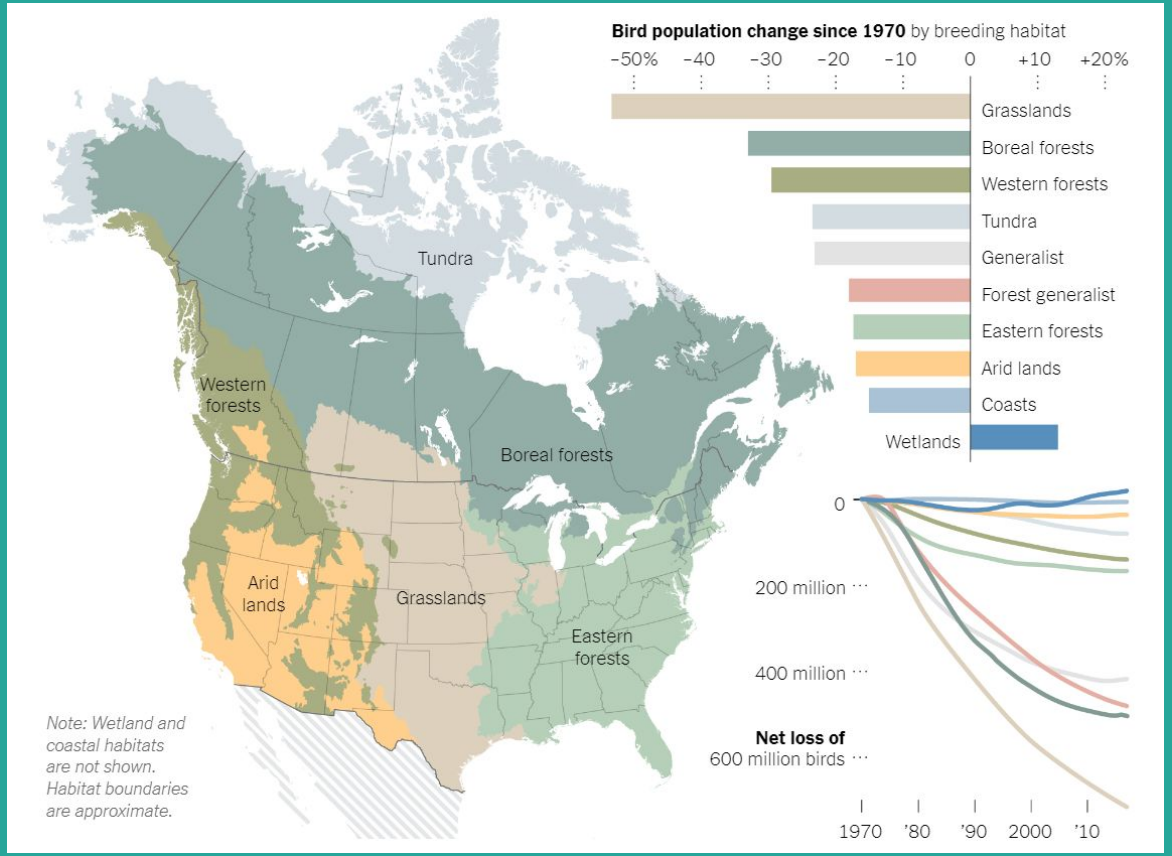
Bird Classification

with Computer Vision

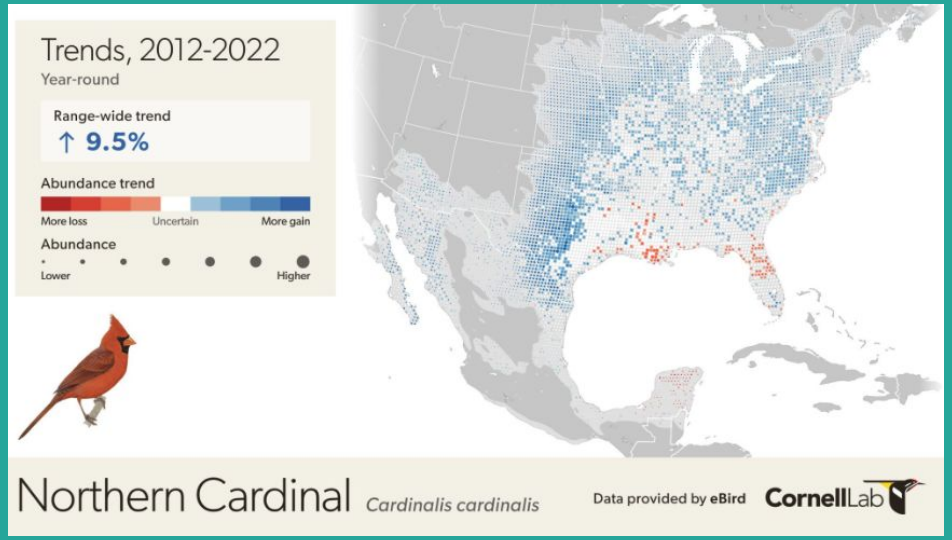
By Larissa Huang

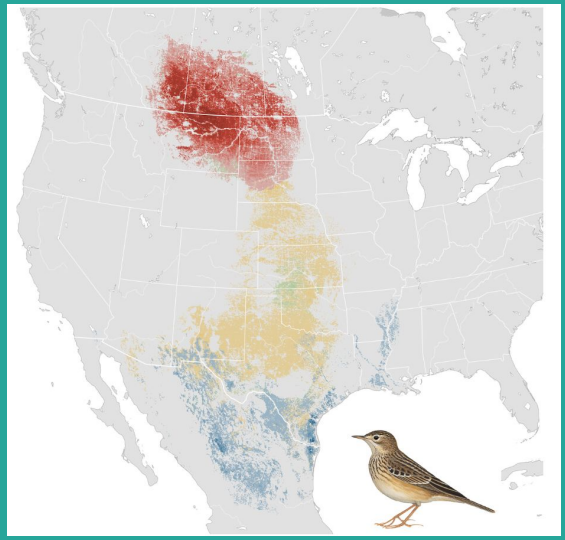
Decline in bird populations since 1970



eBird

A large community science database, with more than 100 million bird sightings contributed annually by eBirders around the world

