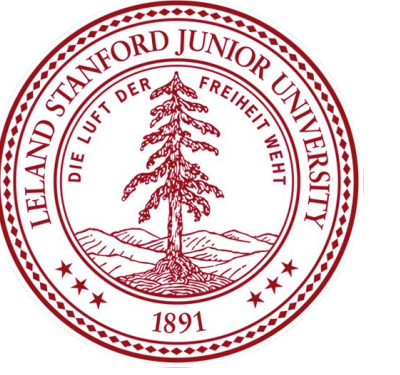




Detecting and Classifying Species of Fish

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Introduction

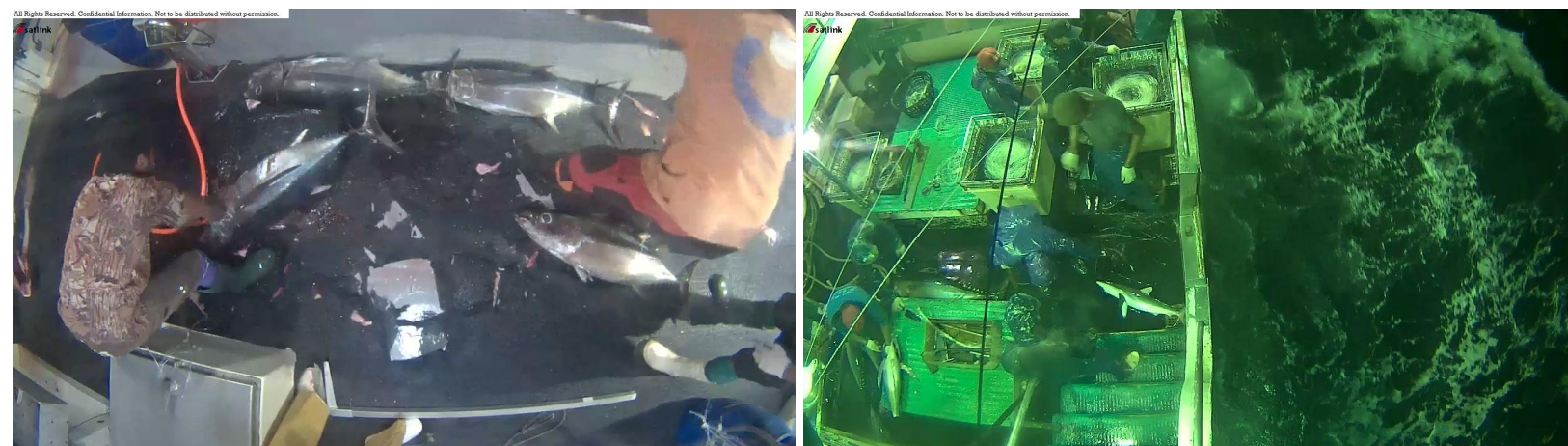
- Illegal, unreported and unregulated (IUU) fishing threatens the health of marine ecosystems and food security worldwide.
- To combat this, the Nature Conservancy mounted cameras on boats to monitor boat catches with the hopes of leveraging artificial intelligence to aid fish reviewers

Goal: The motivation behind this project is two-fold:

1. Detect and crop out fishes
2. Classify them into one of 8 species

Data

- The Nature Conservancy released a dataset on Kaggle containing a training set and two test sets
- Data consists of image and corresponding label



Two examples of images from dataset.

Challenges include differing camera angles, resolutions, colors and there is often multiple fish in an image. The 8 target species are: Albacore tuna, Bigeye tuna, Yellowfin tuna, Mahi Mahi, Opah, Sharks, Other and NoF (No fish observed)

Object Detection and Classification



Object Detection

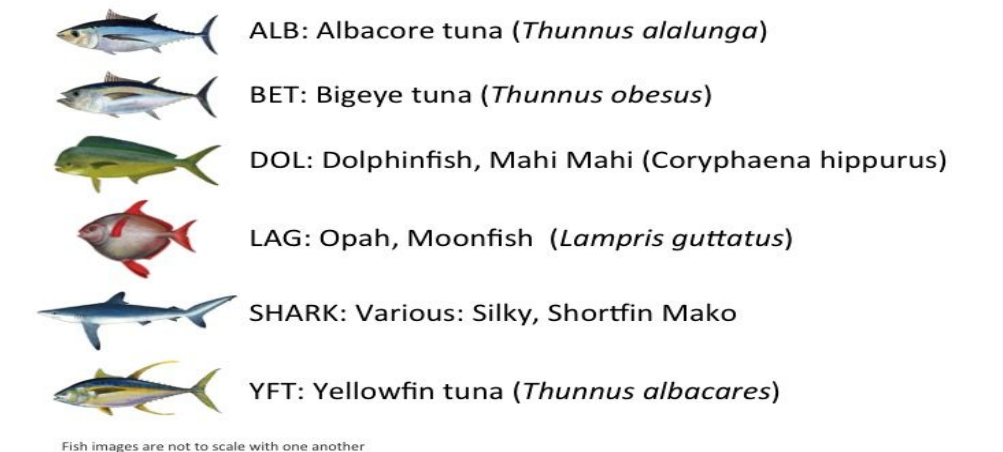
- I use the Python library, ImageAI, for detection and extraction.
- YOLOv3 is a fast detection algorithm as a single neural network is applied to the image



Classification

- Resnet-50: Uses residual nets to provide deeper layers
 - VGG16: A CNN model that uses 3x3 convolutional layers
 - Inceptionv3: Combines blocks, convolutions and pooling
- Metric for evaluation:

$$\text{logloss} = -\frac{1}{N} \sum_{i=1}^N \sum_{j=1}^M y_{ij} \log(p_{ij}),$$



Preliminary Results

- Issues with implementation has resulted in poor object detection rates ~ less than 50%
- Without a working object detection to crop the images, the classification algorithms are very expensive to run since it has to run on the whole image
- As a result, I have not been able to test the classification algorithms yet

Discussion

- Depending on the results from the classification algorithms, I look into whether data augmentation would help reduce error
- Specifically, it could be beneficial to ensure that fishes are rotated in the same direction

Acknowledgements

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