Pavement Marking Fadeness Detection Project
with New York City Department of Transportation

Moya Zhu, Zihao Zhang, Megan Zhou, Ran Pan, Jingfei Fang (advised by Adam K.)

Columbia University

Introduction

- Primary Goal
  Quantify the fadeness of the pavement markings (crosswalk, bus lane, bicycle lane) based on aerial images

- Dataset (Sample)

YOLO - You Only Look Once

Object Detection

- Preprocessing
  - Crop into tiles with a size of 640 * 640

- Labeling - Label Studio

- Model training
  - YOLO v5 pretrained weight loaded
  - 175 cropped labelled images
  - Colab GPU
  - 8:2 - training/validation set split
  - 100 epochs with batch size = 10

- Coordinate mapping

Result

- Convex hull around crosswalks
  - Denoise using morph_open in opencv
  - Contour and minimum_area_rectangle
  - Filter using aspect ratio of rectangles
  - Draw convex hull

- Fadedness Score Calculation
  - Based on Convex hull, locate the pixel that belong to the crosswalks
  - Perform pixel values calibration
  - Calculate the fadeness score based on the mean of pixel values
  - Calculate the percentage fadedness score based on the threshold value

Further Improvement

- Cover of Shadow and passing vehicles
- Quantification of the fadeness of colored pavement
- Flaking of crosswalk, bus lane symbol