Classifying Bird Calls Using a CNN

Ralph Lippert

Barn Swallow
Hirundo rustica[2]

What's at Stake

10,000 Species
50 birds / person

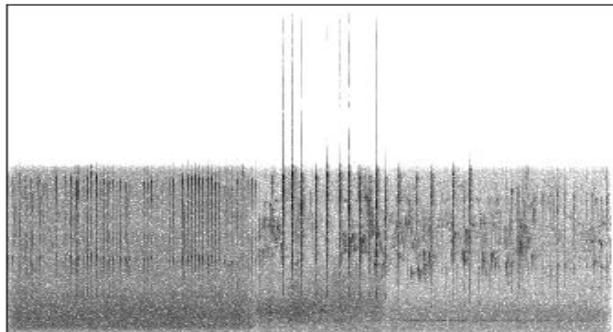Red Crossbill
Loxia Curvirostra[3]
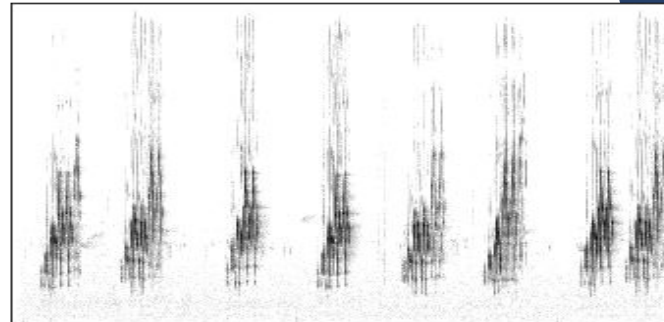
Avian Elusiveness
Solution: Audio Analysis

