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Case Study: Energy & Utilities

AI Analytics and Drones Cut Utility Costs to Boost Reliability

Finding and fixing faulty equipment in distant electric distribution networks is a complex and expensive process.

Utilities must monitor the condition of thousands of different components across tens of thousands of square miles of service area, much of it in hard-to-reach locations. But such monitoring is essential, because fixing damaged or failing components such as the insulators that connect transmission wires to poles is essential to maintaining service levels and preventing outages.

To reduce the cost of sending crews to perform such inspections, one U.S. based electric utility invested heavily in drones to captures images of its power network to identify equipment in need of repair. But manually scanning the images to classify its condition (such as broken, contaminated, good or chipped insulators) and then opening a repair ticket was a time-consuming, inefficient process that made it impossible to generate actionable intelligence in real time. The utility turned to us for an artificial intelligence solution to automate the image scanning.

At a glance

Our utility client now has an artificial intelligence solution that automatically scans images taken by drones of a utility's power distribution network. This dramatically reduces the cost of identifying equipment problems and needed repairs, preemptively alerting maintenance teams to fix problems that could cause power outages.

Outcomes

- 60% reduction of effort for image scanning.
- Automated identification of equipment problems from photographs and triggering of repairs, saving time and money.
- Increased service levels and reduced service outages improves customer experience and revenue.

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Automated image scanning

The application would have to not only automatically classify equipment images by their condition but ignore other objects such as trees, poles and wires. It would also have to take into account the various angles at which the photos were taken and other variations such as the lighting of the images. The platform also needed to automatically generate work tickets so maintenance staff could most quickly fix the problems the application found and provide notifications to drive real-time consumption and alerting.

Our utility client now has a fully-managed data and analytics platform, built on the Cognizant AI Data Modernization Platform, that enables data scientists to "visually" build, train and deploy AI models at any scale either on-site or in the cloud. Their AI-driven image analytics application can effectively process drone-captured images of distribution equipment in real time, providing immediate insights to identify any issue and alert the team on what proactive maintenance needs to be performed. This platform uses a real-time alerting engine to notify the maintenance team about needed repairs.

One significant challenge was that the utility had only 1,000 labeled images showing the correct classification of equipment problems, which was not enough data to properly train the application. This lack of training data is a common problem in AI engagements, which we met by developing a deep neural network cognitive model using image augmentation to supply the required amount of training data. From each image of, for example, a broken insulator we generated as many as 12 new labeled images. Each of the new images might show the insulator from a different angle, with different lighting or with other objects such as wires in the image. Because the newly created images were derived from known properly labeled images, they greatly increased the raw data on which the application could learn and its accuracy.

Their deep learning library is now hosted on a cluster of high computing containers orchestrated by Cognizant partner Kubernetes to reduce the cost and effort of implementation and management. Critical activities such as data labeling, AI model building, training and deployment are all now automated. An optimal cognitive computer vision model has been employed to provide the greatest accuracy and ease of implementation to seamlessly scale the alerting pipeline.

Better service, lower cost

We replaced an expensive, time-consuming manual process of identifying equipment failures and ordering repairs with a self-service AI driven application that analyzes drone-captured images using dynamic visualizations to enhance the user experience. This AI solution reduces the effort required for image analysis by 60%. This reduction in effort translates directly to labor costs savings and reduced service outages. The proactive repairs enabled by this image analysis will reduce maintenance costs, allowing the utility to respond to problems in real time and make more efficient use of the utility's fleet of drones.

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About Cognizant

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