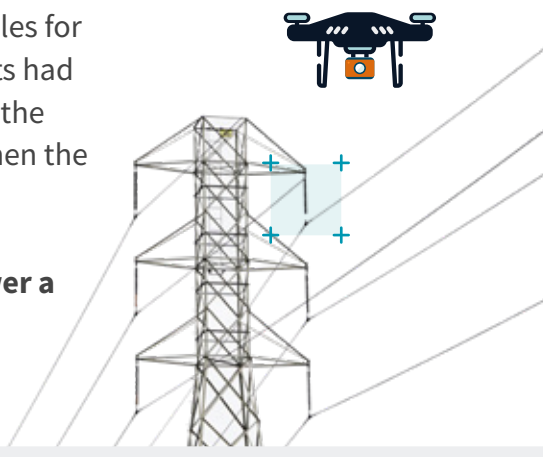
Automating Utilities Inspection

How high-quality data puts EDP on the path to predictive maintenance

The Challenge

Keeping a nation's lights on means constantly inspecting electricity poles for damage. Before EDP partnered with DefinedCrowd, teams of specialists had to jump into helicopters, survey and photograph poles from way up in the sky and use those photographs to manually fill out damage reports when the day was done.

That's a slow, expensive process with a lot of moving parts to answer a simple question: "which of our poles need fixing?"



The Solution

Step 1
Pole detection

As a proof-of-concept, we delivered data that would train a model to identify electricity poles and their components (insulators and crossbars). That meant gathering **12,500 images — 7,000 with poles** — that were then **annotated** by our highly-skilled crowd (200,000+ strong). We used **3,000 of those images to train a pole detection model and 500 more to test it.**

12,500 images **gathered** › **7,000** images w/poles **annotated** › **3,500** annotated images **trained & tested model**

Step 2
Damage detection

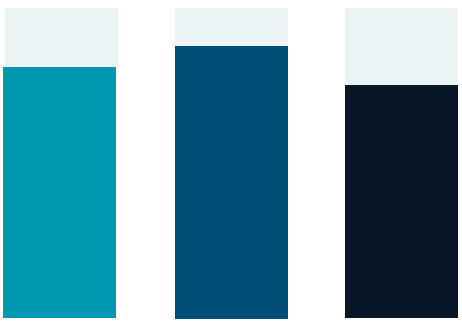
Next, we collected data that would train models to detect damage by hand-selecting a subset of 900 **high-resolution images** to send to our crowd. They **identified the type of damage in each image.** We used those annotated images to **train and test one model to keep track of damaged or missing insulators and another to detect corrosion on crossbars.**

900 poles w/damages **annotated** › **900** annotated images **trained & tested model**

The Results

With these models, EDP is on the path to faster, cheaper, and more accurate asset performance management processes (APM). In the short-term, that means drones will feed high-quality images of poles into automated systems that will deliver comprehensive damage reports as a result. In the long-term, automated APM will allow EDP to ask and answer more sophisticated maintenance questions. Put simply, instead of reacting to already damaged poles, the automated APM will allow EDP to proactively identify which poles will need fixing in the future.

Corroded poles
damage results



81% F1 Score*1 **87%** Recall*2 **75%** Precision*3

Counting insulators
damage results

91% F1 Score*1 **91%** Recall*2 **93%** Precision*3

*3**F1 Score**
Mathematical formula that synthesizes Recall and Precision

*1**Recall**
Target images identified/ total number of target images

*2**Precision**
Images containing correct damage type/total number of images collected by model

At EDP, models built on DefinedCrowd®'s guaranteed quality training-data mean better answers to better questions. Are you asking the right ones?

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