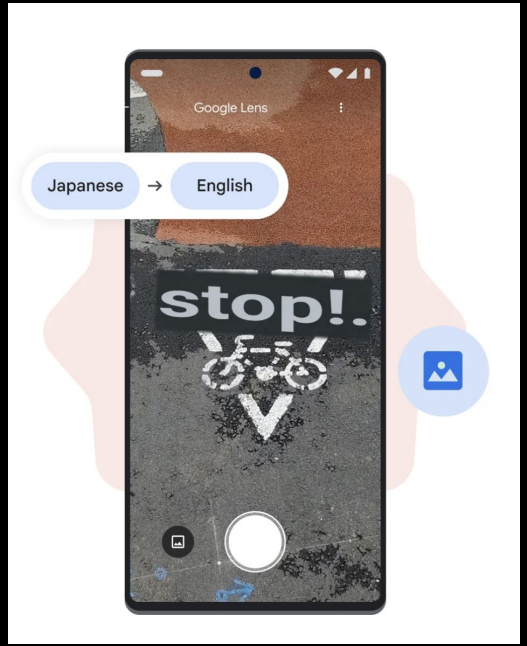




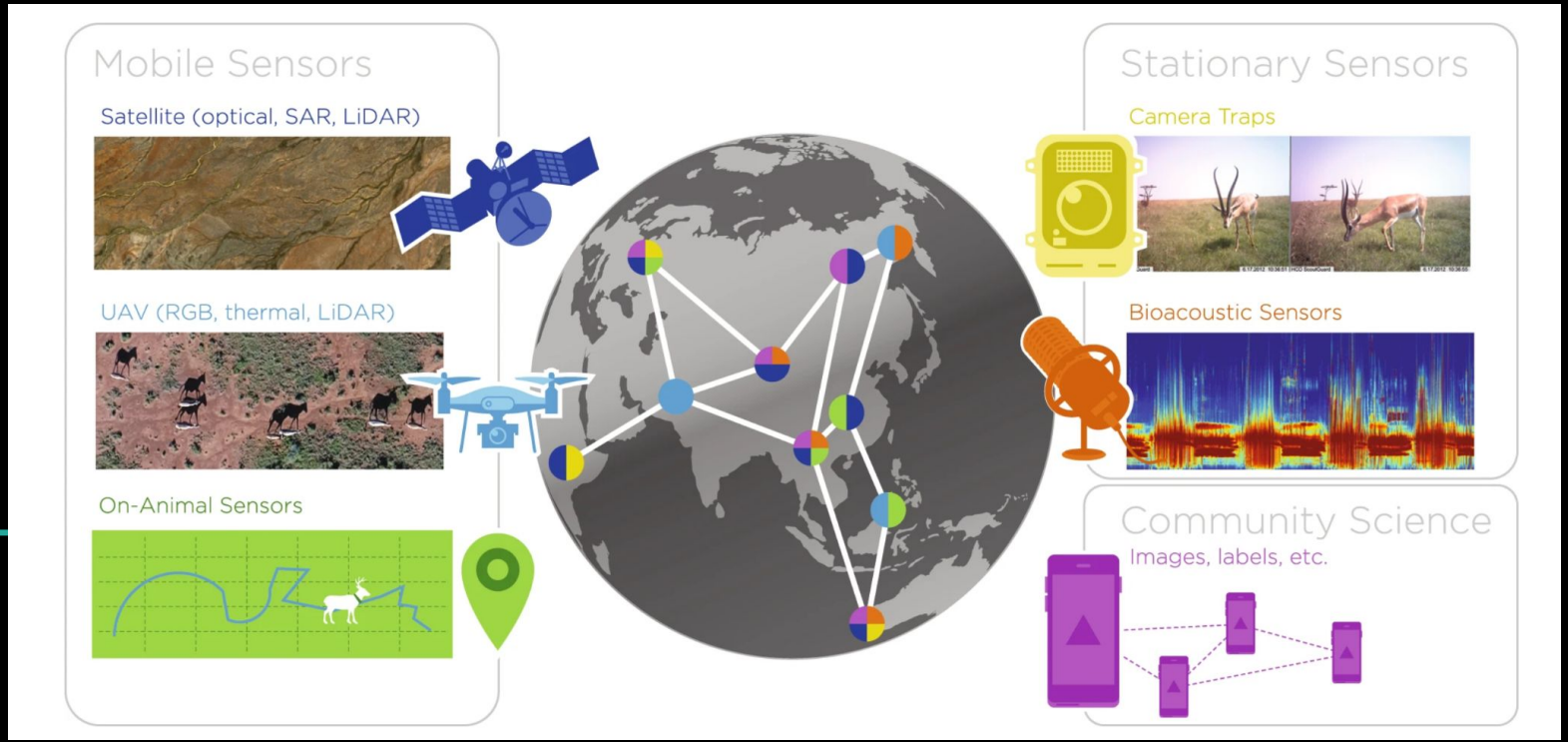
Problems: data quality, sampling bias, resource-intensive, limits of geography

Computer Vision

Computer Vision is a field of artificial intelligence (AI) that uses machine learning and neural networks to teach computers and systems to derive meaningful information from images.



Computer Vision in Wildlife Conservation



