The Ohio State University

HackOHI/O 2021

American Electric Power Challenge: Solutions for improving AEP's Damage Assessment?

AEP has hundreds of thousands of line miles to inspect and maintain. This requires thousands of man hours to accomplish. The challenge this year is to leverage drones to make that job a little easier and more efficient.

AEP is currently using drone flights to supplement the inspection process, but we have run into difficulty ingesting and reporting the data in efficient and usable ways. The data in this challenge will mock one of the inspection flights. AEP is hiring, currently there are several job openings.

The Challenge:

We will be providing you with a set of drone images, each with gps data embedded within their EXIF data. Alongside a kml/shape file containing the known power pole location in the area. We want you to create a way to ingest the image files and use them to map the seen poles and their locations. Once the images are mapped in the UI we also want to see a way for users viewing the images to mark or annotate damages seen within the image. We will also be providing known pole locations in the kml/shape file and would like you to try and map the poles from the images to the known poles in the kml/shape file. This might be a little tricky as the kml/shape files gps coordinates can be inaccurate. After getting the images ingested and mapped we would like to see any kind of reporting you can think of. This could be anything from highlighting areas with dense poles to the number of poles seen.

Bonus points

If you have the time and want to get bonus points, you could take the users damage labels and create a **crowd sourcing** system that allows multiple users to label the same image and use the combined results to validate and crowd source damage identification. Think of the caption images you have to do when you log in and the system behind that needed to validate labels. Second, these inspections can happen as part of storm relief and as such there can be a lot of road closures. If you could build anything around **smart routing** either for road closures or the optimal path for repairs given the known damages at the time you will get bonus points.

Data

A zip file continuing all files will be available for download from
https://americanelectricpower.box.com/s/0stgoq4aftqhrv39ushcnjevvw7ly56t

We will be providing a list of jpegs each with gps data in their exif. As well as a kmz and shape file. The kmz and shape files will contain the same information, you can pick to use the one that

is easier for you to work with. Each will contain information on poles, transformers, and primary conductors

To turn the kmz into kml you can use zip to unzip the kmz files.
Kml is formatted xml you can find the link to docs below
https://developers.google.com/kml/documentation/kml_tut

With in each kml file you should expect to see roughly these fields in the structure below

A head tag to start a new pole, followed by a body which will include a height field indicating the height of the pole. As well as Point tag containing the Latitude and Longitude

```
<Point>
  <extrude>0</extrude><altitudeMode>clampToGround</altitudeMode>
  <coordinates> -82.92978036999995,38.73832714400004,0</coordinates>
</Point>
```

The data will be made available on the day of the challenge via a box.com download link

Prize: **Up to four $250 Amazon Gift Card**

Judging Criteria:

a) Originality - Does it do something entirely novel, or at least take a fresh approach to an old problem?
b) Execution - Is the application usable in its current state? Is the user experience smooth? Does everything appear to work? Is it well designed?
c) Usefulness - Is the application practical? Is it something people would actually use? Does it fulfill a real need people have? Did it produce new and useful data?
d) Presentation - How well was the project presented? Did it make the application more compelling? Did it give a good idea of its purpose?
e) Learning - Did the team stretch themselves? Did they try to learn something new? What kind of projects have they worked on before?