Avitas Systems
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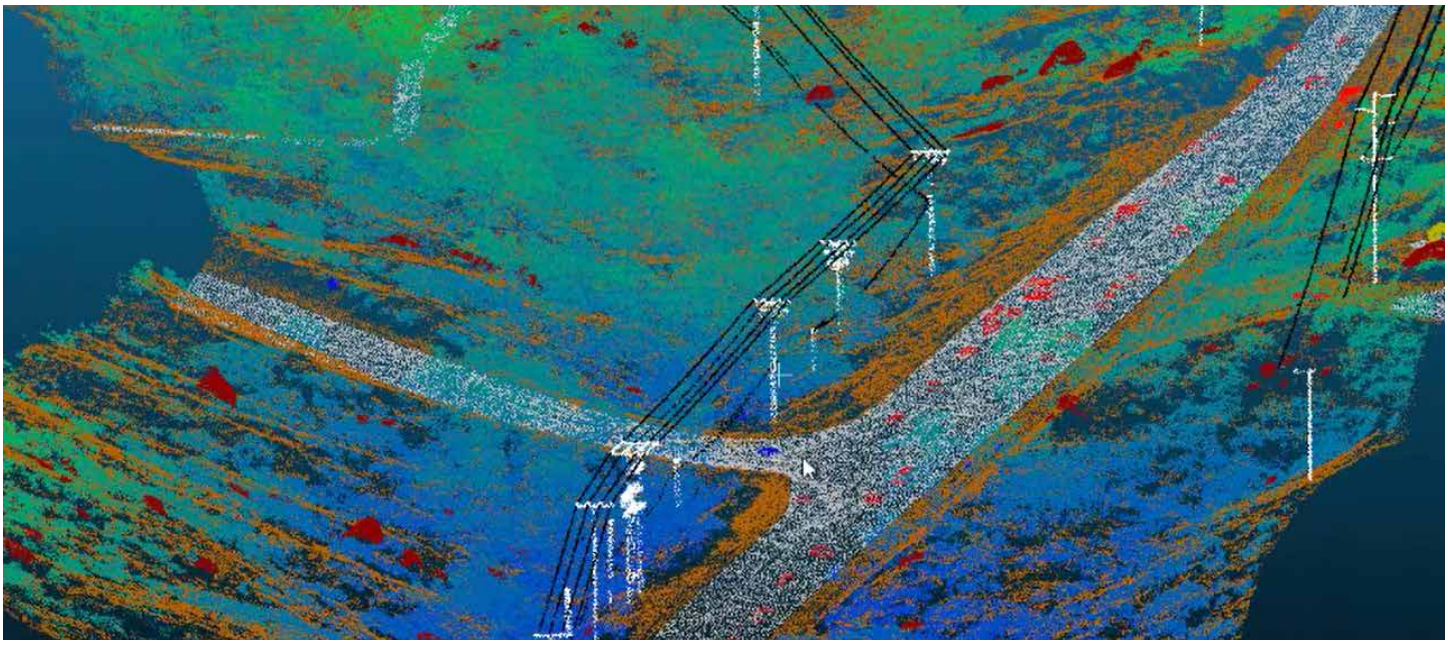

Avitas Systems solutions for Sempra Energy

SUMMARY

Avitas Systems ingested and analyzed inspection data collected by unmanned aerial vehicles, including red, green, blue (RGB) imagery, integrated with data from geographic information systems (GIS), power line systems, computer aided design and drafting (PLS-CADD), and other various other data types. Using computer vision and deep learning techniques to advance inspection analytics for Sempra Energy, Avitas Systems demonstrated the ability to automatically detect and identify defects and vegetation encroachment, which was available to users via the Avitas Systems Platform. Avitas Systems also provided streamlined access to data and inspection recommendations that could integrate with existing and future Sempra-owned San Diego Gas & Electric (SDG&E) infrastructure.

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CHALLENGE

Data collection and storage

SDG&E collects inspection data annually; ingesting large volumes of data and metadata management provides the unique challenge of ensuring the data is properly tagged and associated with utility assets. Additionally, large collections of data is housed on individual storage drives throughout the organization, not accessible to other stakeholders within SDG&E. There is no ability to link all the storage drives, or enrich data with other attribute information. Avitas Systems was tasked with introducing a platform that could integrate with existing and future SDG&E workflow infrastructure, including software applications and legacy data sets. The platform needed to ingest, store, analyze, and report on SDG&E assets from GIS, PLS-CADD, and unmanned aerial vehicle (UAV) collected data and other various sources.

