VERMONT
AGENCY OF TRANSPORTATION

FACT SHEET

2018 Research Symposium & STIC Annual Meeting

Traffic Signs Detection & Geospatial Localization

RESEARCH PROJECT TITLE
Traffic Signs Detection & Geospatial Localization

STUDY TIMELINE
January 2018 – June 2019

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MORE INFORMATION
VTrans Research will add link to the final report and other materials on VTrans website

This fact sheet was prepared for the 2018 VTrans Research and Innovation Symposium & STIC Annual Meeting held at the State House in Montpelier, VT, on **September 12, 2018** from **8:00 am– 1:00 pm**.

Fact sheets can be found for additional projects featured at the 2018 Symposium at http://vtrans.vermont.gov/planning/research/2018symposium

Additional information about the **VTrans Research Program** can be found at http://vtrans.vermont.gov/planning/research

Additional information about the **VTrans STIC Program** can be found at http://vtrans.vermont.gov/boards-councils/stic

Introduction

This research aims to develop a deepLearning-based system to process a stream of road-images in order to detect and classify traffic signs, then localize them on a map by estimating their GPS coordinates. Furthermore, we introduce a new and large-scale dataset to serve as one of the very few benchmarks for US. traffic signs recognition (TSR).

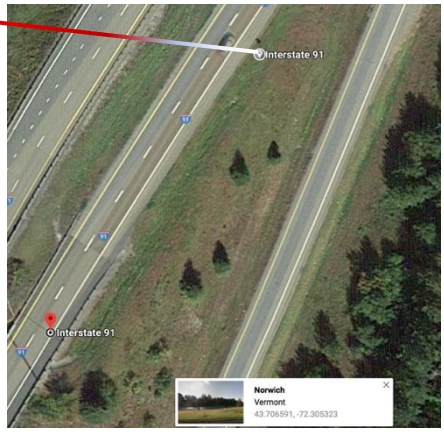

Figure 1: The white color indicates predictions by our network, and the green color refers to the manually labeled ground-truth.

Methodology

We are investigating some of most novel deep learning algorithms and computer vision techniques for object detection/classification and geospatial localization to find the most suitable approach for our application. In terms of dataset creation, we adopted an open-source tool called *labelImg* to serve as an easy, yet cross-platform tool for data annotation. Furthermore, our baseline-system uses a heavily modified version of the state-of-the-art object-detector known as RetinaNet.

Results

Our dataset covers 294 different types of traffic signs containing more than 51,000 images and over 27,000 annotations. Our baseline-system, on the other hand, which was tested on a subset of the dataset (mainly highway images captured in Vermont) achieved 66% mean average precision (mAP) in terms of detection and classification of 51 different labels (sign-types). More importantly, the system scored an average of (±) 5.24 meters' geospatial margin of error, which was very surprising considering that depth perception is certainly not an easy task when applied on single-vision road images without any sensory information.

Potential Impacts

First and foremost, our research will help to accurately identify and localize road assets in order to make better assessments/maintenance plans. Additionally, we plan on reaching approximately 40K annotations by the end of our research introducing the largest dataset for TSR, and first ever dataset to feature object-related GPS information to support future research in this field.