



The clafISHicator

AN original Work by:

DAMiÁN PaSCUAL ORtiz

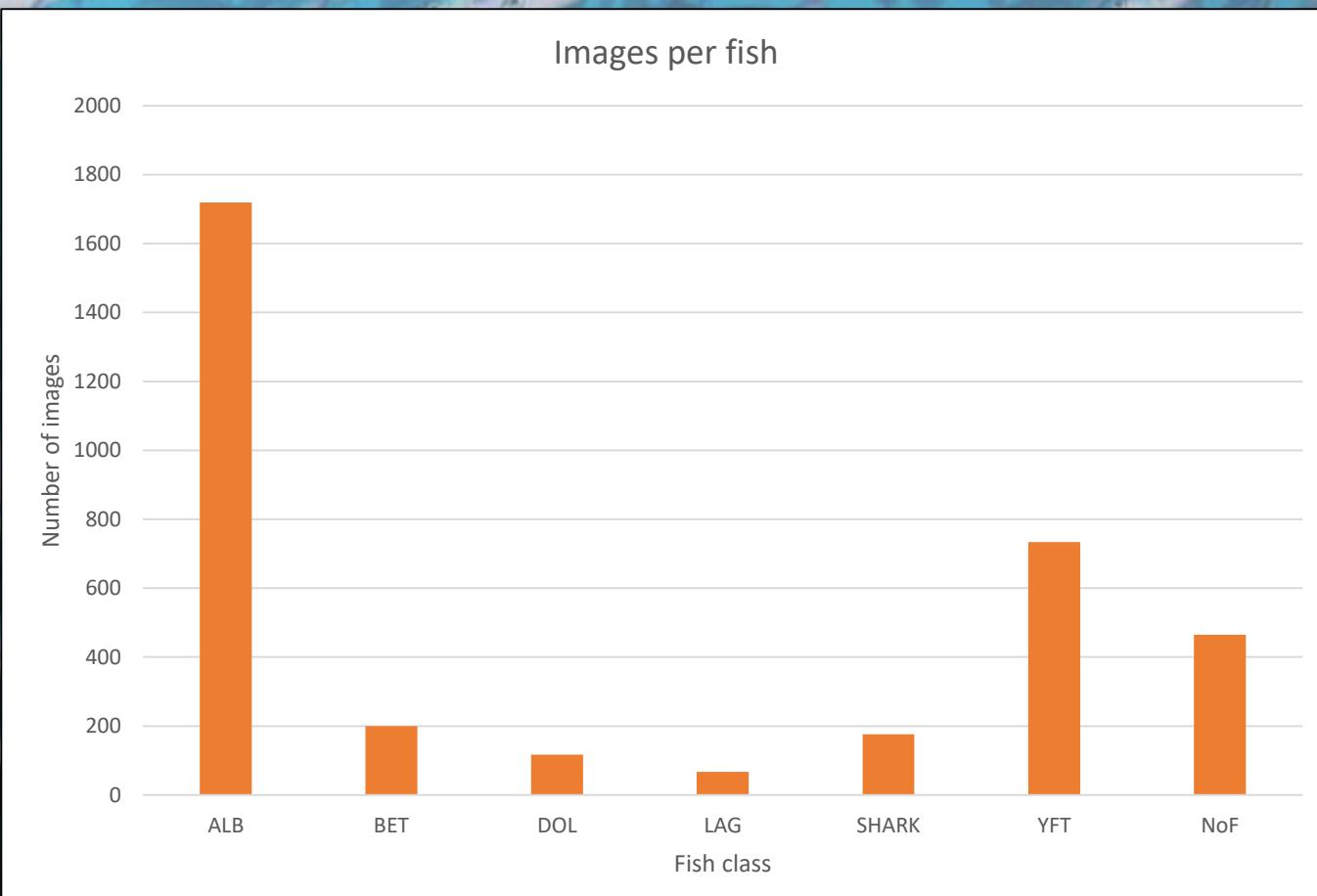
PaBLo MaInar JovaNi

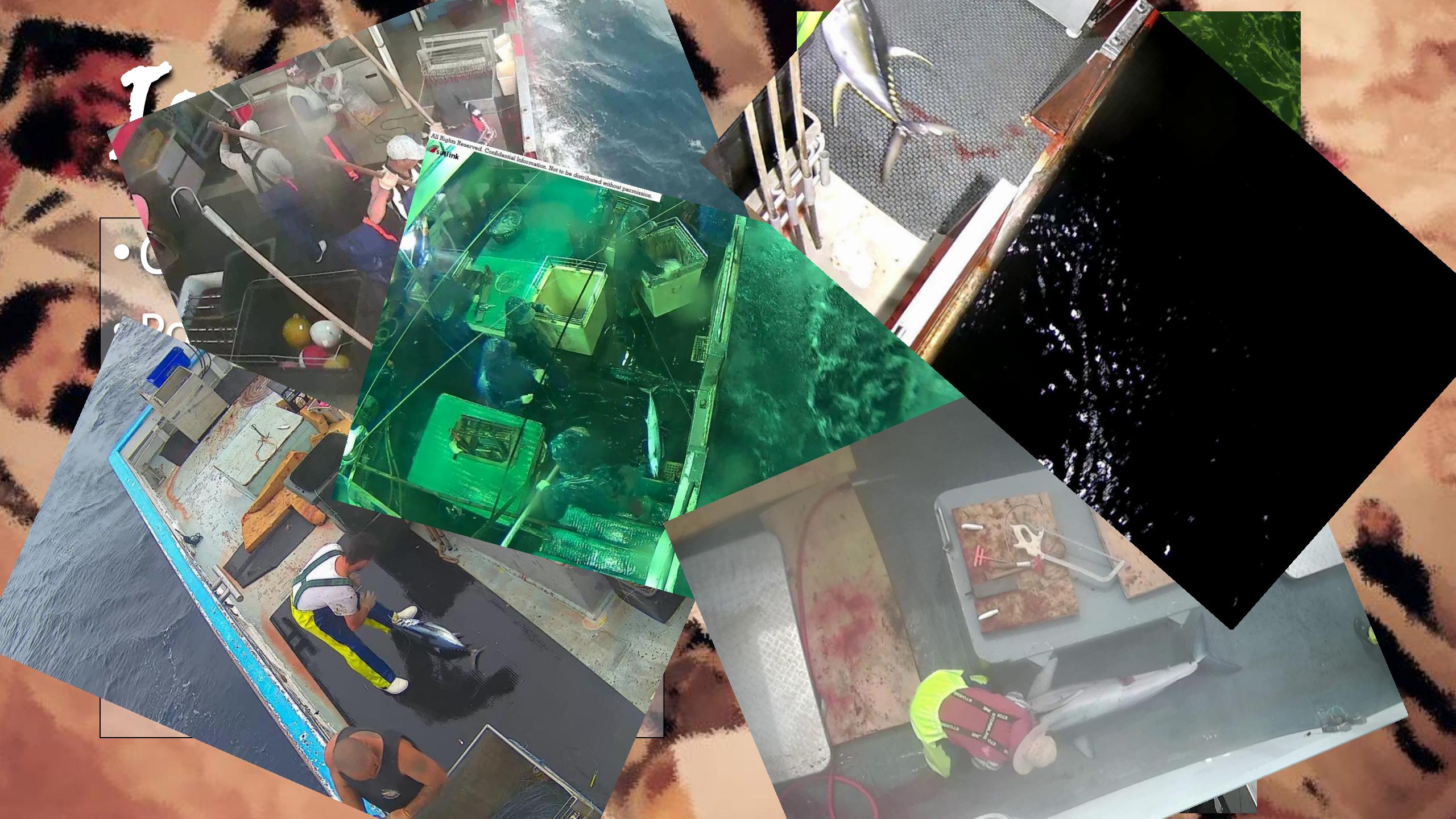
Introduction

- **kaggle** competition
- **Goal:** Control illegal fishing of protected species
- **Objective:** find and classify the fishes of an image
 - 6 types of fishes
- **Two problems**
 - **Computer vision:** Find the fish in the image
 - **Classification problem:** Say the type of fish

