

Object Tracking and Geo-localization from Street Images

PROJECT TITLE

Object Tracking and Geo-localization from Street Images

STUDY TIMELINE

March 2018– Dec 2021

INVESTIGATORS

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VTRANS CONTACTS

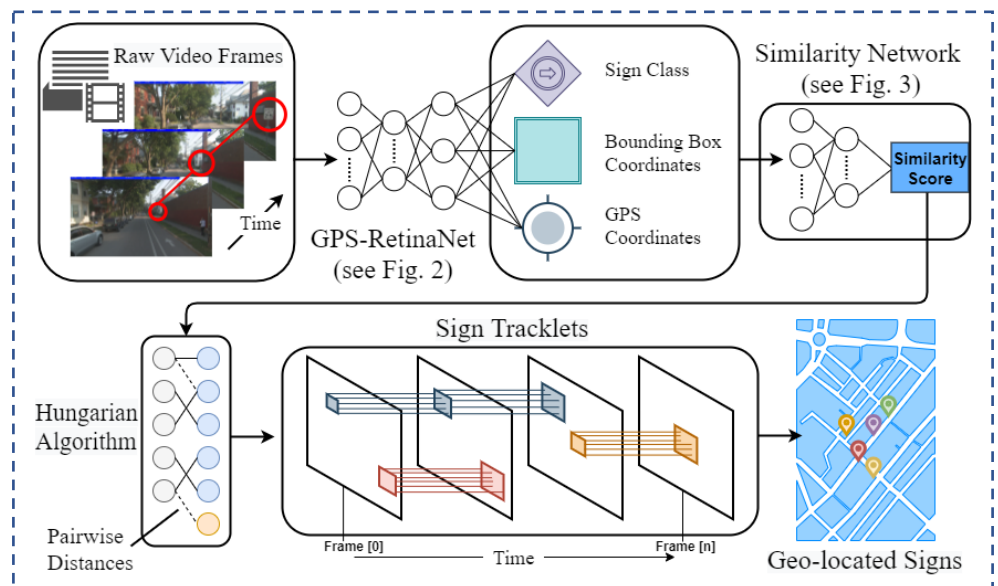
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KEYWORDS

Traffic Signs, Object Geolocalization, Deep Learning, Computer Vision

Object Tracking and Geo-localization from Street Images

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. To train our model we have built a large U.S. traffic sign dataset consisting of over 199 classes and 47,589 unique annotations.



Methodology or Action Taken

Our baseline system extends a Deep Learning architecture called RetinaNet with the capability to both detect and predict GPS coordinates of signs using roadside images as input. To condense redundant detections to a single prediction per sign, we train a neural network to compute a similarity score between detections and match them using the Hungarian Algorithm.

Conclusions or Next Steps

Our best model currently achieves a 75th percentile mean average precision of 86% within 4.33 meters geospatial margin of error when performing localization. We are currently adding capabilities to detect if signs are part of an assembly and which roadside they are positioned on, and switching to a newer, more powerful object detector.

Potential Impacts and VTrans Benefits

Our research provides an automated tool which constructs GIS mappings of signs from street-side images, which is immensely beneficial for inventory assessments and maintenance plans. Additionally, the large dataset we have constructed will support VTrans and future research they may wish to perform in this field.

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