Traffic Flow Monitoring

M11207K01 黃明修

M11207304 陳晏宇

M11207306 林思萱

M11207516 呂鈺婷

Outline

- Motivation
- Dataset
- Related Work
- The Proposed System
- Experiments
- Future Work
- References

TAIWAN TECH 國立臺灣科技大學

Motivation

- Knowing the number and movement of vehicles in distant areas helps in early route adjustments and traffic diversion.

- Smart road users can preemptively understand vehicle numbers in popular tourist areas and along the routes, enabling them to avoid congestion.

- Improving Road Utilization

Dataset

- The COCO dataset by Microsoft enhances scene context understanding with tasks like detection, segmentation, and keypoints.

COCO is a large-scale object detection, segmentation, and captioning dataset. COCO has several features:

- ✔ Object segmentation
- ✔ Recognition in context
- ✔ Superpixel stuff segmentation
- ✔ 330K images (>200K labeled)
- ✔ 1.5 million object instances
- ✔ 80 object categories
- ✔ 91 stuff categories
- ✔ 5 captions per image
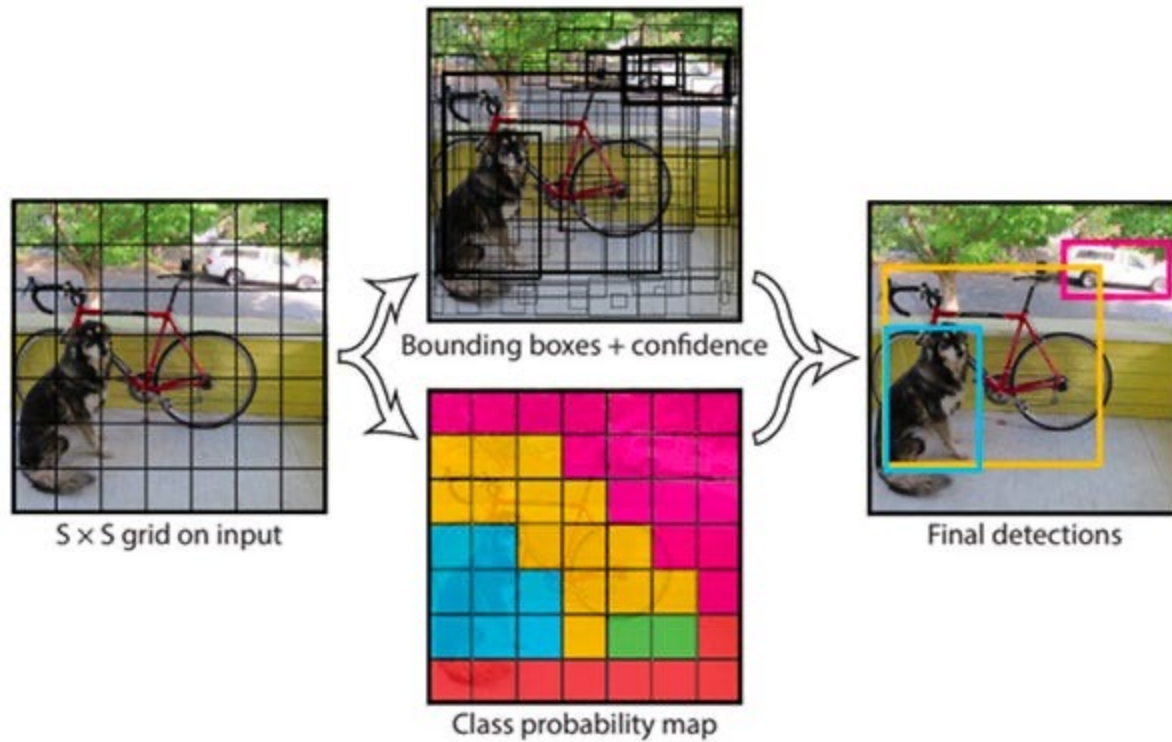- ✔ 250,000 people with keypoints

