Pinpointing Power Outages in Real-Time By Monitoring Severe Weather

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Introduction & Background

- Power outages are one of the biggest disasters of our technologically advanced time, and power providers need to locate them fast and efficiently.
- The purpose of this project is to analyze the usage of computer pinging to predict power outage location.
- The two main electrical systems this project focuses on are radial and cyclical/loop systems (the two images below are simplified versions of the systems, for viewing pleasure).

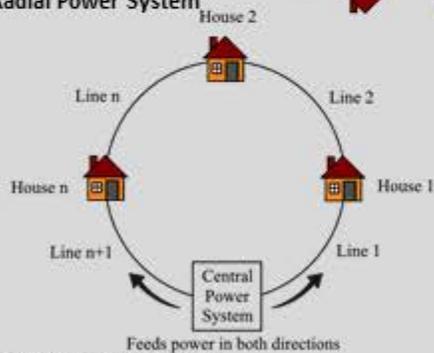
Figure 1. Radial Power System

Figure 2. Cyclical Power System

Methods

1. Develop Bayesian algorithms to predict location of power cut given type of power system (radial or loop).
2. Use machine learning to allow for automatic recognition of severe weather alerts in real-time.
3. Ping receivers within counties and states affected by severe weather to pinpoint power outages
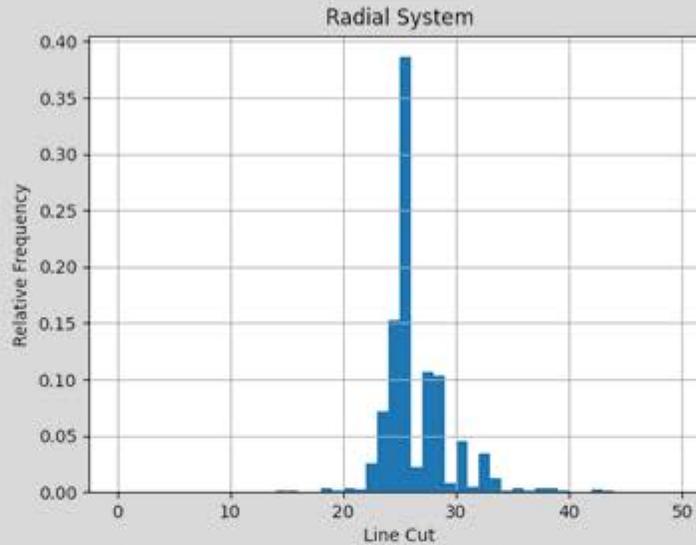
Results

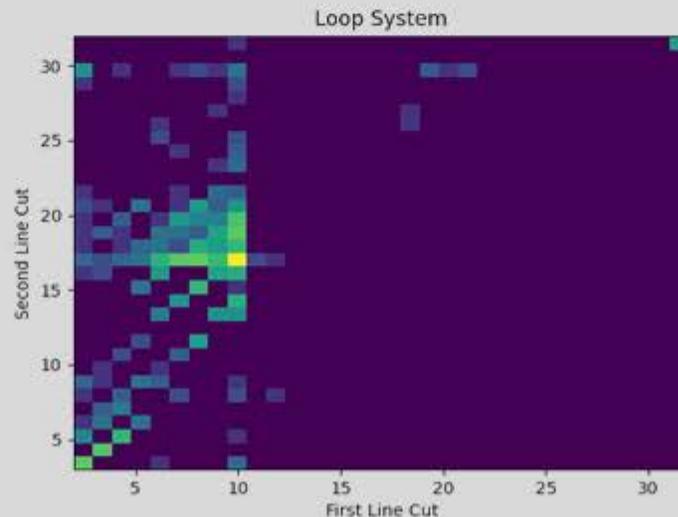Figure 3. 10,000 Trials of Power Line 25 Cut in Radial System

Figure 4. 10,000 Trials of Power Lines 10 and 17 Cut in Cyclical System

Conclusions

- The histograms yield results of 10,000 independent trials with hypothetical line cuts. One line is cut for radial systems (line 25), and two lines are cut in cyclical systems (lines 10,17).
- Both histograms show relative majorities in finding the correct power lines cut, in both hypothetical and real-world practice.
- Pinging is a reliable way to detect power outages for both radial and cyclical systems.
- Combining computer pinging and an automated weather alert system can allow for accurate, real time power tracking.

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