STRIDE Project: Fly-By Image Processing for Real Time Congestion Mitigation (Project H2) Dataset

Dataset available at: http://doi.org/10.5281/zenodo.3911555

(This dataset supports report **Fly-By Image Processing for Real-Time Congestion Mitigation**)

This U.S. Department of Transportation-funded dataset is preserved by STRIDE | Southeastern Transportation Research, Innovation, Development & Education Center in the Zenodo Repository (https://zenodo.org/), and is available at https://doi.org/10.5281/zenodo.4688028

The related final report **Fly-By Image Processing for Real-Time Congestion Mitigation**, is available from the National Transportation Library's Digital Repository at https://rosap.ntl.bts.gov/view/dot/57434.

Metadata from the Zenodo Repository record:

Title: STRIDE Project: Fly-By Image Processing for Real Time Congestion Mitigation (Project H2)

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Description: Traffic monitoring is the centerpiece of congestion mitigation and traffic management. Whilst surveillance technologies have matured enough to provide informative depiction for the traffic, the current state-of-the-art systems cannot support immediate congestion problems. Proactive congestion mitigation requires a) real-time surveillance for traffic parameters, b) prediction for imminent congestion onset, in order to c) inform responsible parties to take immediate actions to prevent congestion. This framework is founded on short time analysis (1-5 minutes) which is not valid up to date. We foresee that using a "flock" of interconnected, self-managed drones, can establish a deployable system to perform immediate monitoring/assessment for traffic conditions to infer if congestion is approached. To detect vehicles, a faster technique of Convolutional Neural Network (CNN) called YOLOv3 is used. In this technique, a single neural network is used to the full image which divides the image into regions and predicts bounding boxes and probabilities for each region. Then these bounding boxes are weighted by the predicted probabilities. This technique requires huge computational power and therefore, GPUs are used to process the videos recorded by drones' cameras. By calibrating the camera using real values compared to their apparent values in images, the detected vehicles can be tracked. The targeted feature (herein, features correlated to traffic congestion) were reproduced utilizing a traffic simulation model. The proposed methodology was tested by collecting and investigating video images from drones. The project, if continued further, has the potential to advance the state of proactive traffic and congestion management by embedding a distributed, simulation-based traffic state prediction system within the integrated drone surveillance software to enable congestion mitigation actions to be undertaken before congestion happens rather than after traffic flow has already broken down.

Publication Date: April 14, 2021

DOI: 10.5281/zenodo.4688028

Keywords: Traffic Management, Camera Calibration, Object Detection, YOLO, GPU Computation

Communities: STRIDE | Southeastern Transportation Research, Innovation, Development & Education Center

Versions: Version 1

Recommended citation:
Nasim Uddin, & AbdelAziz I AbdelLatef. (2021). STRIDE Project: Fly-By Image Processing for Real Time Congestion Mitigation (Project H2). Zenodo. https://doi.org/10.5281/zenodo.4688028

Dataset description:
This dataset contains 1 file collection described below.

Fly_By_Image_Processing_for_Real_Time_Congestion_Mitigation.zip:
- 2.mp4
- cars.mp4
- Drone.MOV
- drone.mp4

The .mp4 file extension is used mainly for the MPEG-4 multimedia file format. The MPEG-4 file format, as defined by the MPEG-4 specification, contains MPEG-4 encoded video and Advanced Audio Coding (AAC)-encoded audio content. It typically uses the mp4 file extension for its files. The .mp4 files support all kinds of multimedia content (multiple audio streams, video streams, subtitle streams, pictures) and advanced content (called "Rich Media" or "BIFS") like 2D and 3D graphics, user interactivity, DVD-like menus. The MP4 file format is also streamable. (for more information on .mp4 files and software, please visit https://www.file-extensions.org/mp4-file-extension).

The .MOV file format is a multimedia container format that can store one or more tracks of data such as video, audio, text, and effects. Each track can either contain a digitally encoded media stream, playable using the appropriate codec, or a data reference to a media stream located in another file. (for more information on .mp4 files and software, please visit https://www.file-extensions.org/mov-file-extension).

National Transportation Library (NTL) Curation Note:
As this dataset is preserved in a repository outside U.S. DOT control, as allowed by the U.S. DOT's Public Access Plan (https://ntl.bts.gov/public-access) Section 7.4.2 Data, the NTL staff has performed ***NO*** additional curation actions on this dataset. NTL staff last accessed this dataset at https://doi.org/10.5281/zenodo.4688028 on 2021-11-04. If, in the future, you have trouble accessing this dataset at the host repository, please email NTLDataCurator@dot.gov describing your problem. NTL staff will do its best to assist you at that time.