Hz

Time

Great Spotted Woodpecker
Dendrocopos Major

Hz

Time

Swainson's Thrush
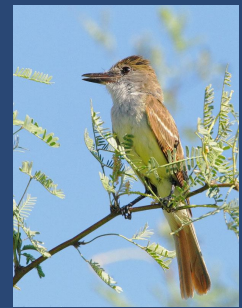Catharus ustulatus

Gathering Data
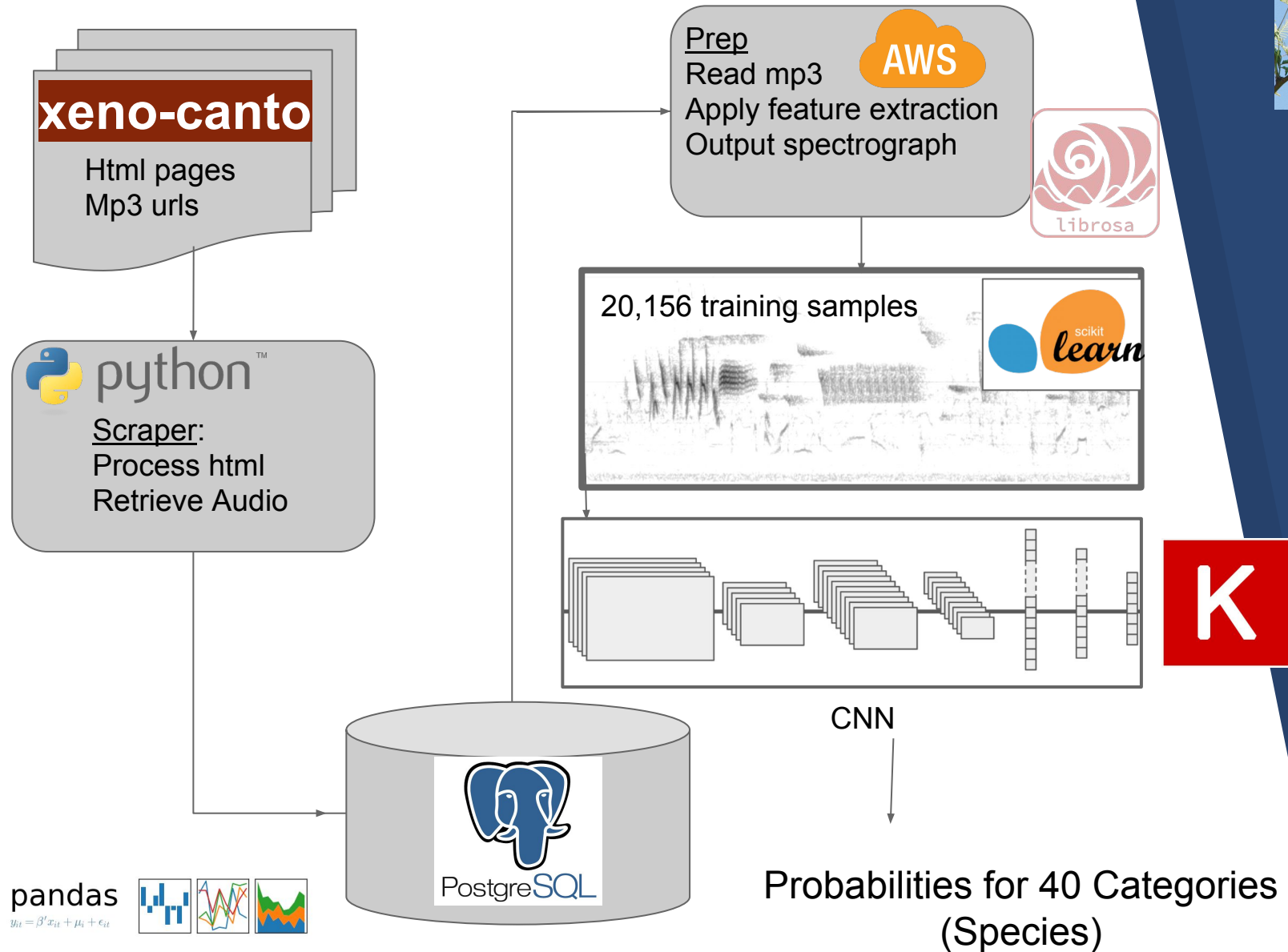
33,596 Samples

85 Gigabytes

570 hours of Audio
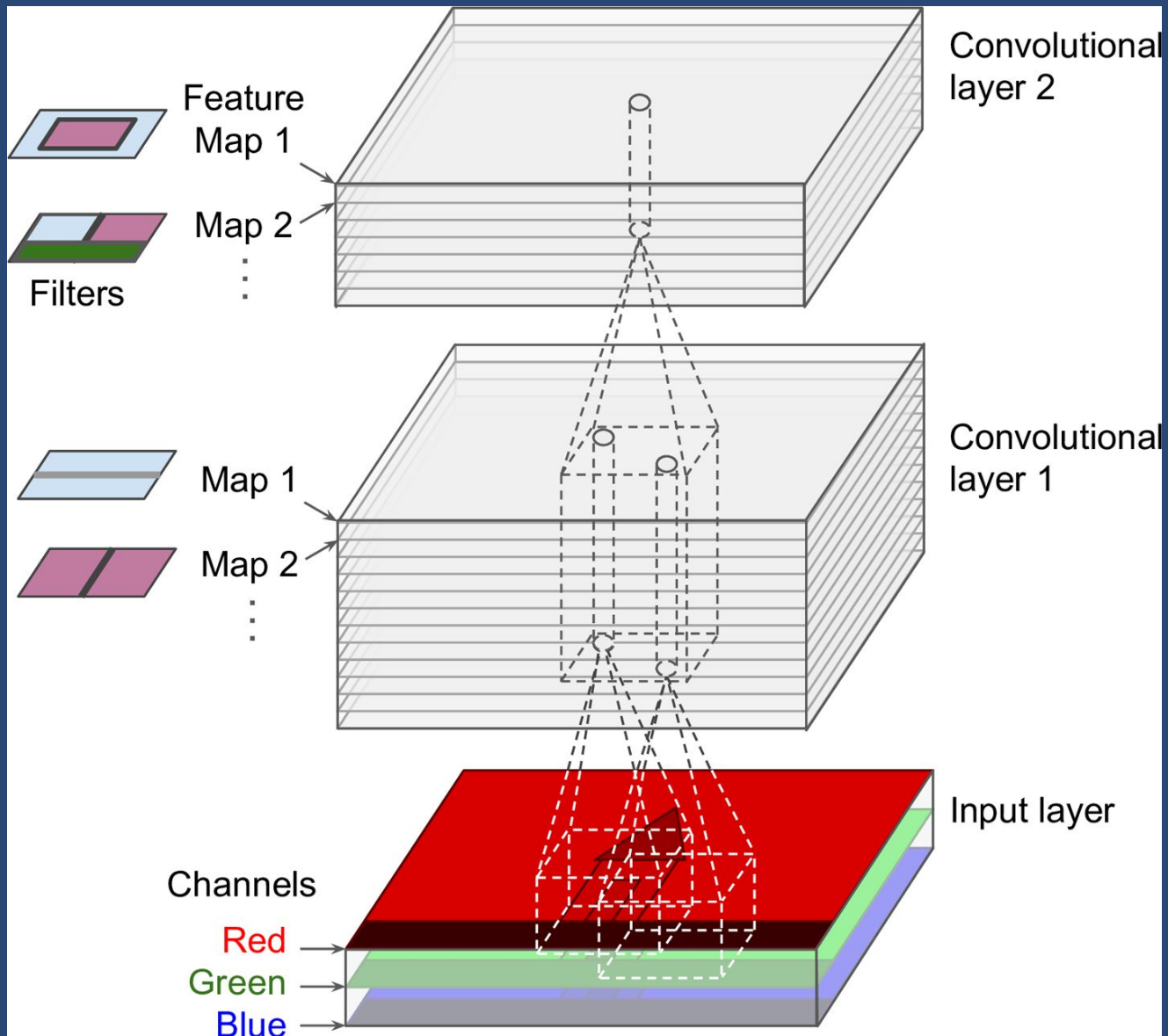
336 Hours possible project

