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CSE541 Computer Vision

Object detection techniques in case of small objects on AU Drone dataset

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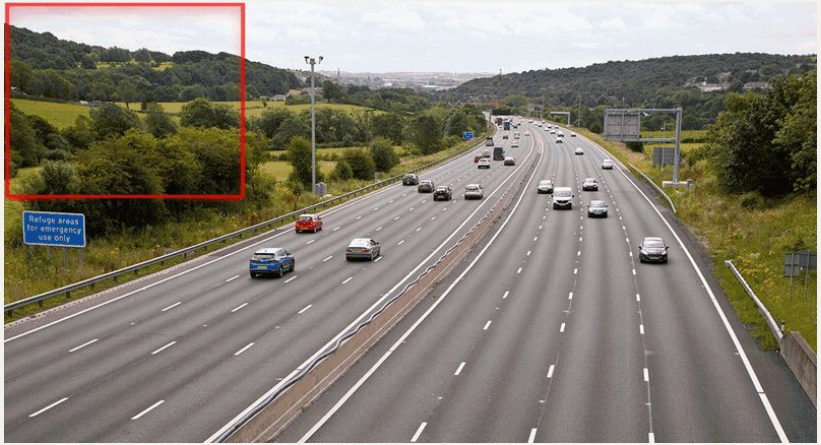
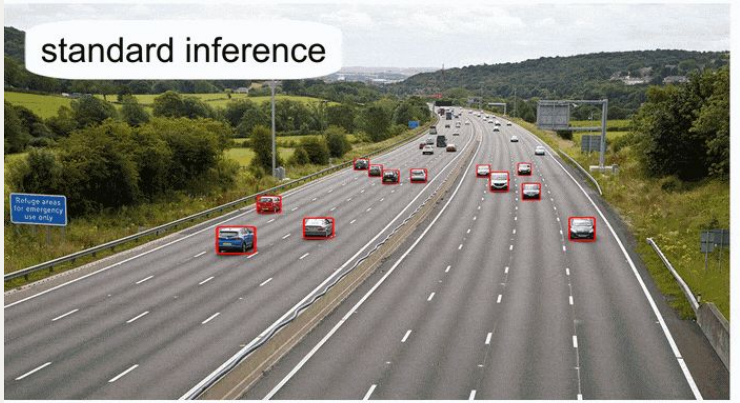
Problem Statement

- Small Object Detection
- Deep Learning Models
- Performance metrics will be mAP@0.5, mAP@0.75, mAP@0.95, and confusion matrix.

SAHI (Slicing Aided Hyper Inference)





