Traffic sign detection and recognition

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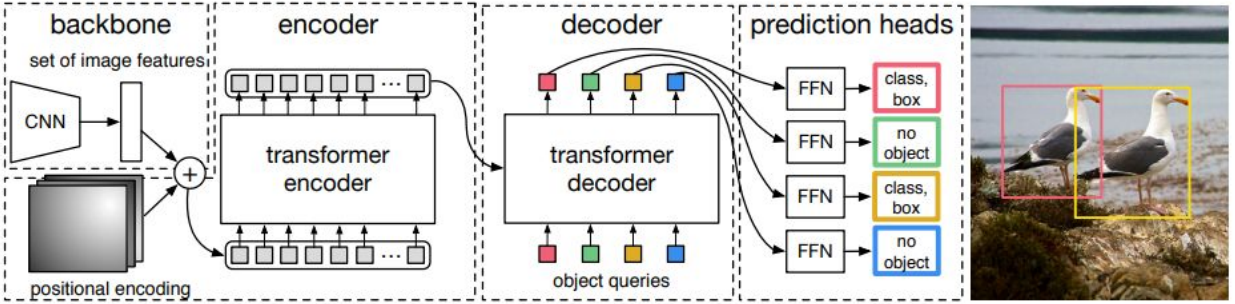
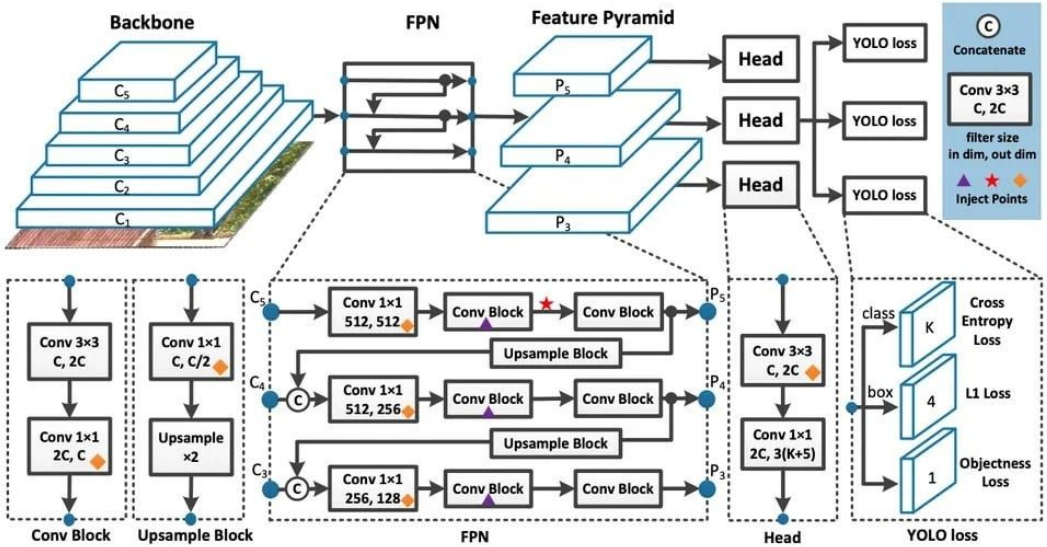
Dataset

- Mapillary Traffic Sign Dataset
  - 50 000 images
  - 400 traffic sign categories
  - various countries and regions
  - Various environmental conditions
- pre-processed to YOLOv8 and COCO formats

Used Models

- DETR
- **YOLOv8**





Simultaneous detection and classification

- Detection and classification to all 400 classes simultaneously

Model	Input image resolution	Precission	Recall	mAP
YOLOv8-medium	800	62.7%	58.9%	52.3%
YOLOv8-medium	1280	68%	73%	63%
YOLOv8-medium	1920	69%	79%	67.1%

Decoupled approach - 1. Binary Detection

- Detection to single class only - *traffic-sign*

Model	Input image resolution	Precission	Recall	mAP
YOLOv8-nano	640	76.1%	73.7%	57%
YOLOv8-nano	1280	79.4%	84.1%	70.5%
YOLOv8-small	1280	82.1%	85.9%	73.9%
YOLOv8-medium	1920	83.9%	87.2%	77.3%

Decoupled approach - 2. Classification

- Trained on ground truth crops from the detection dataset
- YOLOv8 classification models
- Simple CNN classifier with 7 convolutional layers

Model	Validation accuracy
YOLOv8-n	89.3%
YOLOv8-m	93.1%
Simple CNN	89.5%

Decoupled approach - 3. Combined

- Combination of binary detection and classification

Binary detector model	Input image resolution	Classifier model	mAP
YOLOv8-medium	1920	YOLOv8-medium	66%
YOLOv8-medium	1920	Simple CNN	59.7%


regulatory--no-right-turn--g1
regulatory--one-way-left--g1
regulatory--no-right-turn--g1