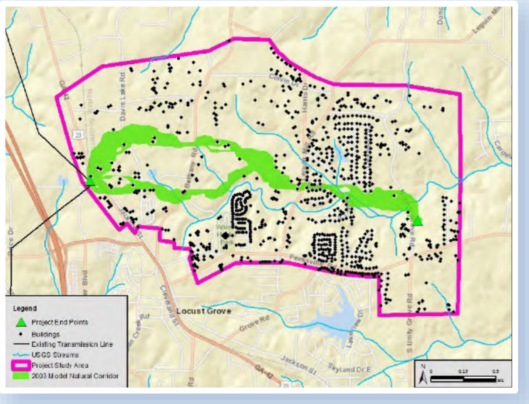
Supplemental Project Notice

USING MACHINE LEARNING TO SUPPLEMENT THE EPRI-GTC SITING MODEL



Route options from the EPRI-GTC siting model

PROJECT HIGHLIGHTS

- Develop a machine learning model that can decrease data analysis time for the EPRI-GTC Siting Model.
- Reduce the labor required to review aerial photography.
- Use the same images to classify multiple types of land cover, land use, and intensive agriculture.

Background, Objectives, and New Learnings

Data collection and evaluation to perform power delivery infrastructure siting is labor-intensive and often takes months to complete. EPRI and Georgia Transmission Corporation (GTC) created a model to make siting decisions more quantifiable, consistent, and defensible. This model has been adopted by many utilities in North America. Developing data inputs for the EPRI-GTC siting model is a factor in the lead time necessary to site new infrastructure and may result in schedule delays for high-priority projects if resources are constrained.

Advances in machine learning may offer a solution to analyze large numbers of aerial photographs to classify land use, land cover, and intensive agriculture, resulting in decreased time and labor inputs for data collection. Properly trained machine learning models are able to quickly and accurately analyze thousands of images, freeing labor resources to review only a fraction of the material for quality control.

Machine learning models are also able to answer multiple questions at one time from the same photographs, for example, what is the land cover, what is the land use, and if the land use is agricultural, is it intensive agriculture. This project seeks to develop and train a machine learning model that can simultaneously assess and classify land use land cover patterns specific to corridor development for new transmission lines. Some of land use land cover classifications may include:

- Residential
- Natural Forest
- Pecan Orchard
- Silviculture
- Pastureland
- Row Crops
- Waterbodies
- Building footprints
- Commercial /Industrial
- Recreational
- Mining

Combining the analysis for these inputs could significantly decrease the lead time necessary to develop critical data for the EPRI-GTC siting model. In.In addition, the the algorithm developed for this study could be further modified to analyze additional aerial imagery inputs for application in other siting models.

Benefits

The energy transition currently underway will require siting thousands of miles of new power delivery infrastructure in order to bring power from distributed generation resources to load centers. Decreasing the time and cost necessary to site a route for new infrastructure could increase the rate of new line completion by reducing the lead time and effort associated with data collection. Decreased project completion times contribute to improvements in greenhouse gas emissions, grid stability, power availability, and affordability for rate payers.

Utilities participating in this work may benefit from participating in the development of the machine learning algorithm to ensure the needs of the EPRI-GTC siting model are fully addressed during model development and training. Additional benefits such as easing resource constraints and reduced costs may be available to utilities that choose to apply the algorithm to data collection for proposed infrastructure routing.

Project Approach and Summary

This project will develop and train a machine learning algorithm to assess land use, land cover, and intensive agriculture from aerial photography.

1. Aerial photography from proposed or completed line routes previously categorized and tagged by project participants will be used for algorithm training. Aerial photography that shows all of the land uses, land covers, and intensive agriculture categories included in the siting model will be required.

2. The initial model will be developed by evaluating different machine learning algorithms capable of answering multiple questions either in parallel or in series.

3. The model will be trained and tested using the categorized and tagged aerial photography. Training and testing will continue until the model achieves 95% accuracy.

Once the model is trained, there is potential to make future adjustments to the land use, land cover, and intensive agriculture descriptors to accommodate other siting models.

Deliverables

The deliverables for this project will include a machine learning algorithm trained to identify the land use, land cover, and intensive agriculture types used in the EPRI-GTC siting model.

Price of Project

The price for each participant will be $35,000. A minimum of three participants willing to contribute aerial photography for completed or proposed infrastructure routes are required by March 1, 2024 for the project to complete Tasks 1 and 2. To execute the full scope of the project, seven funders willing to contribute aerial photography for completed or proposed infrastructure routes are required by March 1, 2024 to provide an algorithm trained to 95% in 2025.

Project Status and Schedule

The project is scheduled to begin in January 2024, and is expected to deliver the final trained algorithm in June 2025.

Who Should Join

This project is open to all EPRI members, electric utilities, and other companies using the EPRI-GTC or other siting models for power delivery infrastructure siting.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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