

# Great Barrier Reef Starfish Detector

Team 8

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# 1 Problem Statement




Research Code Competition

## TensorFlow - Help Protect the Great Barrier Reef

Detect crown-of-thorns starfish in underwater image data

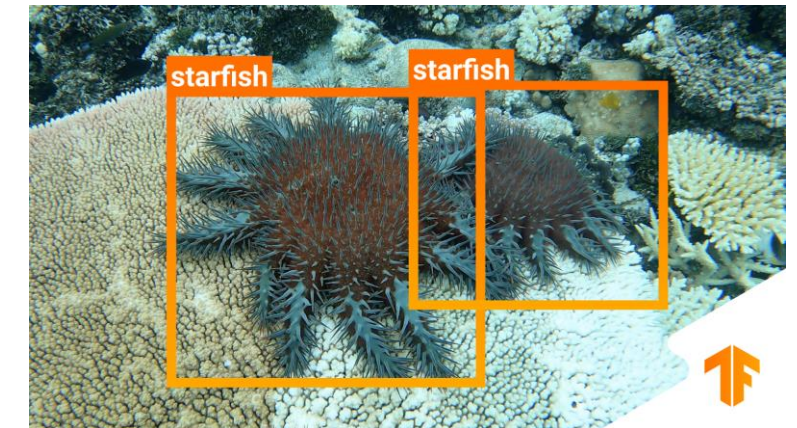
**\$150,000**  
Prize Money

 TensorFlow · 1,890 teams · 14 days to go (7 days to go until merger deadline)

1,890	2,353	42,929
Teams	Competitors	Entries

<https://www.kaggle.com/c/tensorflow-great-barrier-reef/overview/description>

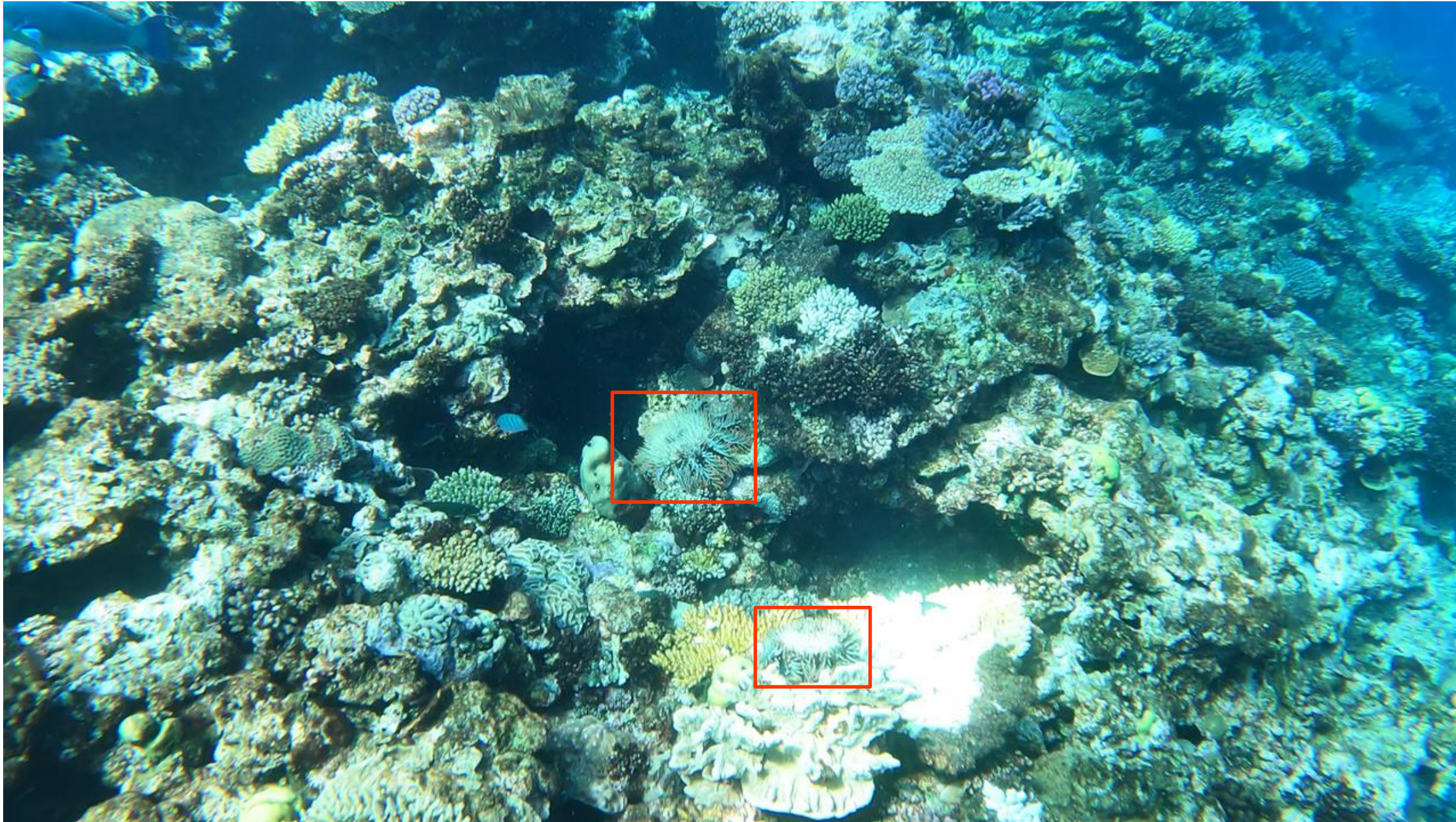
**Our goal:** Implement a YOLO object detector from scratch