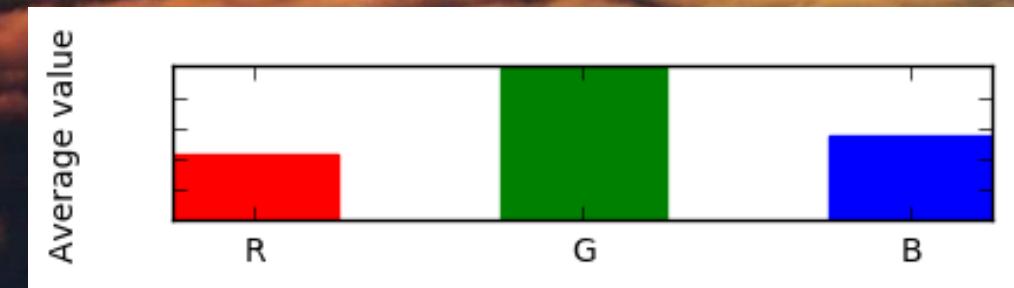
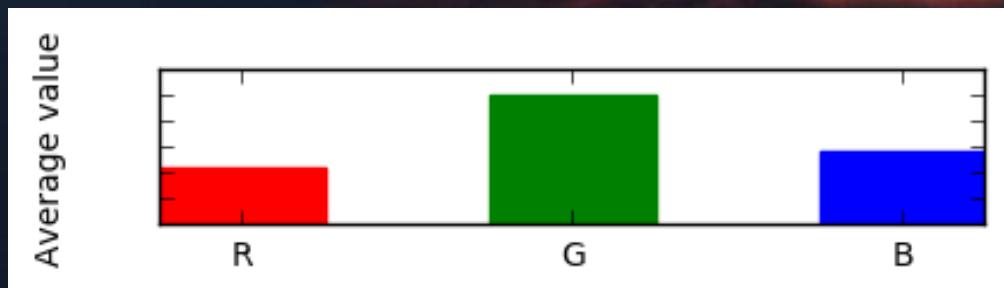
Data exploration

Extremely unbalanced dataset!





