

Ecological equilibrium and coral reefs: deep neural networks for detection of *Acanthaster planci* in images and videos.

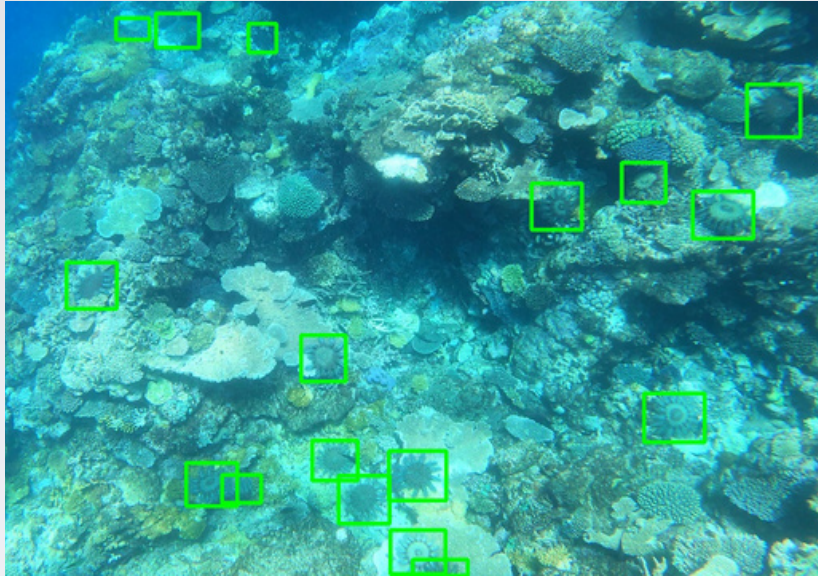
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Abstract: *Acanthaster planci* starfish (also known as crown of thorns) outbreaks have caused serious mortality of coral reefs. The causes vary a lot. Hence, lot of effort has been made by scientists in terms of monitoring the species for maintaining ecological equilibrium. In this work, a real time object detection system known as YOLO (Redmond et al 2015), is trained to identify and locate the individuals in real world videos and images.



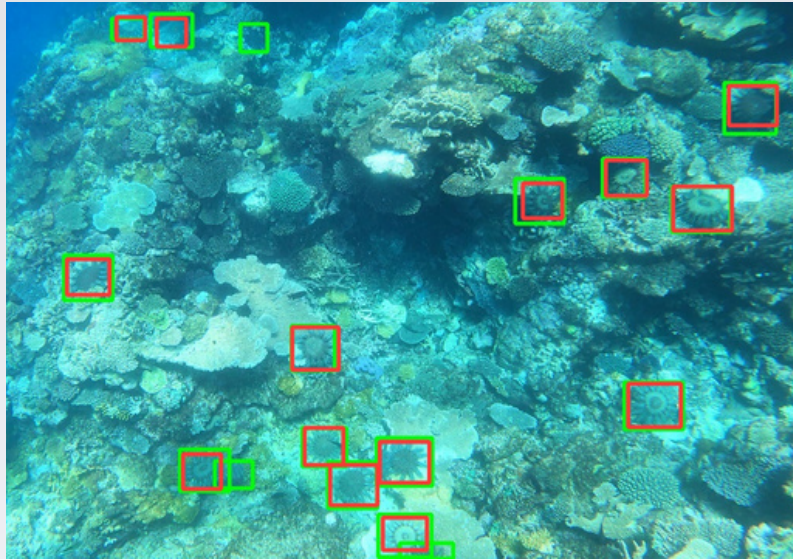
Challenge and approach



Frame from validation.

- YOLOv5 - deep neural network for object detection.
- Kaggle Competition Dataset:
 - Training video (6708 frames)
 - Validation video (8232 frames)
 - Test video (8561 frames)
- Not much data available.
- Sequential images with correlation.
- Small instances of COTS.

Techniques and Methods



Frame from slide 2 with predictions.

Partial result computed on the validation dataset.

	Precision	Recall	mAP0.5	mAP0.5:0.95
Base Train	0.759	0.307	0.359	0.166
Step 1	0.659	0.321	0.366	0.148
Step 1 and 2	0.894	0.707	0.799	0.389
Steps 1, 2 and 3	0.895	0.738	0.836	0.406

- Base Train: training in frames from video 1.
- Step 1: Selection and augmentation.
- Step 2: Increase image input size to 2400x2400.
- Step 3: Bigger COTS instances (Roboflow).

Results and Conclusions



- **test video:** https://youtu.be/d_qX3FrqgUQ
- **video from youtube:** <https://youtu.be/8hGZwAd3DJ0>

Final results.

	Precision	Recall	mAP0.5	mAP0.5:0.95
Test video	0.869	0.567	0.65	0.34

