

Object Tracking and Geo-localization from Street Images

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Project Overview

- **Goal**

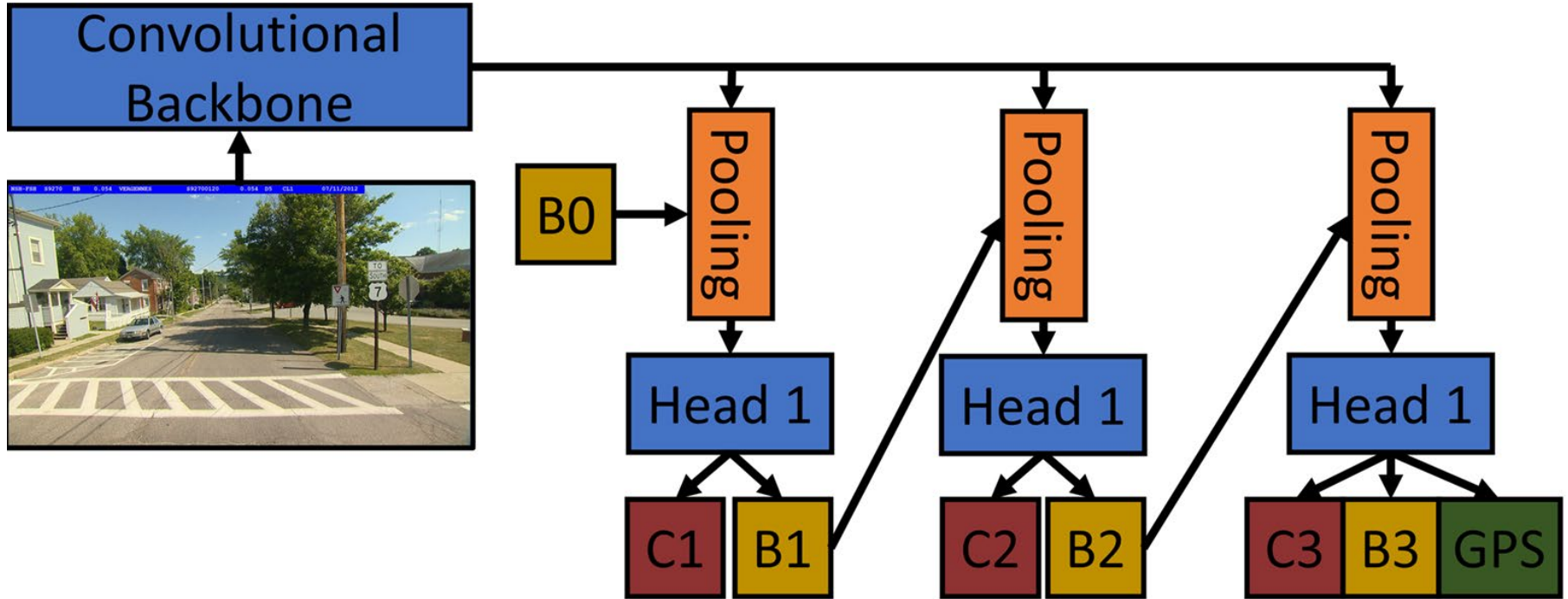
- Create an algorithm taking existing street images as input
- Detect, classify, and geolocalize each sign
- Automatically produce GIS sign map as output
- Construct web viewer widget enabling user to explore and interact with map.

- **Motivations**

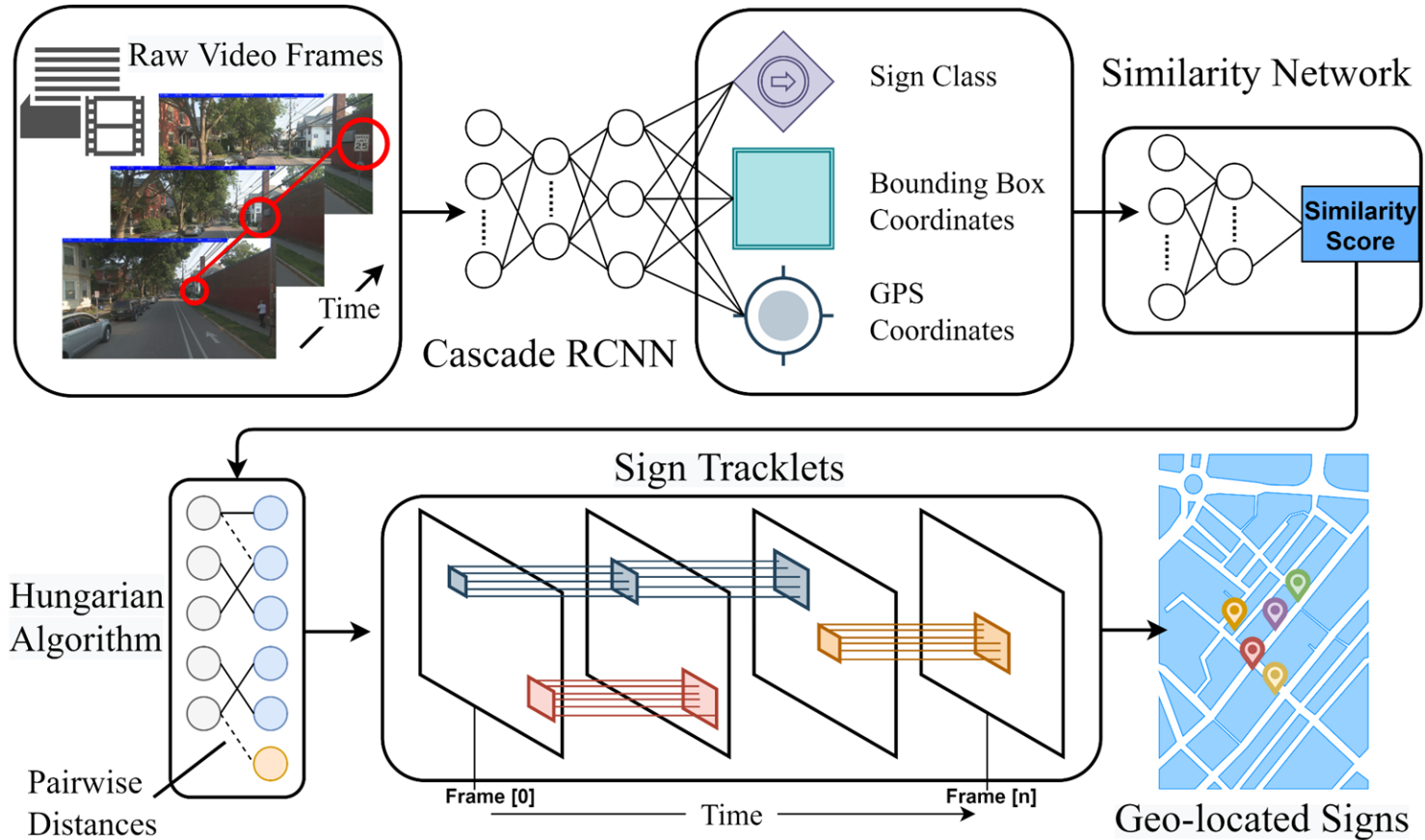
- Automated tracking and management of road assets
- Better assessment/maintenance plans
- Large Dataset for future research and experiments involving deep learning and traffic sign recognition