Dataset examples
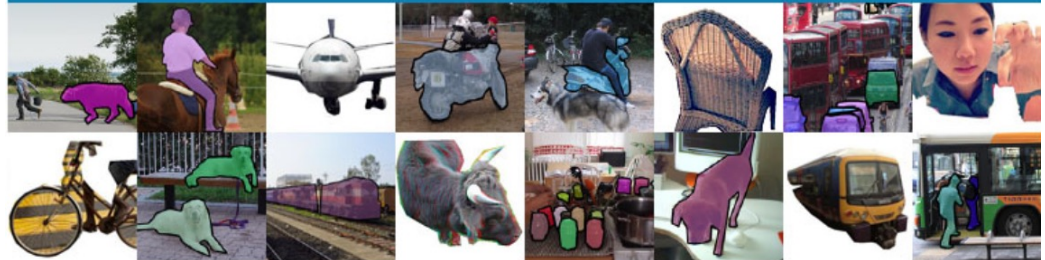
Related Work

- YOLO （You Only Look Once）is an object detection algorithm that achieves faster processing speeds and enables real-time object detection.
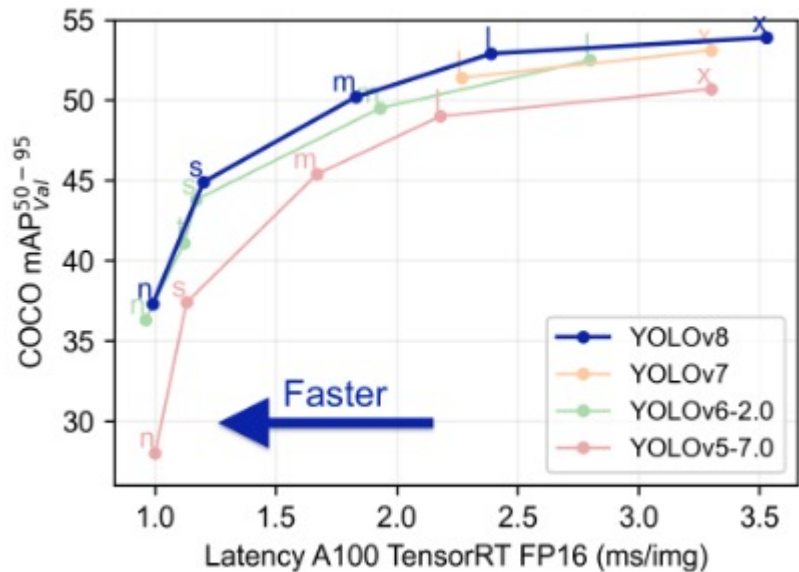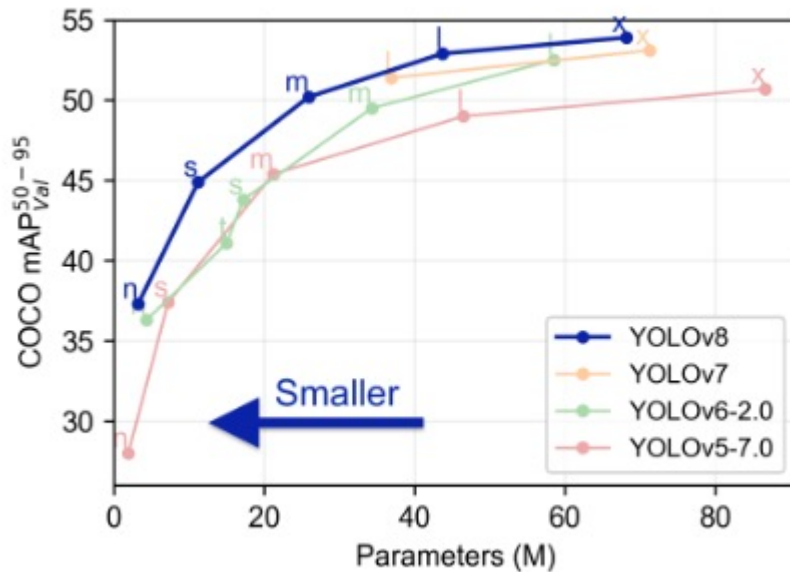
Related Work

- YOLO framework

S × S grid on input

Bounding boxes + confidence

Class probability map

Final detections

Related Work

- YOLOv8

Related Work

- YOLOv8

Model	size (pixels)	mAP^{val} 50-95	Speed CPU ONNX (ms)	Speed A100 TensorRT (ms)	params (M)	FLOPs (B)
YOLOv8n	640	37.3	80.4	0.99	3.2	8.7
YOLOv8s	640	44.9	128.4	1.20	11.2	28.6
YOLOv8m	640	50.2	234.7	1.83	25.9	78.9
YOLOv8l	640	52.9	375.2	2.39	43.7	165.2
YOLOv8x	640	53.9	479.1	3.53	68.2	257.8

