Geo-Localization and Risk Estimation using Deep Learning: Utility poles

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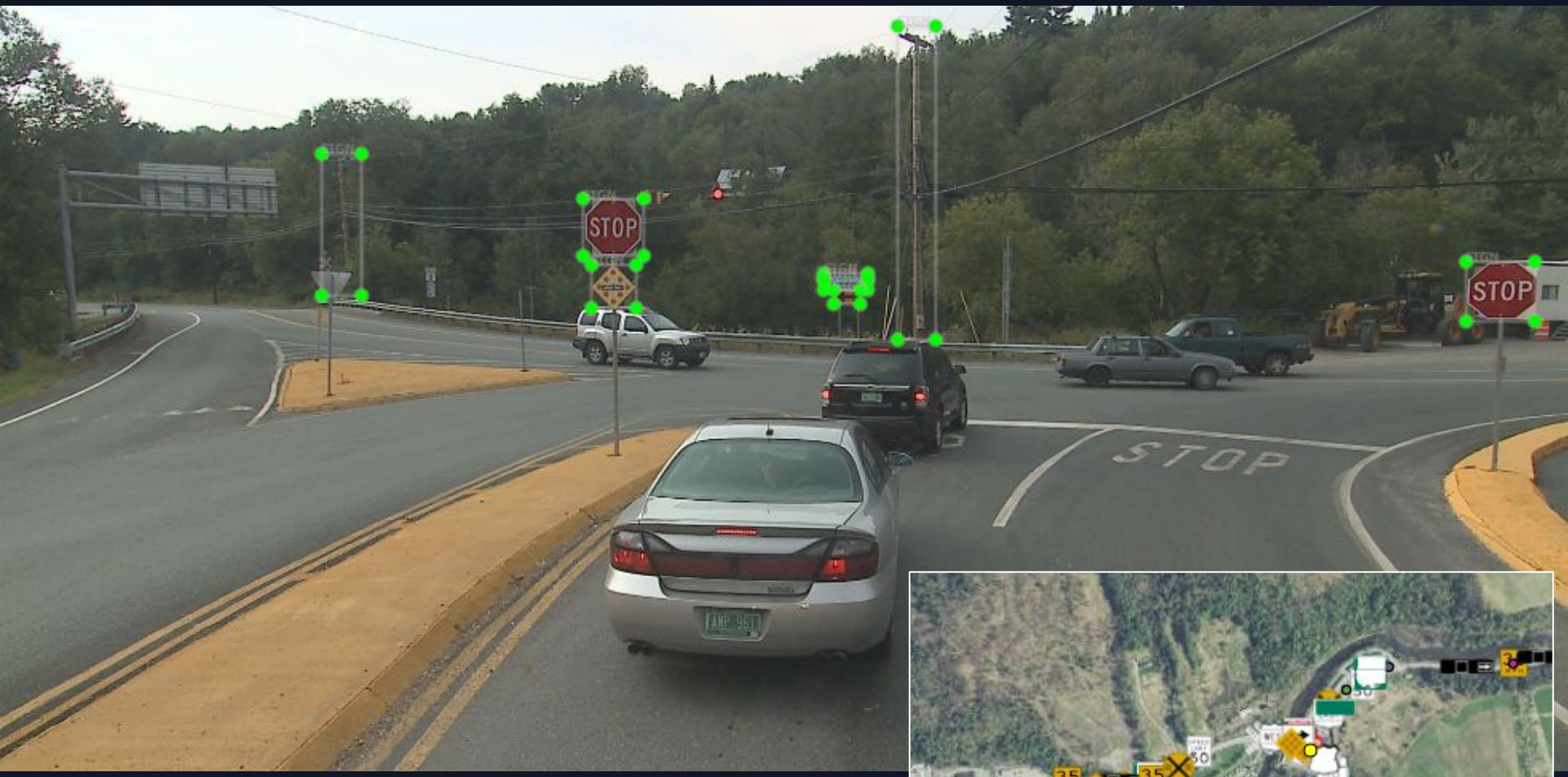
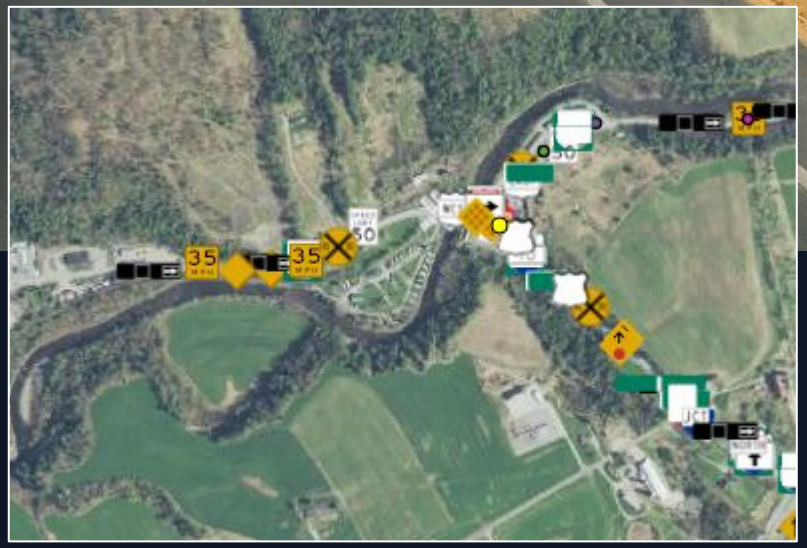
Background





