

**Ahmedabad
University**

CSE541 Computer Vision

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

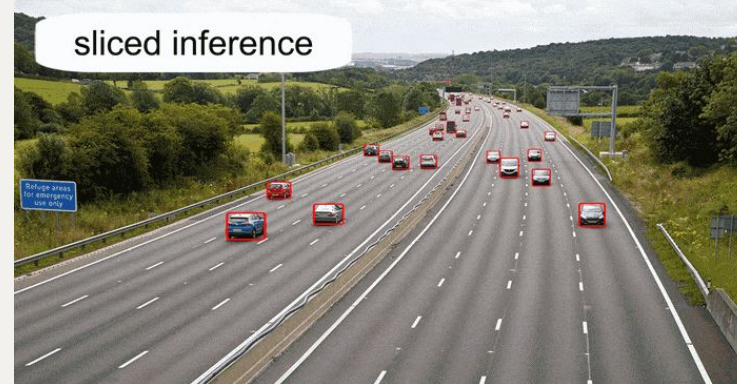
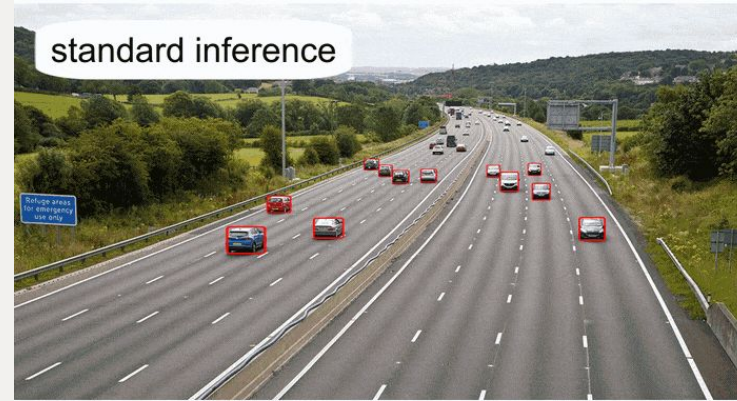
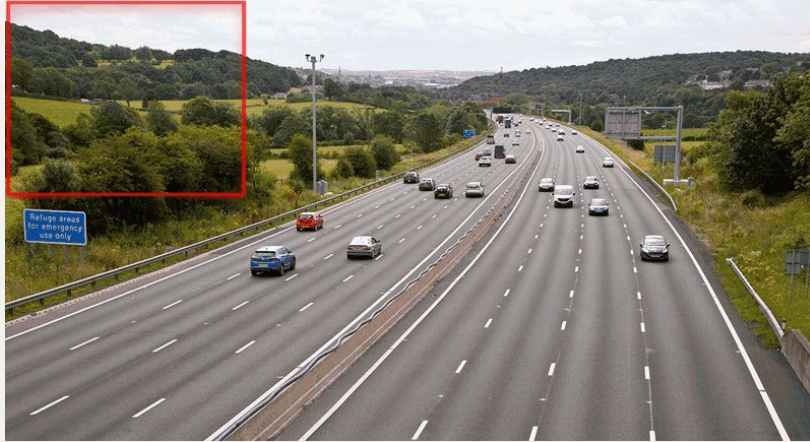
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Problem Statement

