

Business Domain

Civil Engineering, Utility,
GIS and Geospatial

Project Type

Tech Partnership

Automating Point Cloud Classification: How Dielmo 3D Improved Accuracy, Scalability, and Data Quality

Client

Dielmo 3D specializes in topography, digital mapping, and AI-driven data analysis. With 20+ years of experience, they provide aerial and terrestrial data capture, serving global clients in infrastructure, forestry, hydraulic studies, renewable energy, and agriculture.

Project

The project aimed to develop an automated point cloud classification system. The goal was to accurately segment key objects such as ground, vegetation, roads, buildings, towers, poles, and conductors. The final outcome was a console application that efficiently processes LAS files with precise classification labels.

Objective

- Develop a stable, generalizable deep learning model to reduce manual effort and increase accuracy in point cloud segmentation across diverse environments.
- Implement a scalable solution that seamlessly integrates into existing workflows, enabling higher data processing capacity and operational expansion.
- Optimize training data for consistent classification, improving data quality and reliability for better decision-making and project outcomes.

Team Reinforcement

The Client engaged the Remote In-Sourcing Team® to build a comprehensive point cloud classification pipeline. Intetics formed a team of ML engineers with specialized expertise in civil engineering and powerlines.

Challenge

- Ensuring the model generalizes across diverse environments while maintaining class balance.
- Handling sparse data, such as thin structures like wires, without losing accuracy.
- Developing a stable and reliable model from scratch for consistent performance.

Dielmo lacked the in-house resources with the required deep learning expertise and faced scalability constraints in developing a robust classification model. They sought a reliable partner with the right expertise to ensure an efficient and scalable solution.

Quick Facts

- ✓ **54% Faster Processing:** Automation reduced manual annotation, speeding up workflows and boosting efficiency
- ✓ **18% More Accurate:** Enhanced classification precision lowered errors, improving data reliability
- ✓ **27% Cost Reduction:** Streamlined workflows cut operational costs, making geospatial analysis more affordable

Technologies

Python / PyTorch / PyTorch Geometric

Solution

★ 01

By boosting processing speed and accuracy, the Client can deliver faster results to customers, improving client satisfaction and retention, and solidifying their position in the market.

★ 02

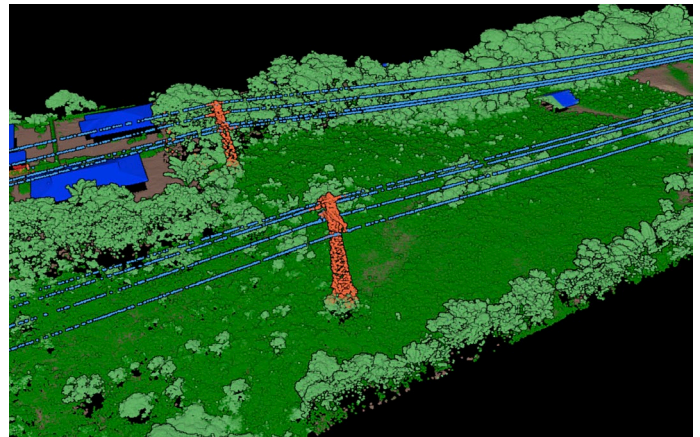
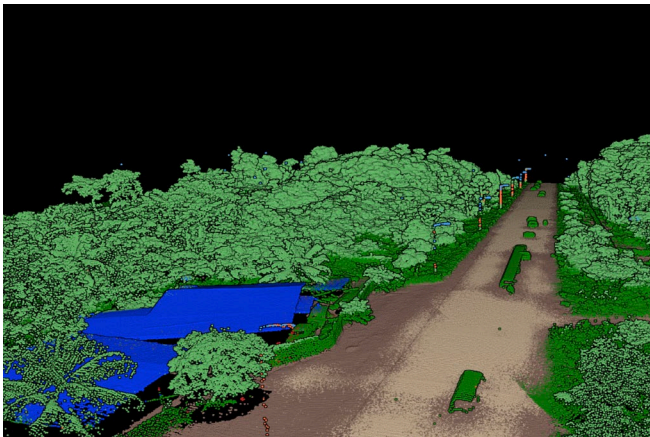
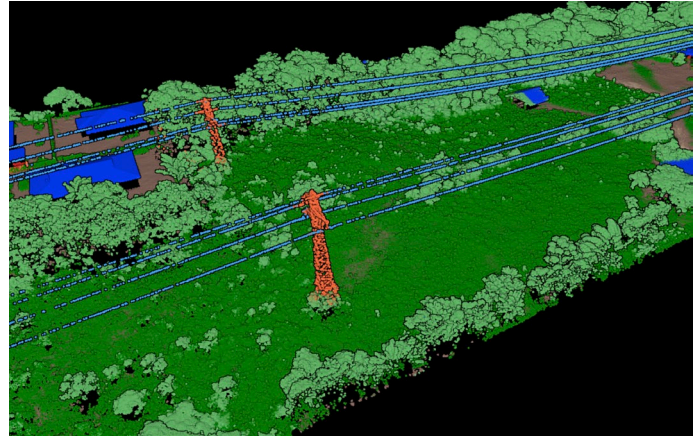
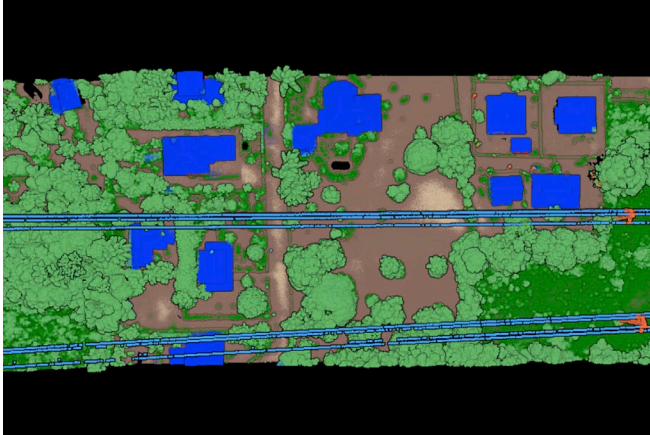
A customized PointNet++ model is optimized for precise point cloud segmentation, ensuring comprehensive and accurate classification across all target classes.

★ 03

A user-friendly console application simplifies the processing of LAS files and updates classification fields, ensuring smooth and accurate data handling.

★ 04

Advanced re-sampling techniques address class imbalances, ensuring improved model accuracy and better representation of sparse data features.



Benefits and Results

- ★ The model demonstrates **84%+ accuracy** in classifying diverse environments, ensuring reliable results across various real-world scenarios, with consistent performance even in previously unseen conditions.
- ★ Innovative techniques reduced misclassification rates for thin structures like wires by **30%**, enhancing detection accuracy and reliability in sparse data scenarios.
- ★ **The scalable architecture** allowed the client to handle larger datasets without the need for significant investment in additional infrastructure, resulting in **cost savings of up to 50%** in hardware and IT resources as the business grows.