<https://www.google.com/url?sa=i&url=https%3A%2F%2Fblog.tensorflow.org%2F2021%2F11%2Fannouncing-tensorflows-kaggle-challenge.html&psig=AOvVaw3pZWcfWwVYD7HMyptUNG62&ust=1643789767389000&source=images&cd=vfe&ved=0CAsQjRxqFwoTCN-CrpJ6I3vUCFQAAAAAAdAAAAABAJ>

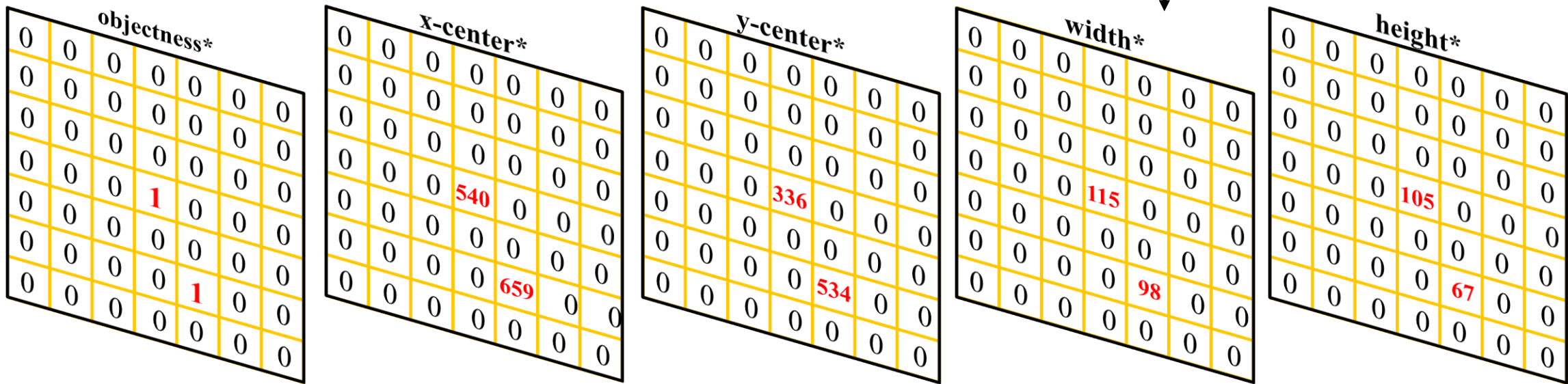
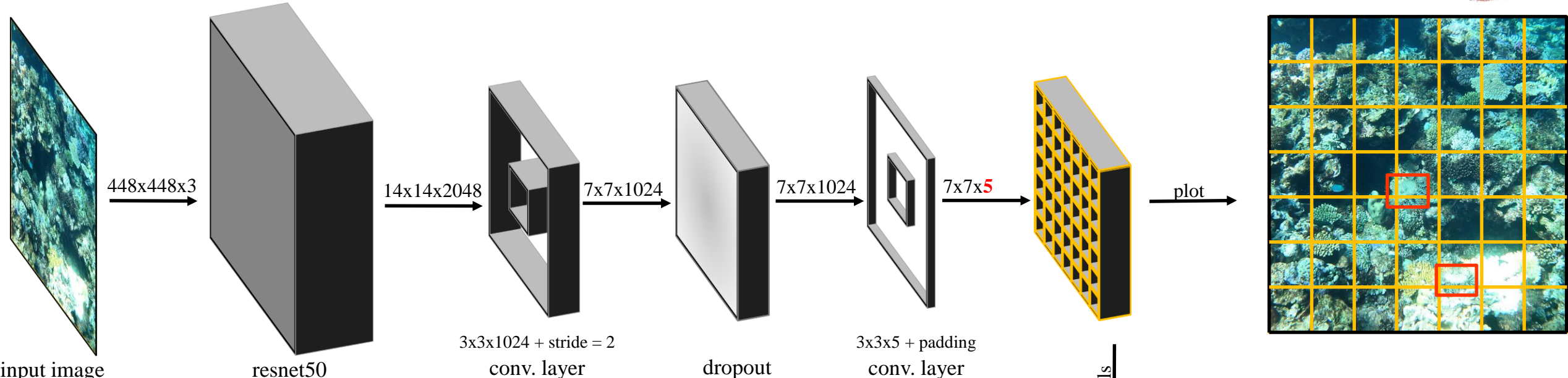


# 1 Problem Statement





# 2 Our YOLO Architecture



\* For simplicity the values are denoted as pixel values. The implementation is relative to the grid.