Day/Night classification



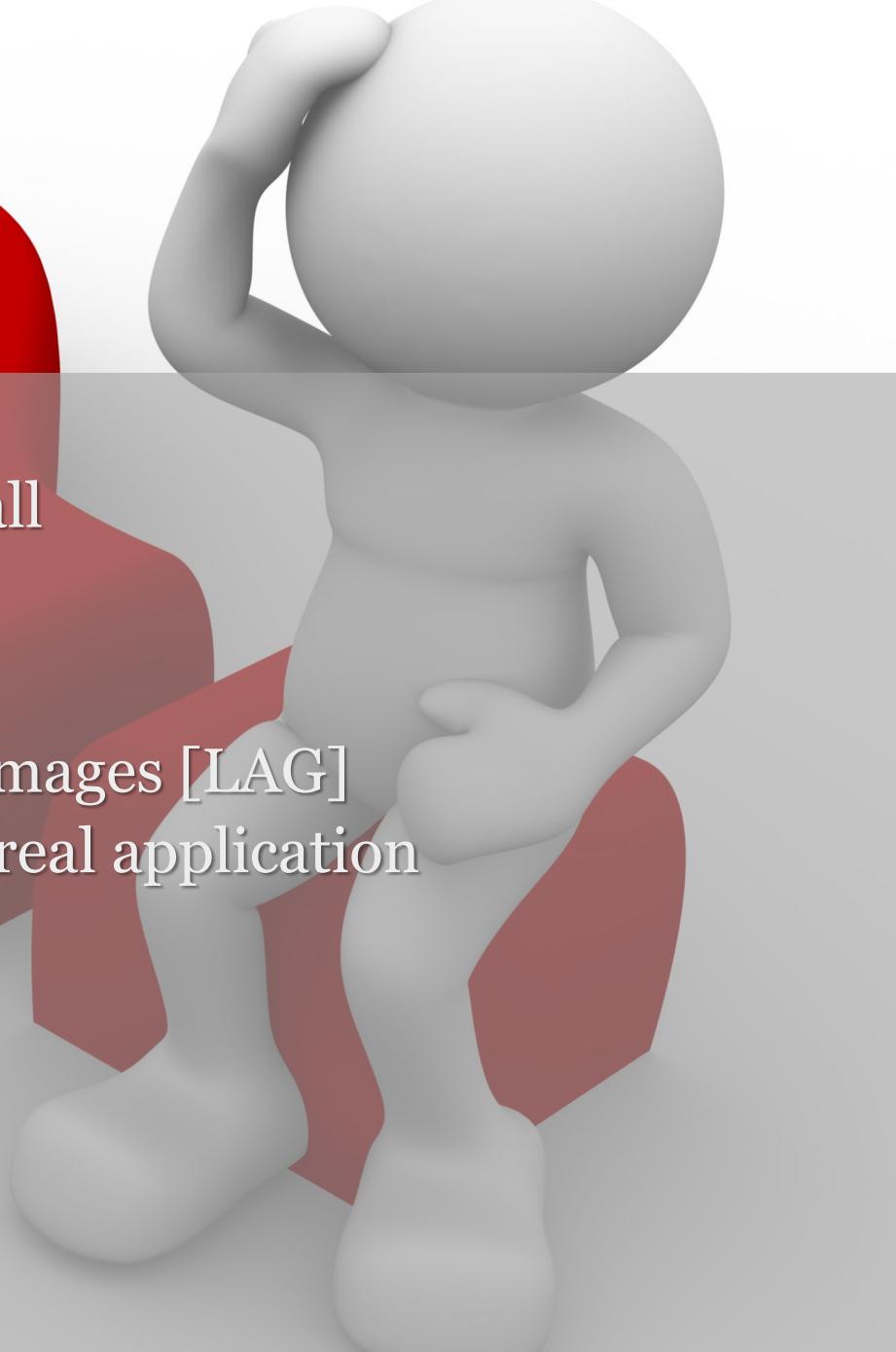
Computer vision

Finding fishes... Fishing

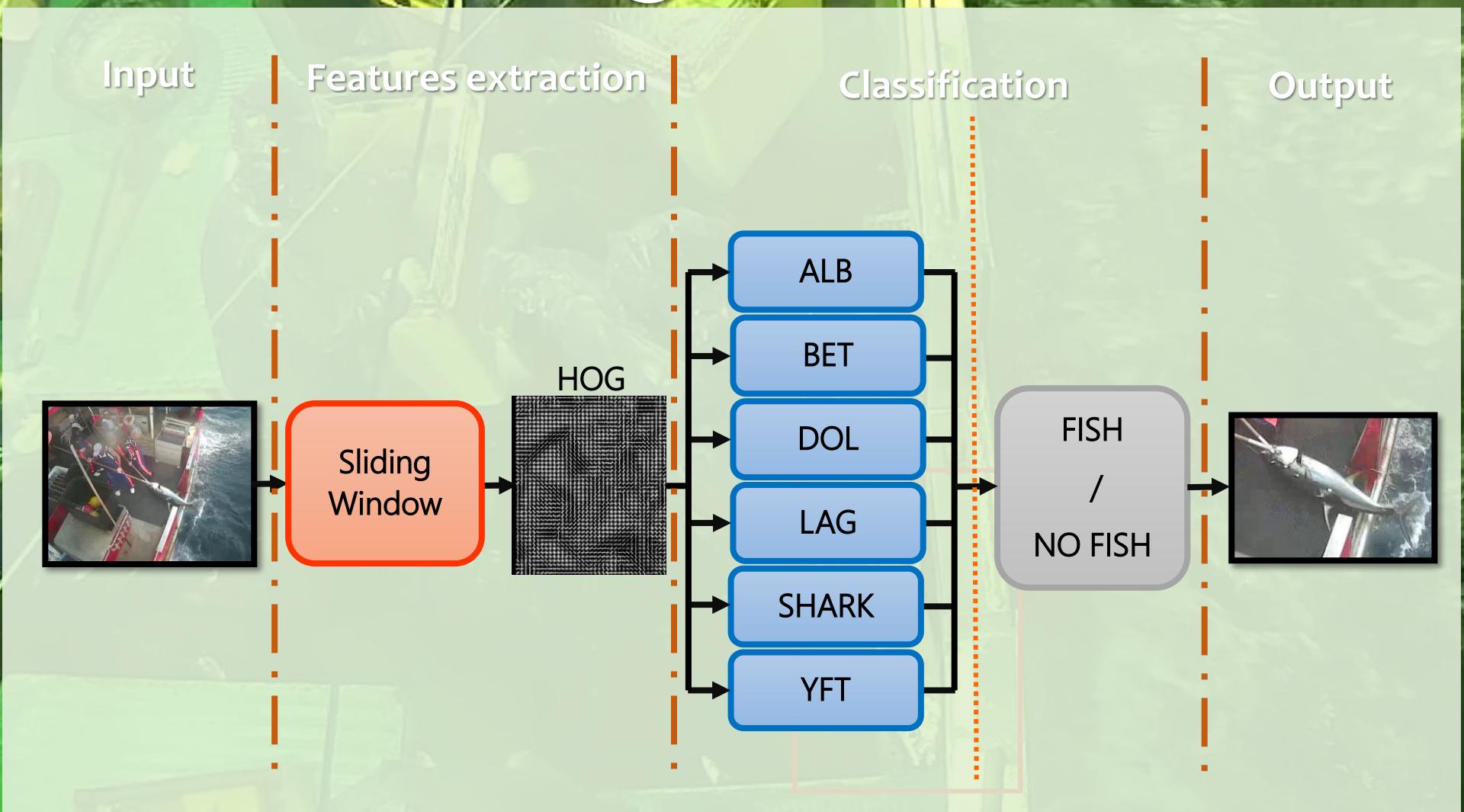


Strategy

- **Pass whole image to a CNN:**
 - Images too complex → Data set too small
 - Result: random performance
- **Template matching:**
 - Effective in some cases → very similar images [LAG]
 - Ineffective or too time consuming for a real application
- **Sliding window**
 - Train with cut images of fishes
 - Best performance: time and accuracy



Sliding Window



But how to train the claFISHicator...?

With cut images of fishes!

But how to cut the images...?

With the claFISHicator!

Solution

- o. Cut manually + template matching
1. Train classifier
2. Run
3. Manually sort:
 - 3.1 Good cut → Feed positive
 - 3.2 False → Feed “No Fish”
4. Repeat (many many times)

Test Results

	ALB	BET	DOL	LAG	SHARK	YFT
Samples	115	95	76	51	81	107
Detected	17	13	28	18	28	32
%	14.78 %	13.68 %	36.84 %	35.29 %	34.57 %	29.91 %