System Overview
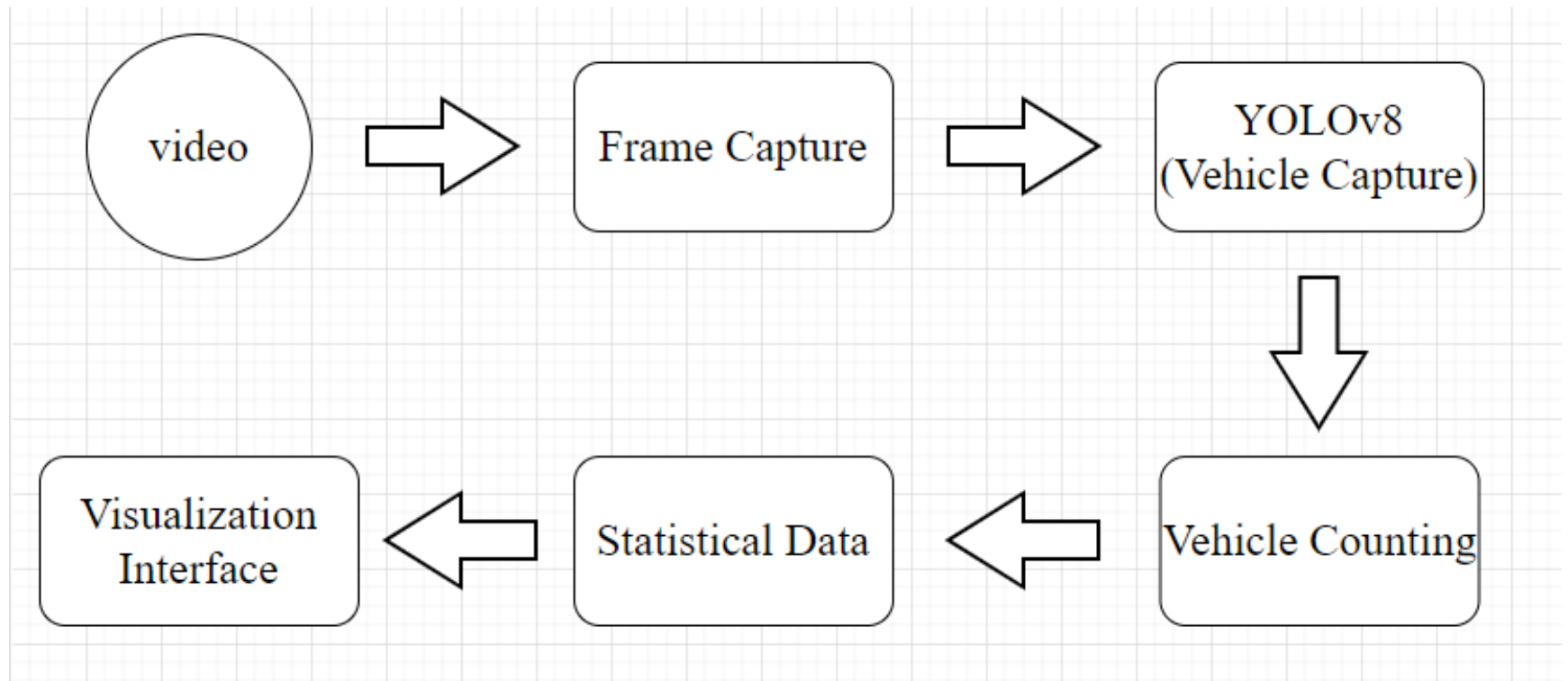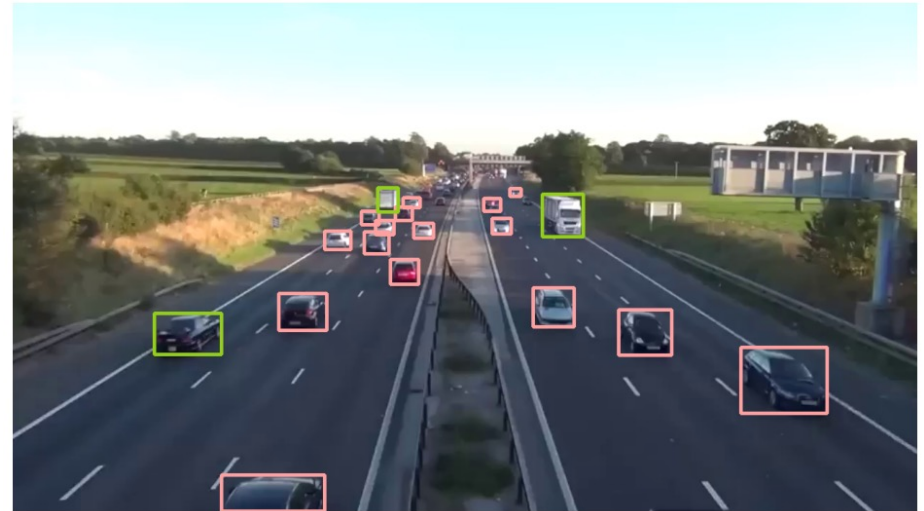