Dataset

Birds 525 SPECIES - Kaggle

- 84635 training images
- 2625 test images
- 2625 validation images

across 525 bird species.

*images sourced from Google

Data dictionary

labels: bird species associated with the image file

scientific label: scientific name for the bird species

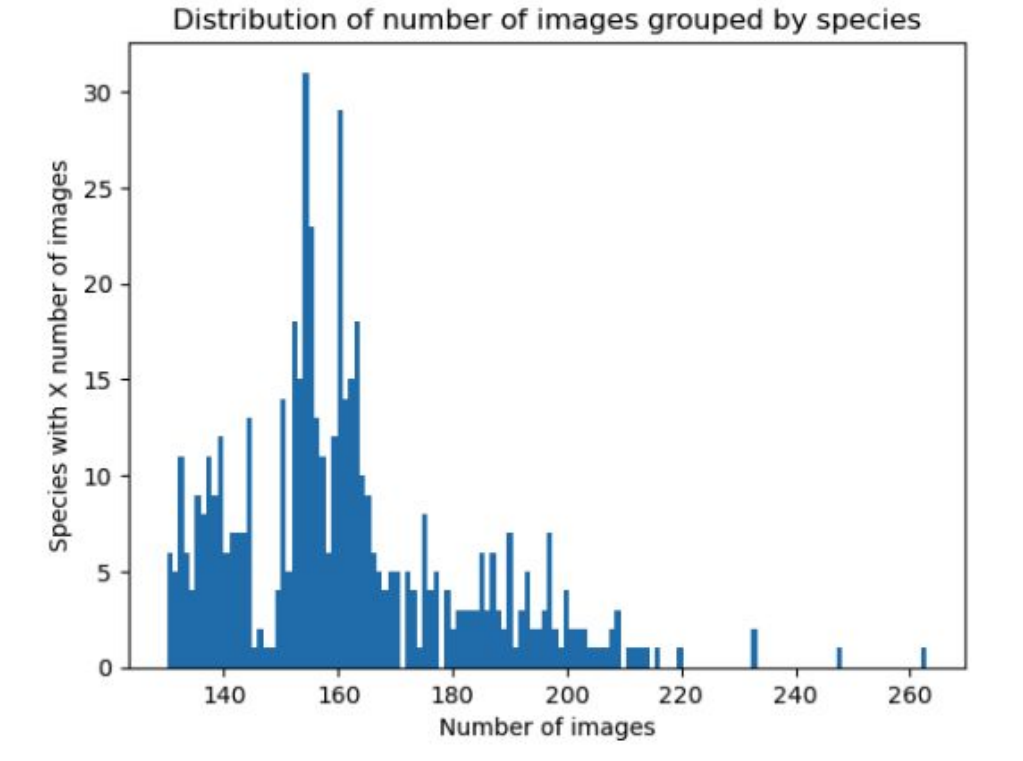
filepaths: the relative file path to an image file