Safety and accessibility

Manually inspecting utility assets for vegetation management or erosion problems is unsafe for inspectors or field crews. SDG&E has transmission and distribution lines in treacherous terrain, which is difficult for field crews to access. Additionally, vegetation encroachment itself can cause power outages and spark wildfires. These challenges can be mitigated with the utilization of UAV technology and more precise inspection analysis.

INSPECTION SCOPE

- *Avian cover identification:* test case to evaluate the identification of avian covers through advanced analytics on RGB images for continual maintenance
- *Vegetation encroachment identification:* test case to evaluate identification of vegetation encroachment within a buffer zone around power lines, thereby assisting in identification of trees for maintenance and trimming
- *Cataloging and remote asset management:* test case to demonstrate ingestion of data from various sources and cataloging metadata, enabling remote asset management

SOLUTION

Avian cover identification

Avitas Systems sought to identify avian covers, specifically the existence or absence of avian covers where they were required. The goal was to capture more detailed inspection data and assess conditions with automated machine learning analytics. Avitas Systems developed and trained machine models that could continuously learn to automatically identify avian covers as new images were ingested into the platform. The models would then be applied to drone-captured data to assess whether avian covers were present or needed repair.

Vegetation encroachment identification

Avitas Systems used Light Imaging Detection and Ranging (LiDAR) data, monitoring for vegetation encroachment in predetermined zones around electrical wires to provide a road map for future proactive vegetation maintenance efforts. To predict growth rates of vegetation near SDG&E lines, Avitas Systems leveraged the metadata that had already existed within SDG&E databases. By collecting repetitive datasets, Avitas Systems allowed for enhanced prediction of vegetation growth rates. Predictive algorithms were used to target areas where the growth would soon encroach on the safe zone around SDG&E facilities.

Cataloging and remote asset management

To prevent costly field visits and manned technology usage, Avitas Systems integrated UAVs for data collection. Across all test cases, Avitas Systems also integrated PLS-CADD, a sophisticated three-dimensional engineering model used to model SDG&E powerlines. By utilizing UAV technology, field crews did not need to travel far by foot into unfavorable terrain. For example, pole inspections required less hiking, since a UAV could be launched from a nearby access road and flown to inspect SDG&E assets. Using LiDAR allowed Avitas Systems to catalog assets in remote areas and demonstrate change management for those assets. Because assets were automatically cataloged

from high-resolution imagery, a more accurate inventory of asset conditions could be maintained to increase focus on predictive failure. Inspection data was also streamlined, and multiple end users could access and sort it by location or other specific criteria, such as areas prone to erosion problems. Avitas Systems reconciled records from different data sources on the same asset and reported discrepancies back to SDG&E for database corrections.

RESULTS

Cost savings

- Provided access to remote sensor data from UAVs, leading to cost savings and enhanced SDG&E personnel and public safety
- Utilized a synergistic approach to fusing different types of data, which saved money

Efficient vegetation management

- Automatically detected vegetation within a specified encroachment zone to facilitate proactive and focused vegetation management with analytics
- Using LiDAR point cloud data and PLS-CADD models, developed algorithms to locate and categorize vegetation encroachments of potential risk to conductor lines
- Made encroachment areas searchable and accessible across a large geographic area

Enhanced data integration and visibility

- Fused collected datasets into existing systems of asset records for deeper analysis
- Introduced an organization-wide data management platform with problem-specific analytics and easy access to critical information for informed maintenance decisions
- Managed metadata and storage for facilities with advanced search and filter capabilities
- Developed comprehensive final report on inspection findings

Advanced analytics and machine learning

- Automated defect detection on power lines using advanced image analytics: images from the UAV and sensor technology were higher resolution – UAVs could fly 30-50 feet away from assets and identify objects or damages with a size greater than 4cm.
- The Artificial Intelligence (AI) Workbench, an original solution that can process inspection data in real time and retrain deep learning models to rapidly adapt to new use cases, identified the avian covers with an accuracy of 85%.

Visit Avitas Systems at: ***www.avitas-systems.com*** *or* ***@Avitas_Systems*** *on Twitter*

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