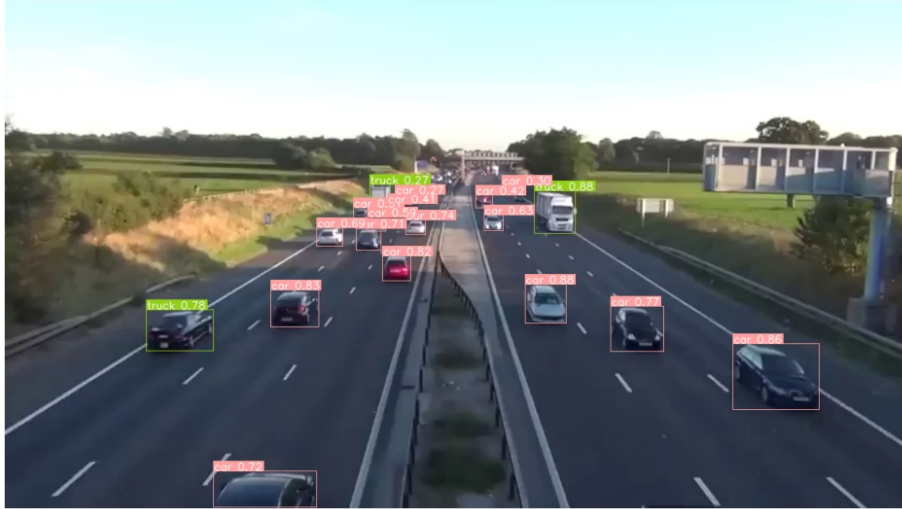
System Overview