data set: which dataset (train, test or valid) the image filepath belongs to

class_id: the class index value associated with the image file's class

	class id	filepaths	labels	data set	scientific name
0	0.0	train/ABBOTTS BABBLER/001.jpg	ABBOTTS BABBLER	train	MALACOCINCLA ABBOTTI
1	0.0	train/ABBOTTS BABBLER/007.jpg	ABBOTTS BABBLER	train	MALACOCINCLA ABBOTTI
2	0.0	train/ABBOTTS BABBLER/008.jpg	ABBOTTS BABBLER	train	MALACOCINCLA ABBOTTI
3	0.0	train/ABBOTTS BABBLER/009.jpg	ABBOTTS BABBLER	train	MALACOCINCLA ABBOTTI
4	0.0	train/ABBOTTS BABBLER/002.jpg	ABBOTTS BABBLER	train	MALACOCINCLA ABBOTTI

EDA: Data attributes



African crowned crane:
4 randomly selected images



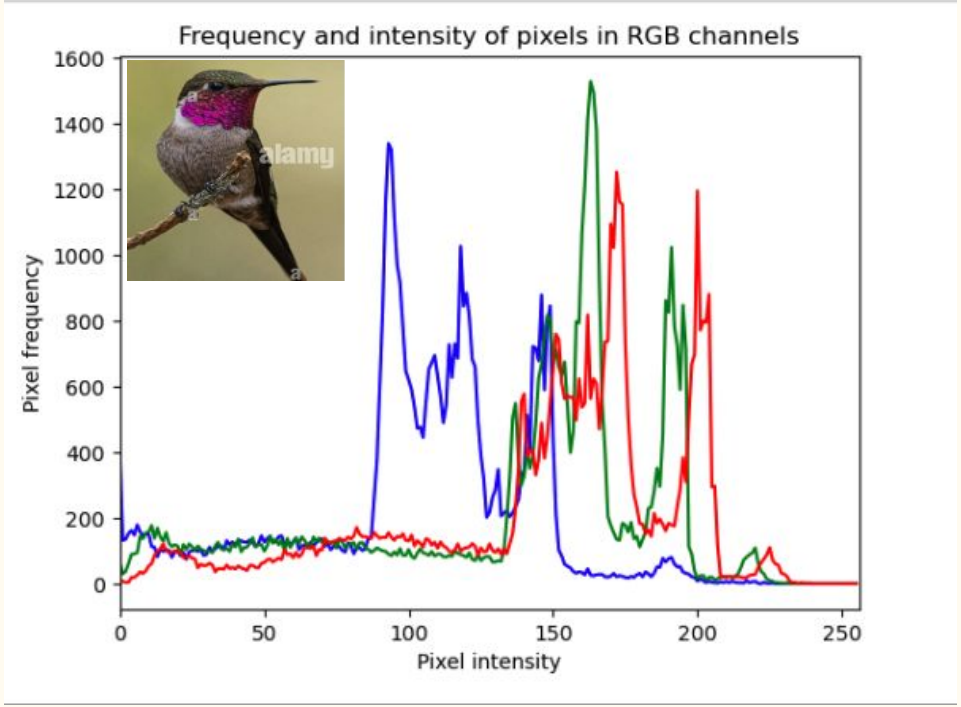

concerns: not enough data, male/female visual differences, many similar species

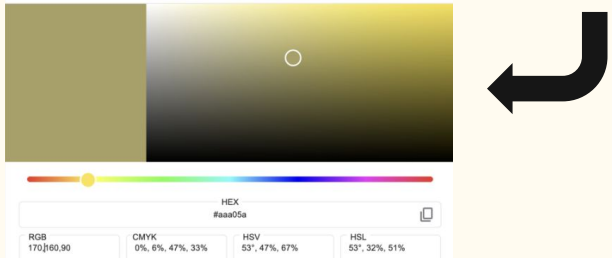
EDA: Plotting image data

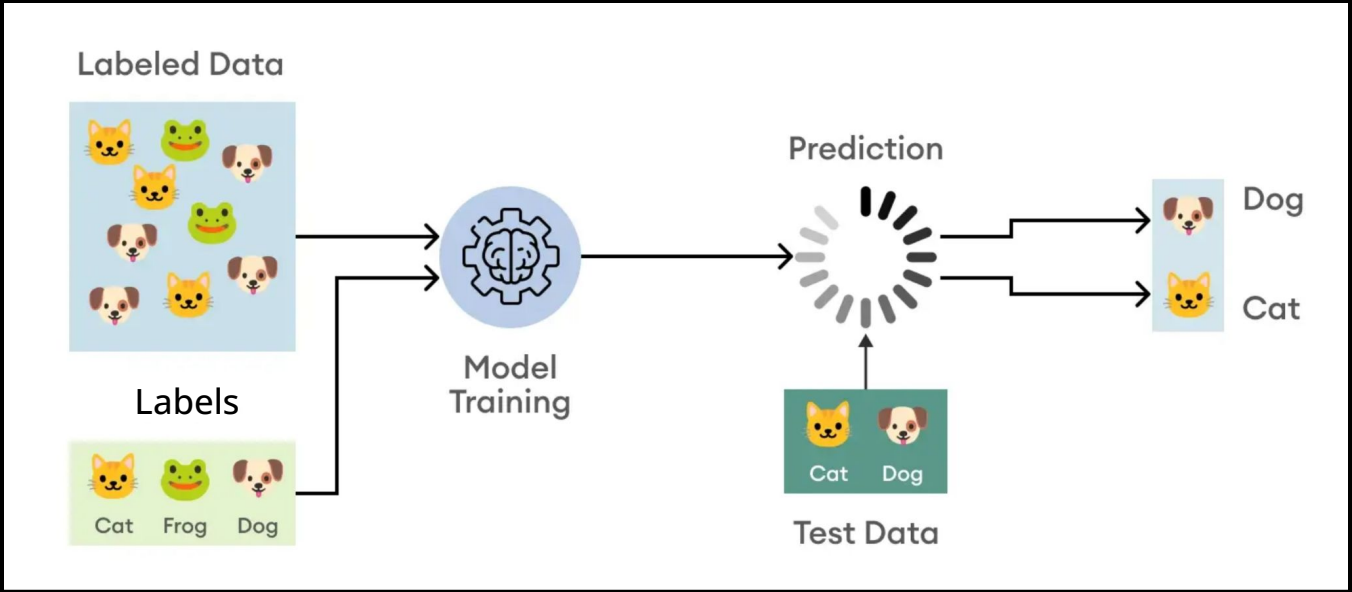
Each pixel is made up of three channels: R, G, B

<u>X-axis:</u>
Brightness of the pixel
0 → Black | 255 → White

<u>Y-axis:</u>
How often a pixel occurs in the image. A higher peak means more of that RGB channel.







The impact: more data, higher quality data, reduce load on conservation scientists; collect data for difficult geographies, developing countries

Next steps

Process all images as RGB channel histograms

Do baseline Logistic Regression model to categorize birds into species
- using degree of variance from mean values for RGB histograms

Denoising using CNN

Feature Engineering on Image Data For Higher Accuracy
- cropping, grayscalling, intensity thresholds, edge detection, colour filters

Clustering
- group images by similarity, compare across species

Neural Network and Deep Learning
- test more robust models

Iterate, check accuracy, iterate again

Access another dataset about endangered status, migration or population data