- The Vermont AI Lab (VaiL) and VTrans collaboration
- Previous Projects (Sign Detection, Lane Line QA)
- Next asset class: Utility Poles
- The connection between this project and past research

Motivation

Poles
Utility poles exist on roads worldwide
Provide services to humans everywhere
Tens of millions of utility poles exist in the united states

Potential for damage
Wooden structures tend to have issues in nature
Susceptible to damage from weather, insects/animals.

The burden
When a pole is damaged (and collapses), the burden is felt by the community, the local government, and the utility companies.

Role of Deep Learning
How can we protect companies and communities?
What is needed in order to achieve these goals?

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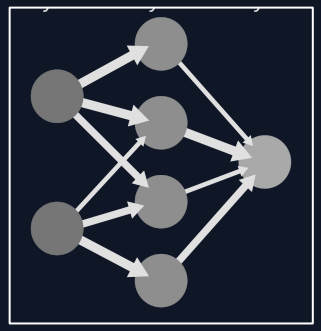
System Overview

Neural Network



Architecture from "Focal loss for dense object detection" https://arxiv.org/pdf/1708.02002.pdf

Output for each image

- Bounding Box 1 + GPS + Quality Estimation
- Bounding Box 2 + GPS + Quality Estimation
- Bounding Box n + GPS + Quality Estimation

Database

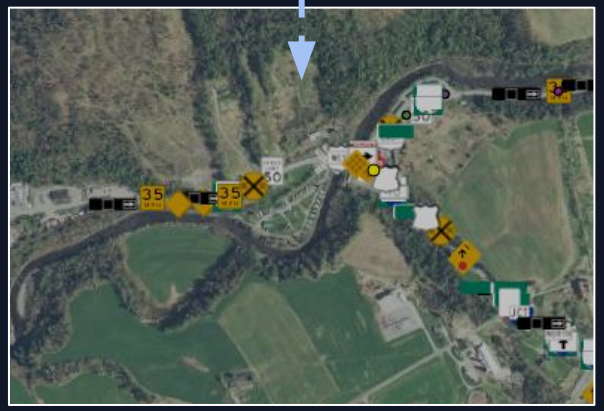
Sampling Data

Contains

Labeling Images

Back into Database

Item(s) with quality estimate



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Developments to date

- Dataset
- Labeling Tool
- Labeled Data (in-progress)
- Data Extraction Pipeline (in-progress)

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The future of the project

Next Month:
Complete data extraction pipeline
Train baseline model
Prepare code for DeepGreen execution

Future Work:
Continue labeling dataset
Build full model (supported by GPU)
Iterate on labeling and modeling

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What I Hope to Learn

Deep Learning Ideas

SOTA computer vision architecture

Large scale distributed computing (GPUs)

Data/Software Engineering Ideas

Developing intelligent and efficient ways to access data

Creating pipelines for training, testing, and evaluations

Practicing general developer techniques (git, command line, etc.)

Timeframe:

Start Date: 1/19/2021

End date: 5/14/2021

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Thank you for listening to my brief introduction!