Total samples: 525

Total detected: 136

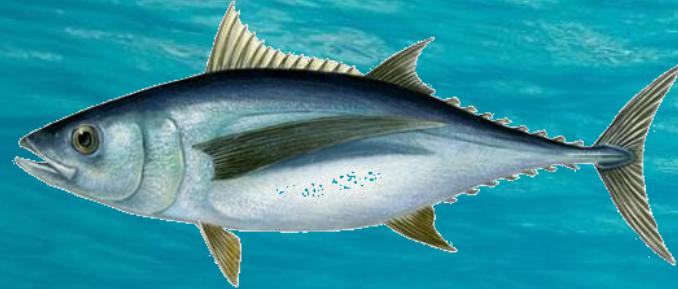
Total %: 25.90 %



Classification



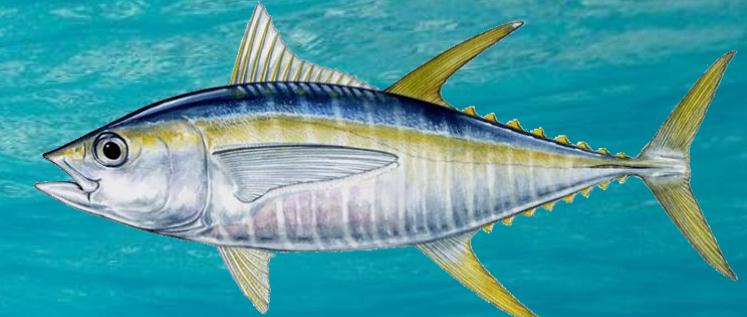
Once we have the fish...we classify it!



Albacore Tuna



Bigeye Tuna



© 1992, Diane Rome Peebles

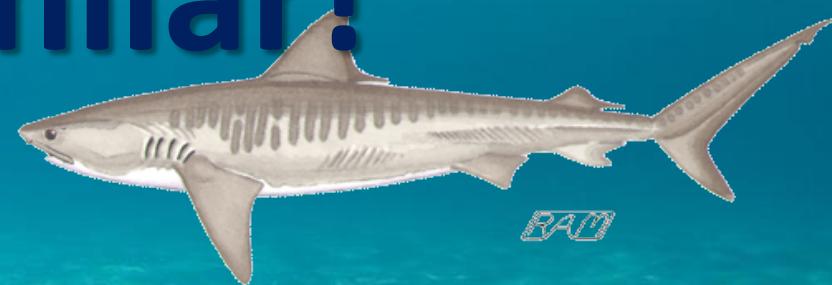
Yellowfin Tuna



Dolphinfish



Moonfish



Shark

Reality is not so simple



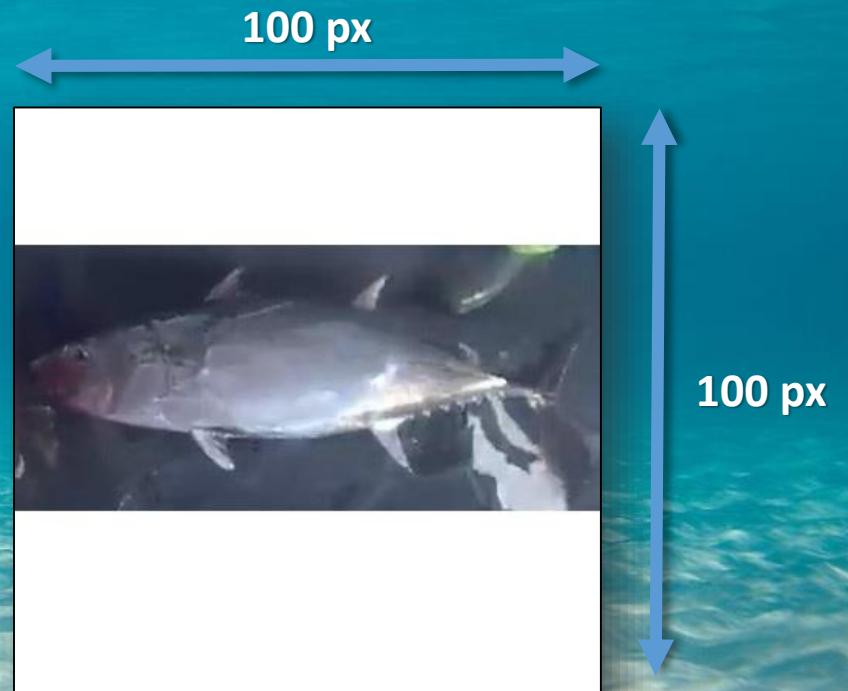
First step: Oversample

- Images are very unbalanced.
- Need to balance them to avoid biased classifier.
- Slightly change them to avoid overfitting.