Extracting a Frame from Video
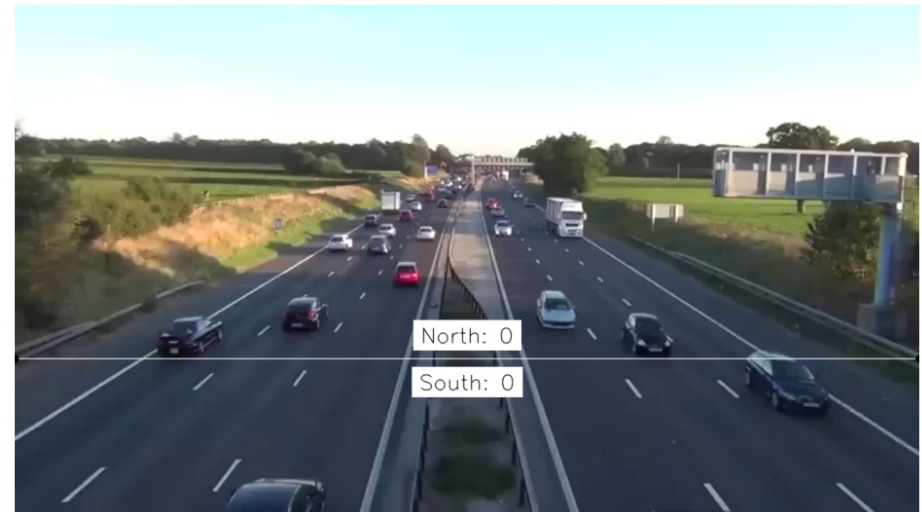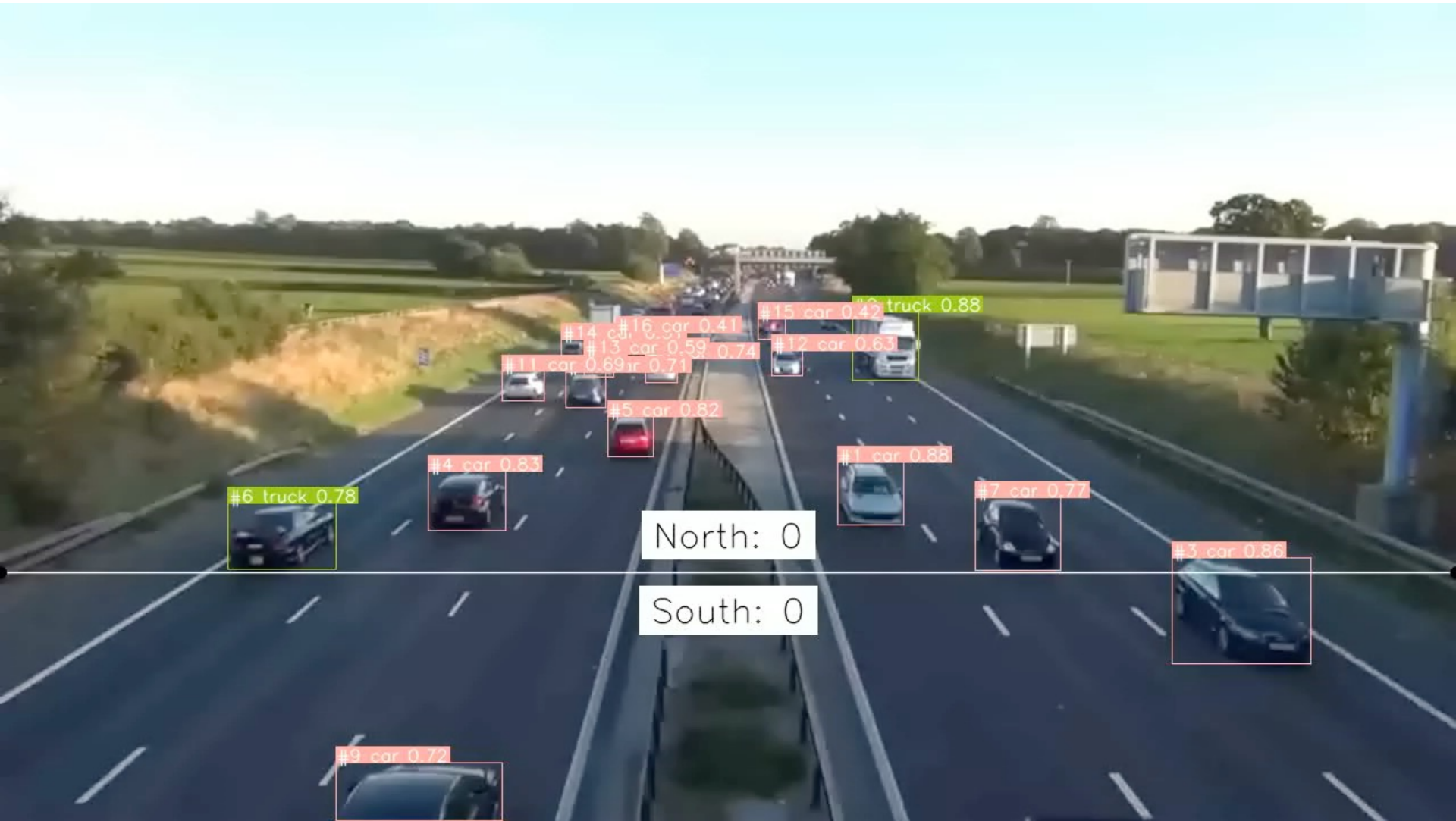
YOLOv8(Vehicle Capture)

System Overview

Visualization

Direction

Experiment

Future Work

- Lightweight Model Frameworks: Adopt lightweight model frameworks such as MobileNet and EfficientNet, which are specifically designed for mobile and embedded devices.

- Real-time Data Processing Capability: Enhance the system's real-time data processing and response speed to reduce latency, enabling quicker traffic management decisions.

References

- https://supervision.roboflow.com/latest/
- https://supervision.roboflow.com/annotators/
- https://github.com/ultralytics/ultralytics
- https://hackmd.io/@luckychi/yolov8_simple_tutorial

TAIWAN TECH

國立臺灣科技大學

Thank you!