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

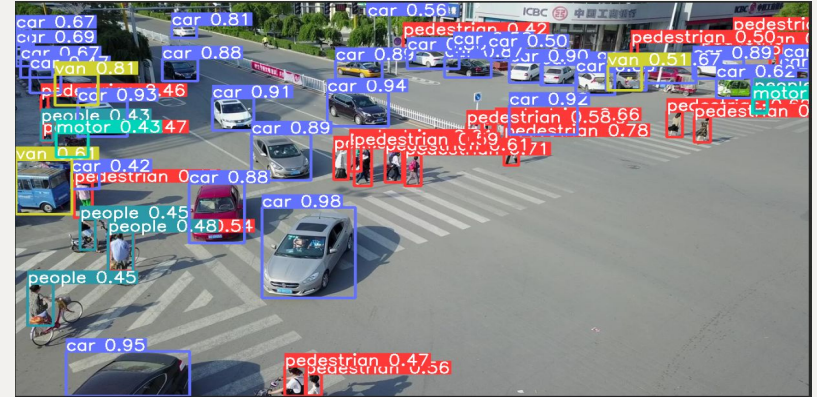
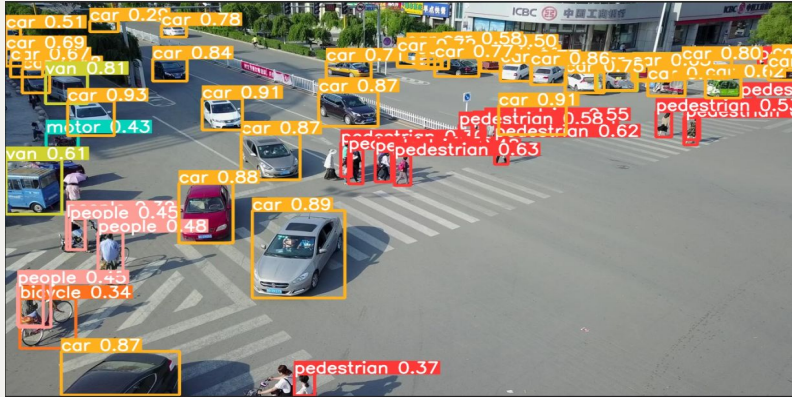


SAHI (Slicing Aided Hyper Inference)

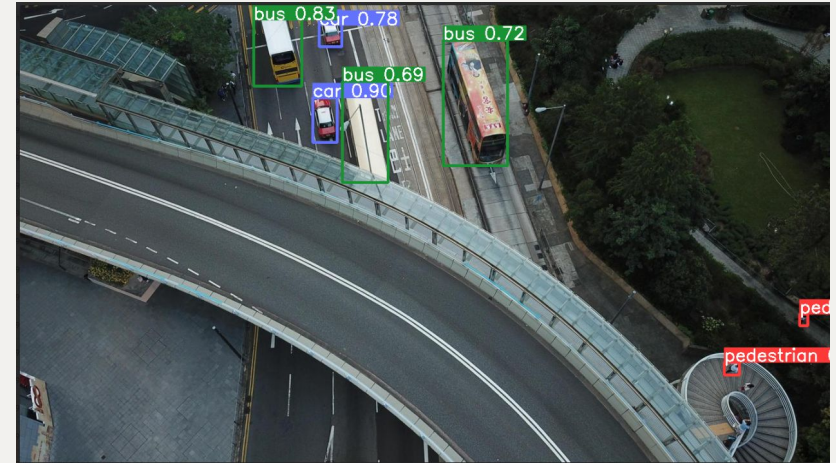
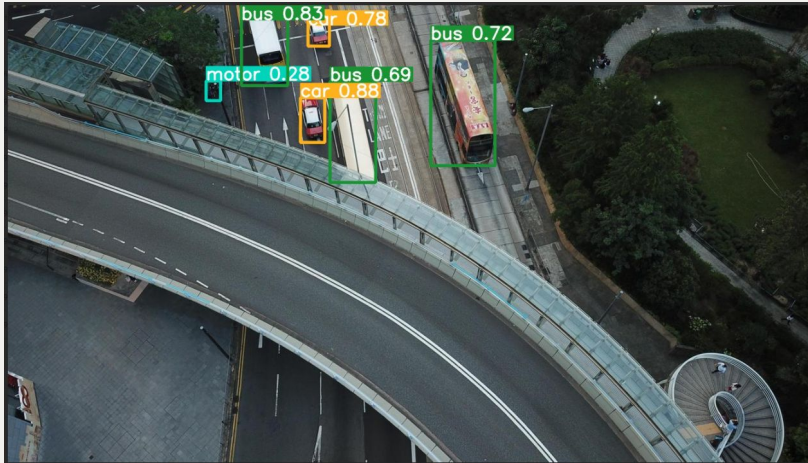


Advantages of Sliced Inference

- Reduced Computational Burden
- Preserved Detection Quality
- Enhanced Scalability



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
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YOLOv8	0.62	1.3ms
EfficientDet	0.47	-