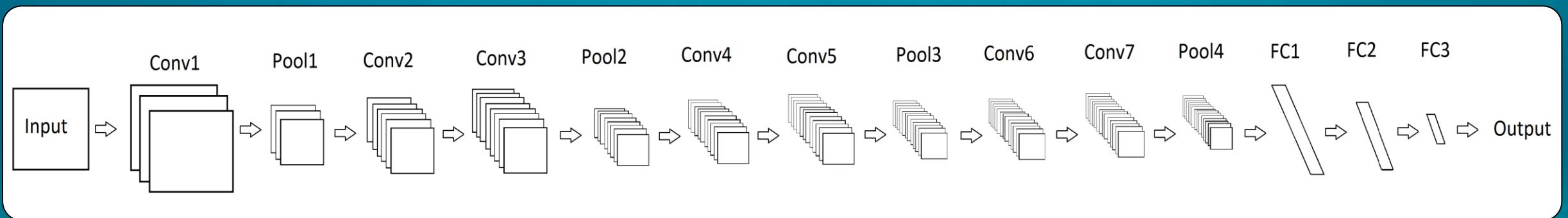
Second step: Adapt images

- All images must have same size.
- They must preserve their ratio.
- White pixels must be added to fill the images.



Third step: CNN

- Convolutional neural network
- Deep to improve efficiency

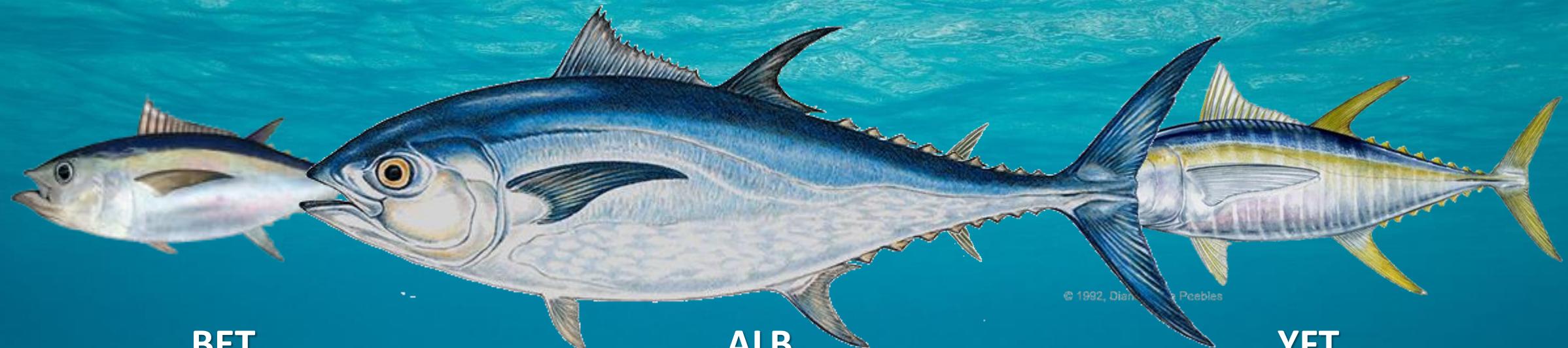


Test Results

	Well classified	Bad classified	Mostly classified as
ALB	55%	45%	ALB/YFT
BET	20%	80%	ALB
YFT	10%	90%	ALB
LAG	90%	10%	LAG
DOL	60%	40%	DOL
SHARK	85%	15%	SHARK

LAG, DOL and SHARK relatively well classified
ALB, BET and YFT very bad classified
Globally: 53% Accuracy

Solution



© 1992, Diana & Alan Peebles

BET

ALB

YFT

TUNA

Test Results

	Well classified	Bad classified	Mostly classified as
TUNA	55%	45%	TUNA
LAG	88%	12%	LAG
DOL	60%	40%	DOL
SHARK	79%	21%	SHARK

Global accuracy: 70%

Questions

