

The Coral Rescue



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Introduction

- Coral reefs are essential marine ecosystems.
- Coral reefs face threats from climate change, pollution, and other human activities
- Monitoring coral health is critical for conservation efforts.



Impact of vision2030

NEOM and KAUST are participating in the largest coral restoration project in the world, called the "KAUST Coral Reef Restoration Initiative," as part of the 2030 vision.



"نحن في سباق مع الزمن لإنقاذ الشعاب المرجانية، وتعاني
الشعاب المرجانية في جميع أنحاء العالم من أزمة".

"We are in a race against time to save coral
reefs, and coral reefs around the world are
in crisis".

KAUST President **Tony Chan**

Problem Statement



- Coral reefs are under significant threat from bleaching, which puts marine biodiversity at risk.

Solution



- Develop a deep-learning model to classify coral as either bleached or healthy.
- Applying computer vision technology to detect and monitor fish populations.

Data

Coral Dataset:

- Total Images: 923
- Categories: Bleached and Healthy
- Training Set: 80% (738 images)
- Test Set: 10% (92 images)
- Validation: 10% (93 images)

Fish Dataset:

- Total Images: 98
- Categories: Low F and High F
- Training Set: 80% (79 images)
- Test Set: 20% (20 images)

Model

Coral Classification:

- Convolutional Neural Network (CNN)
- VGG16
- ResNet50

	CNN	VGG16	ResNet50
Epochs	5	10	10
Loss	0.52	0.46	0.72
Accuracy	0.73	0.76	0.55

Model

Fish Detection:

- YOLOv5

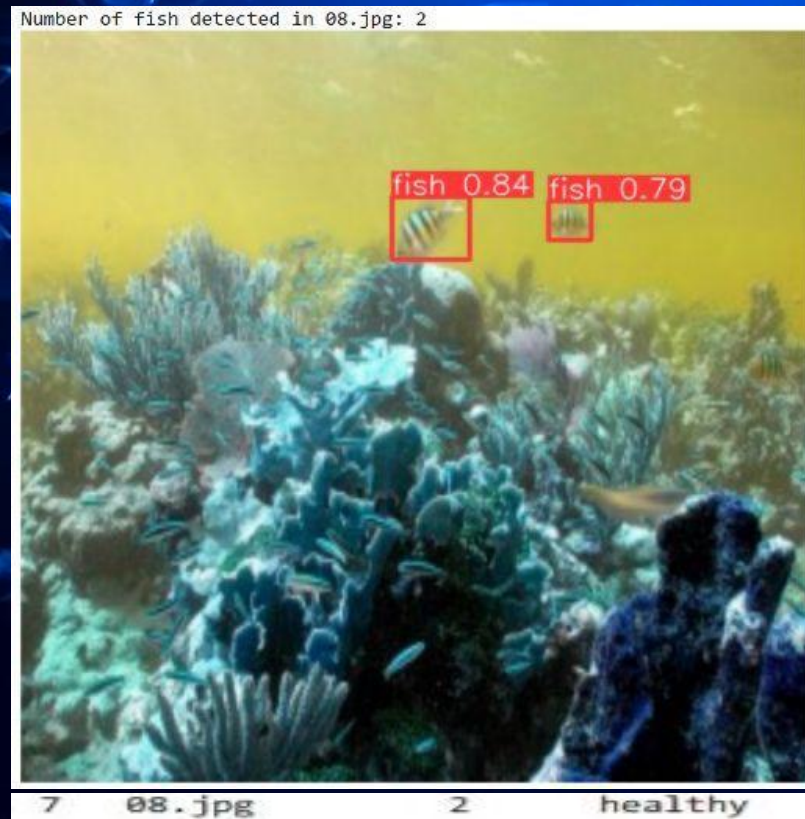
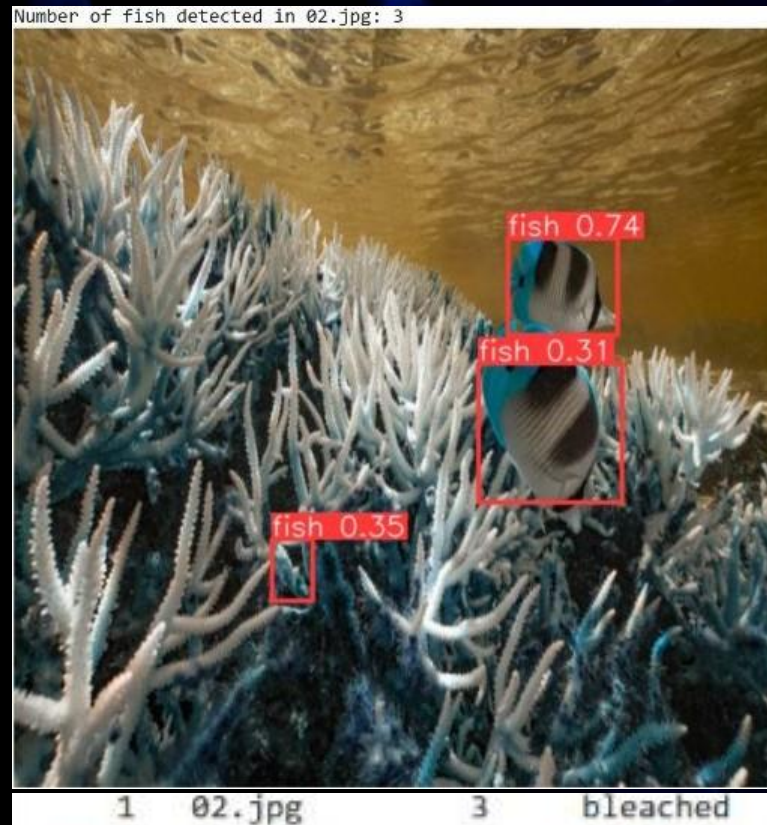
	YOLOv5
Epochs	50
Precision	0.977
Recall	0.923
mAP50	0.959

Limitations

A large school of fish, possibly sardines or anchovies, swimming in deep blue water. The fish are silvery and their movement creates a sense of depth and motion. The lighting is soft, coming from above, highlighting the scales of the fish.

- Encountered difficulties in data collection for training the models.
- Due to the data limitations, we could not implement the confusion matrix in fish detection.

Output



Future work

- To enhance the Coral Rescue project's effectiveness, we plan to develop an application that utilizes augmented reality and artificial intelligence. This application will assist divers in identifying and classifying various types of coral underwater, incorporating features such as camera functionality for real-time coral classification.

Conclusion

In conclusion, this project developed computer vision with deep learning and used YOLO, CNN, VGG, and ResNet to assess coral health by analysing images and counting fish accurately. This tool is vital for monitoring and protecting coral reefs from bleaching, a major threat to marine biodiversity. Improved data and model development will expand its applicability to other marine areas and organisms, supporting global conservation efforts.



Thank You

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