

## Sign Hunter: Automated System for Classification and Geolocalization of US Traffic Signs

### PROJECT TITLE

Sign Hunter: Automated System for Classification and Geolocalization of US Traffic Signs

### STUDY TIMELINE

March 2018– Dec 2020

### INVESTIGATORS

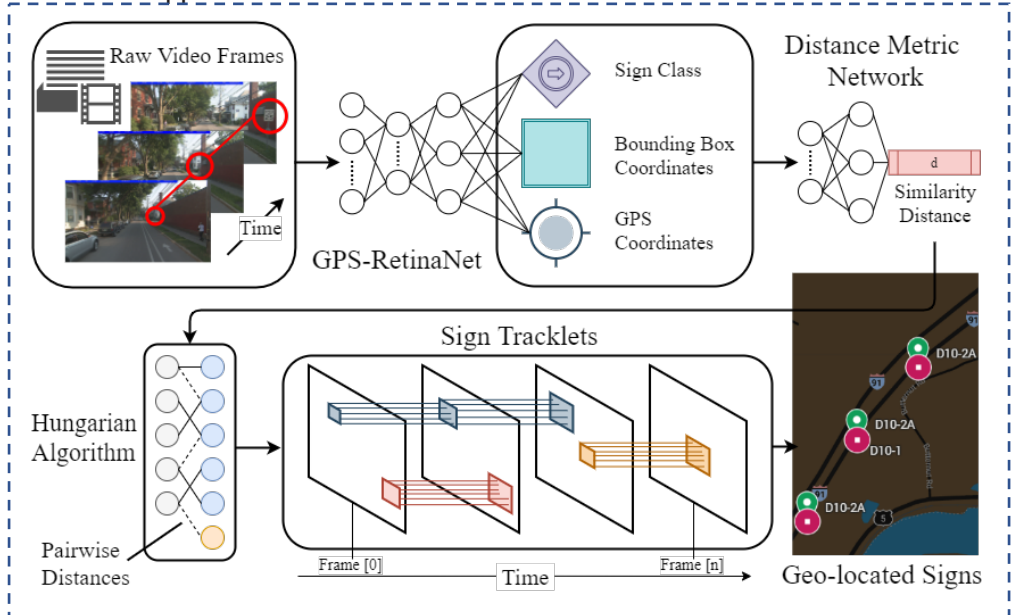
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### Problem Statement

We leverage novel deep learning computational techniques to construct a system which detects, classifies, and determines the GPS coordinates of traffic signs using roadside images as input. We have built and annotated a large US. traffic sign dataset to support our work and future research in the field.



A visual representation of our system pipeline.

### Methodology

Our baseline system extends a version of advanced Deep Learning architecture, RetinaNet, which detects and predicts GPS coordinates for signs using roadside images as input. To convert these detections into specific sign locations, we train a neural network to compute the similarity between detections, and use the Hungarian Algorithm to match the sign detections based on their similarity.

### Next Steps

Our best model currently achieves a 75th percentile mean average precision of 85% when performing sign detection and classification. The system scores an average of 4.62 meters' geospatial margin of error for sign localization. We are currently enhancing our detection model to detect if signs are part of an assembly and which road side they are positioned on, in addition to exploring opportunities to handle other road assets such as pavement markings.

### Potential Impacts and VTrans Benefits

Our research provides an automated tool for constructing a GIS map of signs and their respective classification types from right-of-way images, which can assist with inventory assessments and maintenance plans. Additionally, our dataset will reach approximately 55K annotations within a few months. This will make it the largest available dataset for US road signs, and first ever dataset to feature object-related GPS information, which will support future research VTrans performs in this field.

More information about the VTrans Research Program, including additional Fact Sheets, can be found at:  
<http://vtrans.vermont.gov/planning/research>