

Pavement Marking Fadedness Detection Project

with New York City Department of Transportation

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Introduction

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

- Dataset (Sample)



- YOLO - You Only Look Once

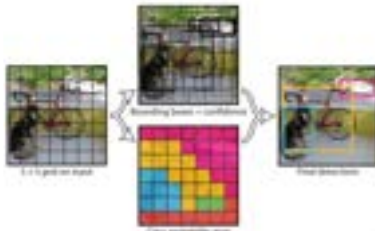


Image Source: <https://doi.org/10.48550/arXiv.1506.02640>

Object Detection

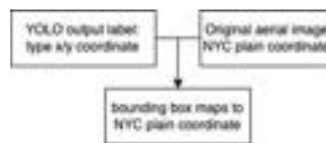
- Preprocessing
 - Crop into tiles with a size of 640 * 640

- 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



Fadedness

- 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 fadedness score based on the mean of pixel values
 - Calculate the percentage fadedness score based on the threshold value

Result

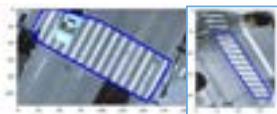
- Bus Lane & Bicycle Lane



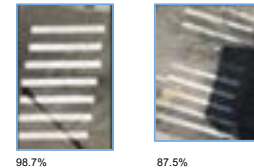
- Crosswalk



- Convex Hull



- Fadedness Scores



Further Improvement

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

Flowchart

