Model Card for Faster R-CNN Traffic Light Detection Model

MODEL DESCRIPTION

Developing Organization: University of Southern California

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Model Type: Traffic Light Detection

Architecture: Faster R-CNN with MobileNetV2 Backbone

Features: Detection of traffic lights in various environmental conditions

Input: Image(s)

Output: The model can detect 7 different traffic light classes, including 'go', 'warning', 'stop', 'goLeft', 'warningLeft', 'stopLeft'. For each object detected in an image, the model outputs: {traffic light bounding box coordinates, label}.

INTENDED USE

Primary Intended Uses: This model is intended for traffic light detection as part of an autonomous driving system or ADAS.

Primary Intended Users: Researchers and developers in the field of autonomous vehicles and traffic management systems.

Out-of-scope Use Cases: This model is not intended for use cases outside of traffic light detection, such as pedestrian detection or other forms of object classification.

FACTORS

Relevant Factors: The model's performance was evaluated across different times of day and weather conditions to ensure robustness in urban driving scenarios.

Evaluation Factors: The model was evaluated based on its performance in accurately detecting position and status of the traffic lights during the day and night and under various weather conditions.

METRICS

Model Performance Measures: Precision, recall, accuracy, and Intersection over Union (IoU).

Decision Thresholds: IoU threshold of 0.5

EVALUATION DATA

Dataset: The LISA Traffic Light Dataset. (https://www.kaggle.com/datasets/mbornoe/lisa-traffic-light-dataset/)

Motivation: To provide a comprehensive and challenging dataset for model training and evaluation.

ETHICAL CONSIDERATIONS

Data: Consideration was given to the representativeness and diversity of the traffic scenarios in the dataset.

Human Life: Recognizing the high stakes of autonomous vehicle technology, thorough testing and validation were prioritized.

Mitigations: Continuous monitoring and updating of the model are recommended to maintain performance standards.

Risks and Harms: Potential misclassification of traffic lights could lead to serious safety risks.