

Case Study

How a Fortune 500 Utility Transformed their Vegetation Management Program with Satellite Analytics and AI



About our Client

- A Fortune 500 power utility company
- Nearly 100,000 OH distribution line miles
- Over \$10 billion in revenue
- Over a million consumers

Overview

Challenges

Manual vegetation management practices coupled with reactive and ad-hoc maintenance resulted in low system reliability, high risks of power outages and liabilities along with increased costs for our customer.

Solution

Leveraging Satellite-powered Artificial Intelligence and customizing our Deep Neural Network Model to meet our customer's specific needs, helping them minimize costs and improve reliability in the process.

Results

System reliability improved by 15%

Annual budget for vegetation management reduced by 20%

Approx. \$10M saved annually

Introduction

When you are a Fortune 500 power utility company with OH distribution lines spanning nearly 100,000 miles, efficient vegetation management for system reliability and outage management continue to be the top priorities.

So, when our client was seeking to transform the way they conducted vegetation management, we employed cutting-edge technology and innovation powered by Artificial Intelligence combined with strong business competencies to work for them. We customized our product, AiDash Intelligent Vegetation Management System (IVMS), to meet their specific needs, helping them minimize costs and improve reliability in the process.

Key challenges

Analyzing the past

Vegetation management has never been an easy task to accomplish. It is often one of the largest operational expense items for power utilities, which can result in them spending over \$100 million per year. Let's understand the challenges our customer faced in optimizing their vegetation management budgets and carrying out the tasks in a timely and efficient manner.

Legacy system, traditional approach

At a time when technology is empowering businesses, power utilities still rely on their legacy system and traditional approach for vegetation management. Historically, vegetation management has been driven by:





As these manual operational practices have proved ineffective and are rapidly becoming obsolete, our customer realized the need to **use technology to streamline their Operations & Maintenance (O&M) activities.** They realized that new opportunities exist to dramatically improve vegetation management by moving to condition-based trimming programs and predictive analytics to avoid risks and hazards.

Lack of visibility

When your OH distribution network is spread across nearly 100,000 line miles across multiple states, it is impossible to manage vegetation efficiently via a manual approach. From data collection to data analysis, everything was being done on an ad-hoc basis. The lack of visibility and the looming threat of hazards and power outages triggered our customer to look for a solution that allowed them to gain complete control of all their assets from a centralized location, make informed decisions and empower their field force with tools to report, prioritize and execute tasks from the field. Digitization was one of the key requirements, but that wasn't enough. The entire process needed a tech boost.

Very high costs

Vegetation management is often the single largest preventive maintenance expense in annual operating budgets, exceeding \$100 million annually in many larger utilities. Our customer was no exception. The lack of visibility concerning urgent situations and hazards, **inability to identify the exact point of failure or even prioritize tasks optimally resulted in reactive and ad-hoc maintenance** that is primarily expensive. They decided to find the best solution available in the market that will help them reduce costs.

Increasing losses and risks of liabilities

As assets age and are impacted by weather and surroundings, power outages are a major risk for power utilities. Outages cost an average of about \$33 billion per year in the United States alone. In addition to this, **increasing scrutiny from regulators, legislators, activists, media and customers has caused utilities to understand the increasing risks of liabilities.** This is why our customer realized the need to be well-prepared and prevent risk situations in the best possible way.

Our solution: A DNN model for vegetation management

We embarked on a mission to transform the way our Fortune 500 customer conducted vegetation management. For us, technology runs the show. And when we say technology, we're talking about Artificial Intelligence and Machine Learning.

The initial framework

In the first phase, we deployed a centralized and robust AI-first platform. We started developing a Deep Neural Network (DNN) model that could offer end-to-end visibility of the customer's assets. The plan was to enable them to predict, plan, prioritize and complete vegetation management tasks on-demand anywhere, anytime. To help our customer with an end-to-end vegetation management product, we started building an AI workbench, along with a user-friendly web app and mobile app.

What does our end-to-end vegetation management model entail?

Here's a 4-step guide into the approach of our DNN model:

STEP 1	STEP 2	STEP 3	STEP 4
Identifying and classifying vegetation management tasks using data primarily constitutes location, altitude, weather, soil and tree species.	Tracking and managing assignment and execution via the mobile app.	Optimizing future decision-making by combining field inputs, vegetation data, and pre-trained models for growth rate, trim cycles and labor hours.	Prioritizing tasks as routine, preventive, or on-demand tasks.

Our model identified and tracked the historic growth rate of species, weather, soil. It also used the customer count on the feeder and past outage data. This data was used to make prioritized predictions on what trees need to be trimmed and when, keeping in mind the annual budget and reliability targets. While the AI workbench would work as the centralized control panel for operators, the mobile app could simplify the procedure and enable the field force to report and execute from the field.

The final cut: Satellite-powered vegetation management

While the first phase gave us over 10% saving in cost and reliability, the AI model was only 75% accurate and predictions were made at the feeder level. While some feeders could be 1 mile long, others could be 100 miles long. Assigning the same growth rate to 100-miles long feeder would result in inherent inaccuracies in the model. Also, the model needed accurate species breakup across the entire circuit. This was when we decided to migrate the customer to our satellite-based AI model for change detection.

The new satellite-powered AI model developed in the second phase used 50 cm high-resolution multispectral satellite imagery from leading satellite constellations. With the help of these imageries and a Deep Neural network model, the system learned and then predicted the growth rate of the species in each feeder at a span level, i.e. power lines between two consecutive poles. The span level predictions were then clustered into a more practical plan — at section or sub-feeder and feeder level — and a 3-year to 5-year trim plan for the entire network was prepared with over 85% accuracy. The trim plans were then moved into work orders that can be assigned to contractors. The post-trim satellite image analysis can be used to audit the compliance of the clearance without the need for the supervisor to go on the field.

Take a look at the screenshots of our application to understand how AiDash Intelligent Vegetation Management System (IVMS) simplifies the procedure of vegetation management for all stakeholders:

AiDash IVMS Mobile App



Plan, execute, prioritize Cycle Trims/Line Clearance years in advance



Assign tasks and manage contractors on the go



Pre- and post-trimming validation of field tasks

AiDash IVMS Web Dashboard

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Danger Tree/Hazard Tree Management with zoomed-in actions for individual trees







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Work Planning



Our plug-and-play Satellite Analytics model enabled our customer to:

Predict the growth rate of different tree species along power lines

Real-time identification of high-risk areas Zoomed-in actions for individual trees Plan vegetation management O&M years in advance Engage and enable the field force Desktop & mobile app-based contractor management



Satellites in. Drones & LiDAR out

The combination of satellite imagery and Al is set to transform Vegetation Management for power utilities worldwide. AiDash is pioneering this revolution using our satellite and Al-powered product - Intelligent Vegetation Management System - to add speed, scalability, security, and smartness to the process. It aims to overcome the limitations of Drones and LiDAR.

About AiDash

~10 Million USD

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AiDash is an Al-first vertical SaaS company enabling satellite-powered operations and maintenance for utility, energy, and other core industries with geographically distributed assets. AiDash uses high-resolution, multispectral, and SAR data from the world's leading satellite constellations fed into its proprietary AI models to make timely predictions for O&M activities. These AI models empower AiDash's full-stack applications and enable efficient planning, prioritization, execution, review, and audit of O&M activities using satellite analytics.