resurfacing

- Vegetation mapping
  - Forestry
  - Agriculture

- Transportation corridor mapping
  - Road surveys
  - Rail line surveys
  - Transmission and pipeline surveys
  - Transmission route mapping
Useful LiDAR Applications

- 3D building mapping and urban modeling
- Floodplain mapping
- Archaeology
- Environmental
  - Identify wildlife habitats
  - Coastal morphology and hazard assessment
- Defense
  - Target identification
  - Mine detection
  - Line of sight analyses
LIDAR Tools Overview

**E3DE software experience**

- Automatic solution for point cloud data processing
- Focused on use of LiDAR data to produce realistic 3D models
- Airborne LiDAR data processing software product that transforms geo-referenced point clouds into GIS layers and 3D models.
- Enables the processing of large quantities of data in a short period of time
- Allows for the creation DTM, DSM, SHP files to represent buildings and power lines, trees list and other items
- Automatically creates a 3D view of the mapped area
- Photo-realistic dynamic presentation
The Six Steps to LIDAR data processing

Step 1
Import the LiDAR point cloud and reference information

Step 2
Check density and coverage

Step 3
Filter lower points & Set the project properties

Step 4
Process the data

Step 5
Perform quality assurance

Step 6
Perform Precision Test

.... E3DE software experience
E3De Features

- Automatic Product Generation
  - Classified Point Cloud
  - Digital Surface Model (Grid and TIN)
  - Digital Elevation Model
  - Ground contours
  - Building roof faces vectors
  - Building Perimeter vectors
  - Power line vectors
  - Power pole list (X,Y,Z,H,R)
  - Power line attachment point list (X,Y,Z)
  - Tree list (X,Y,Z,H,R)
  - Point density and coverage analysis
E3De Product Generation – Product Selection

Generate All Products or a subset
Can save parameters to template
Can limit size of output
LIDAR Product Generation – Area Selection

Process Entire Scene or Subset Overlay Reference Data SHP files Imagery

... E3DE software experience
**E3De Product Generation – Parameters**

Setting Parameters for all available Outputs

Parameters can be saved in a template for future processing.
E3De Features

- QA/QC
  - User modifications to TLiD point classification
  - DEM editing
  - Power line and power pole editing
  - Tree parameters editing
  - Manual vector editing

- Visual Exploitation
  - Point Cloud viewing
  - Interactive cross section visualization
  - Manual Point Cloud visualization
  - Flythrough visualization
LIDAR – Point Cloud Visualization

Overview window

Point Cloud Viewer

... E3DE software experience
LIDAR - Point Cloud Classification

.... E3DE software experience
LIDAR - Building Cross Section

.... E3DE software experience
LIDAR – Power Lines w/Cross Section view

..... E3DE software experience
LIDAR – Point Cloud Visualization

... E3DE software experience
LIDAR – Automatic Classification

E3DE software experience
LIDAR – Vector Products

.... E3DE software experience
LIDAR – QA/QC View

.... E3DE software experience
LIDAR – Interactive Building Editing

E3DE software experience
E3De – Interactive Building Editor

- Interactively edit automatically extracted buildings – 2D to 3D linked editor
- Automatically square off buildings
- Remove multiple with square-off
- Add new points
- Add new buildings
- Visualize point cloud data while editing for reference
LIDAR – Interactive Tree Editing

.... E3DE software experience
LIDAR – Interactive DEM editing

E3DE software experience
LIDAR Interactive DEM Editing (con’t)

... E3DE software experience
E3De – Interactive DEM Editing

- Add / Remove points from terrain
- Level Areas
- Filter points in Radius
LIDAR – 3D Flythrough Viewer – Haiti Earthquake

.... E3DE software experience
LIDAR – Flythrough Flight Controls

- Move forward
- y - Move backward
- Right Click - Freeze movement
- Left Double Click - Send location to TL3D
- Left Double Click + Ctrl - Add text label
- - Increase field of view
- b - Decrease field of view
- g - Toggle sensitive navigation
- n - Toggle SDA (On-Screen Display)
- p - Toggle bilinear filtering
- t - Toggle haze
- m - Toggle terrain noise
- [ - Increase light time
- ] - Decrease light time
- 0 - Toggle terrain layer
- 1 - Toggle buildings layer
- 5 - Toggle trees
- 9 - Toggle vectors layer

..... E3DE software experience
LIDAR – Export Options

... E3DE software experience
Advantages of Using E3De

- Short data processing time
- Reduced cost with improved efficiency
- Easy-to-use GUI
- Stand-alone processing product
- Enhanced interoperability of results with other products
- Large number of industry standard output formats
- Fast parallel processing for cost reduction
- No limitation on input file size
- Trees counting feature – height and size
Summary

- E3De releases October, 2011
- Complete solution automatic product generation with interactive QA/QC
- Powerful export capabilities
**ITT Visual Information Solutions**

**IDL**
The preferred computing environment for understanding complex data

**IAS**
Rapid image compression and delivery technology

**ENVI**
Get useful information from geospatial imagery

`Envi` and `ArcGIS`
Percepción Remota – Extraer Información

- ArcGIS (Including Desktop, Server, Enterprise)
- ENVI

Imagenes & Fotos Disponibles
- NOAA – BioGeo – 1999
- IKONOS – 2003
- Fotos Aereas - 2004
- Fotos Aereas - 2007

- Realizar Análisis
  - Reconocimiento Automático de Elementos
  - Detección de Cambios
Percepción Remota & LiDAR – Extraer Información

ArcGIS
(Including Desktop, Server, Enterprise)

ENVI

Geo Database
Nuevas Estructuras

$2,700.00 (54 estructuras x $50.00)
¿Preguntas?

Geographic Mapping Technologies, Corp.  
(787) 250-8182 / (787) 250-8185