Object Detection and Offset Prediction

We construct a new object detector which employs a cascade of CNNs to detect, classify, and geo-localize each sign visible in a street view image.



Full System



Current Tracker

VT-30 V030 SB 105.415 MIDDLEBURY V030-0111 1.742 D5 CL1 06/27/2014

Tracklet: 45, Class: R7-108, Lat: 44.01456752896737, Lon: -73.167981044133



VailViewer Widget

VailViewer

Click dots on map to view street images!

TH 3 30233 58 7.232 UNDERHILL 502339453 6.802 DS MDC 06/26/2019

< >

x1.00

Roadway image:

2016 2017 2018 2019 2020 2021 2012-Test 2013-Test 2C

Pavement image:

Traffic Sign

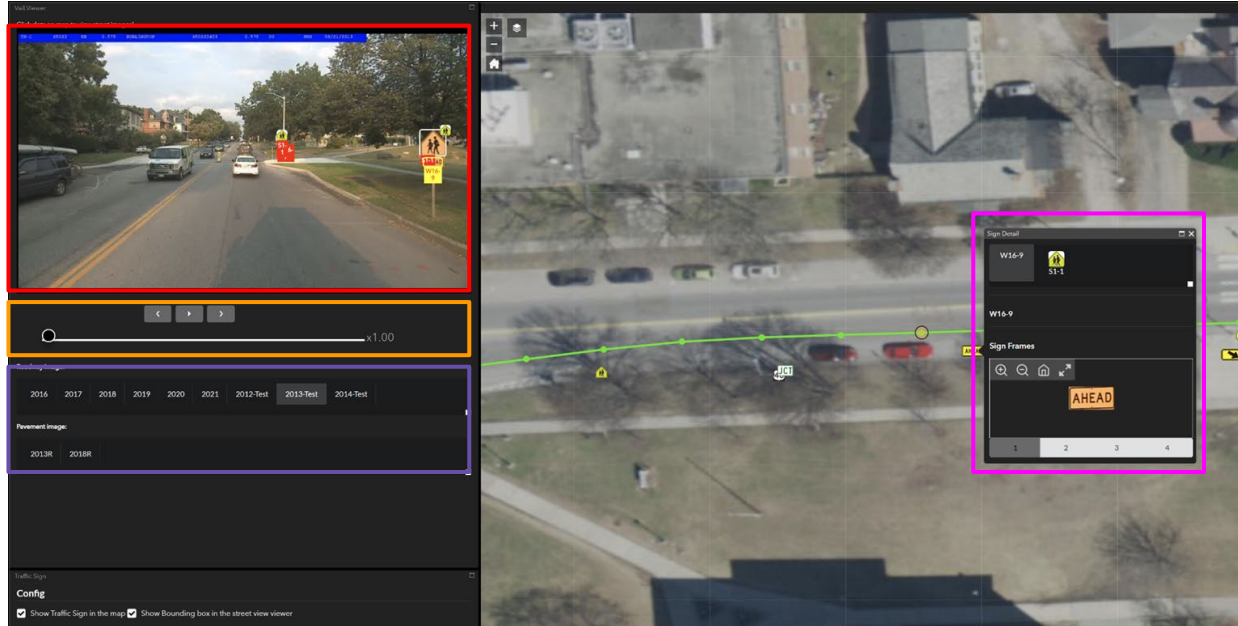
Config

Show Traffic Sign in the map Show Bounding box in the street view viewer

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS

esri

VailViewer Widget



1. Image Viewer
2. Functional Buttons
3. Year Selection
4. Traffic sign Pop up window

Current Work

We are working on multiple enhancements to our system, including...

1. Self-Supervised Learning- We are implementing semi-supervised learning algorithms. These will enable us to take advantage of the unlabeled dataset we have constructed to enhance the performance of our object detector.
2. Multi-Year Tracker- We are implementing a tracker which can merge repeated sign detections across separate years in which the vehicle drove over the same road segment. We will test this using the multi-year dataset we are constructing.
3. Fast traveling speed and shortcuts in the VailViewer widget to improve convenience and make the UI more user friendly.