# 3 Approach

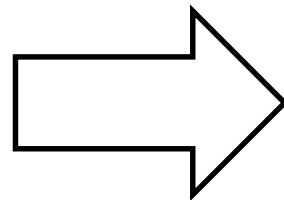


- Detection input pipeline
- Label conversion
- YOLO architecture
- Custom loss function
- Visualization

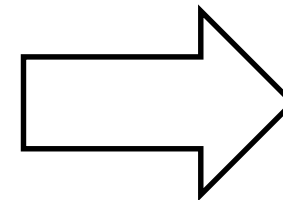
- Optimize the input pipeline
- Transfer learning
- Metrics
  - IOU
  - TP-rate / TN-rate
  - Separate Loss functions

- Data augmentation
  - color jittering
  - horizontal & vertical flip
- Dropout
- Smaller model capacity

Overfit on few  
training samples



Overfit on complete  
training set



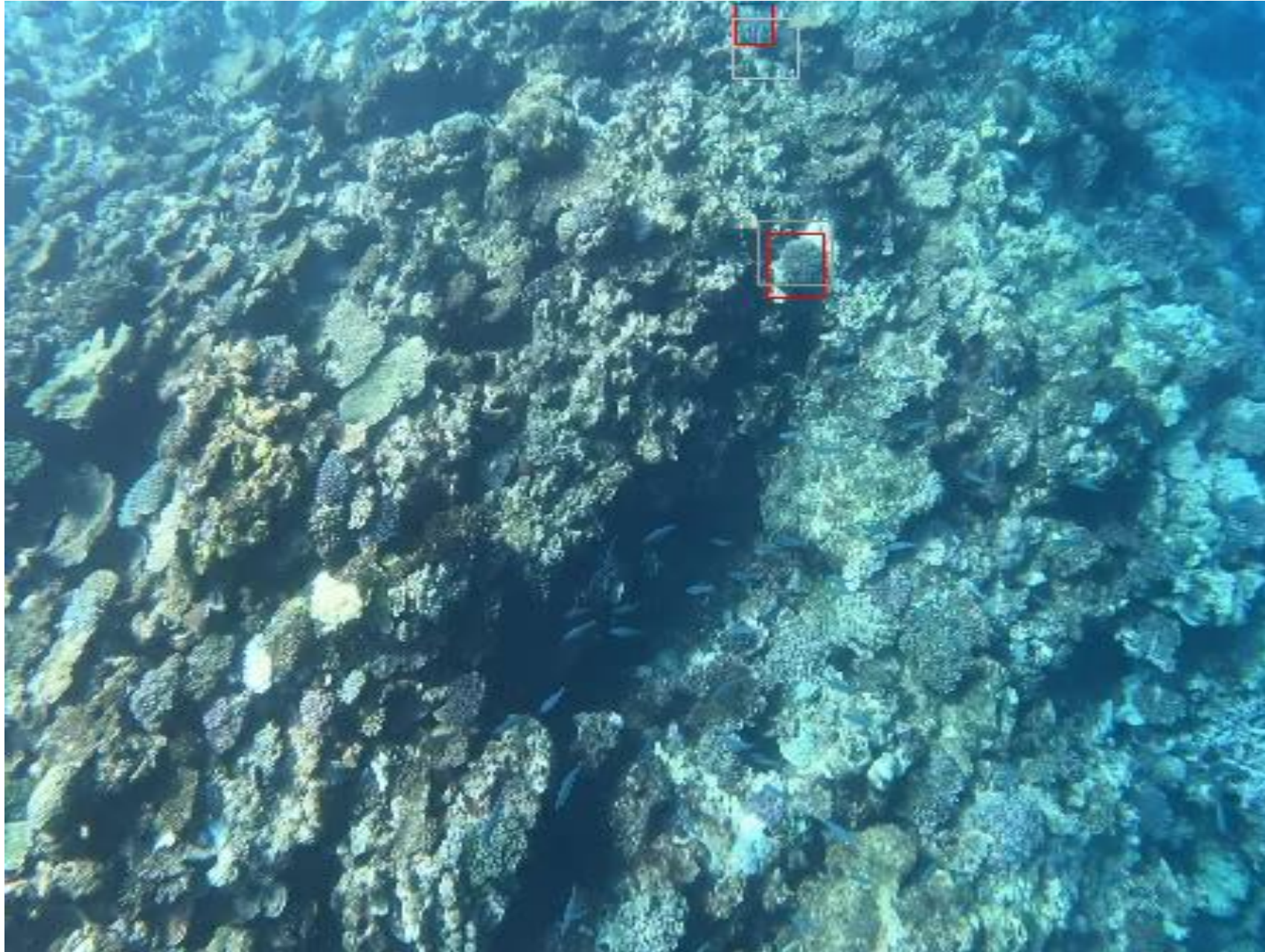
Detector works on  
test set





...more during breakout!



# 4 Results



-  Ground Truth
-  Estimate  
white: objectness = 1, black: objectness = 0



The background of the slide is an aerial photograph of a coral reef. The water is a vibrant turquoise color, and the coral reef is visible as a darker, textured area in the center. A small boat is visible in the distance on the right side of the image.

# Thank you

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