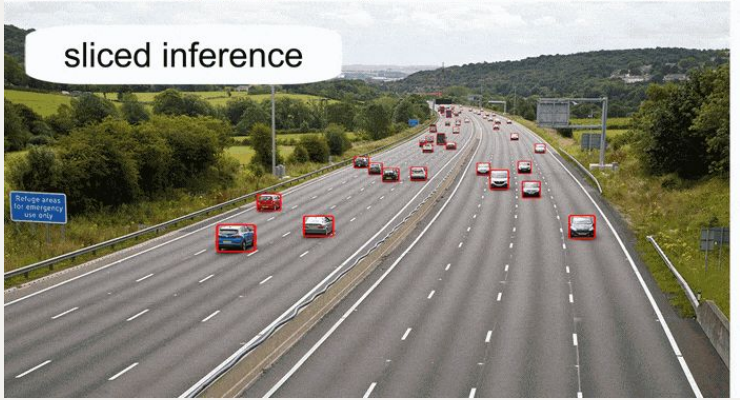


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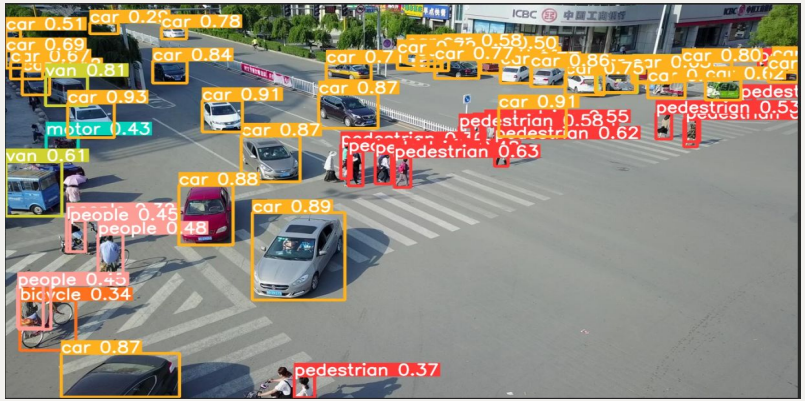
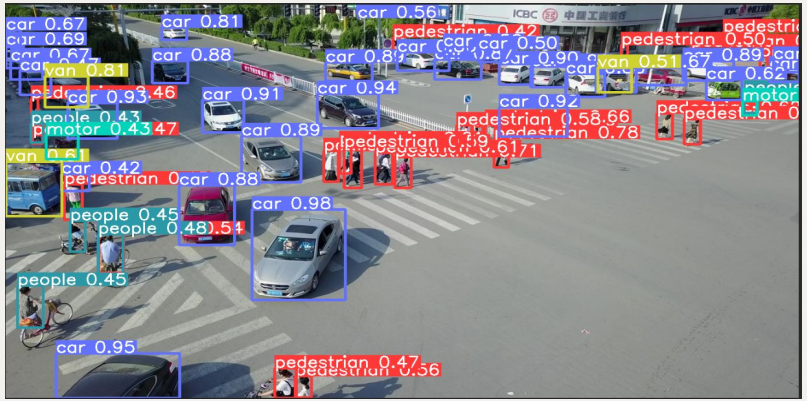
Image retrieved from https://github.com/obss/sahi

Advantages of Sliced Inference

- Reduced Computational Burden
- Preserved Detection Quality
- Enhanced Scalability





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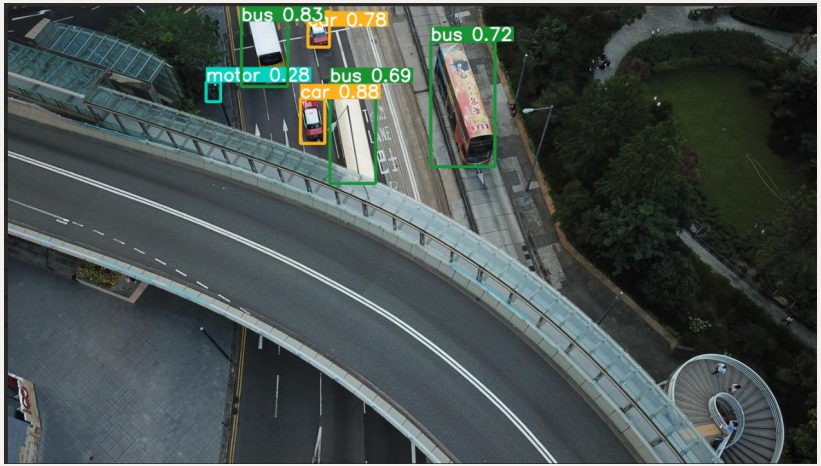
Yolov8 without SAHI vs with SAHI



SAHI hyperparameter tuning

```
predict(
   model_type="yolov8",

model_path="/content/drive/MyDrive/CV_Project/runs/detect/train12/weights/best.pt",
   model_device="cuda",  # or 'cuda:0'
   model_confidence_threshold=0.4,
   source="/content/drive/MyDrive/CV_Project/data/smallTest/images",
   slice_height=512,
   slice_width=512,
   overlap_height_ratio=0.1,
   overlap_width_ratio=0.1,

)
```

Efficient DET

- Challenge: Improve EfficientDet accuracy while maintaining efficiency(compared to YOLOv8).
- Current Status: EfficientDet has lower mAP (mean Average Precision) than YOLOv8.
- Exploration: Investigate techniques to enhance EfficientDet's accuracy.
- EfficientDet Architecture: EfficientDet architecture uses different compound scaling methods, investigating BiFPN+ improvements.

Efficient DET

Architecture	mAP@50	GPU Latency
YOLOv8	0.62	1.3ms
EfficientDet	0.47	-

Source: https://medium.com/@rustemgal/yolov8-efficientdet-faster-r-cnn-or-yolov5-for-remote-sensing-12487c40ef68

Future Work

Implement models to better evaluate their performance and also improve their performance in terms of mAP@0.5, mAP@0.75, mAP@0.95, and confusion matrix.

References

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THANK YOU!