Fox Sparrow
Passerella iliaca

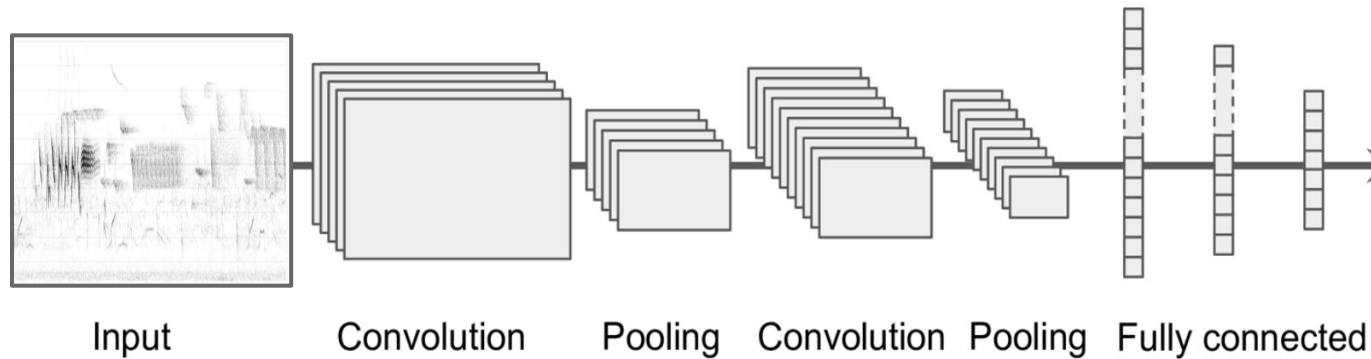# Data Flow / Tech Stack

Convolutional Neural Network Overview

PReLU Activation

Has learning rate but is not a hyperparameter

Parametric ReLU activation function

CNN Classifier

Input → Convolution → Pooling → Convolution → Pooling → Fully connected
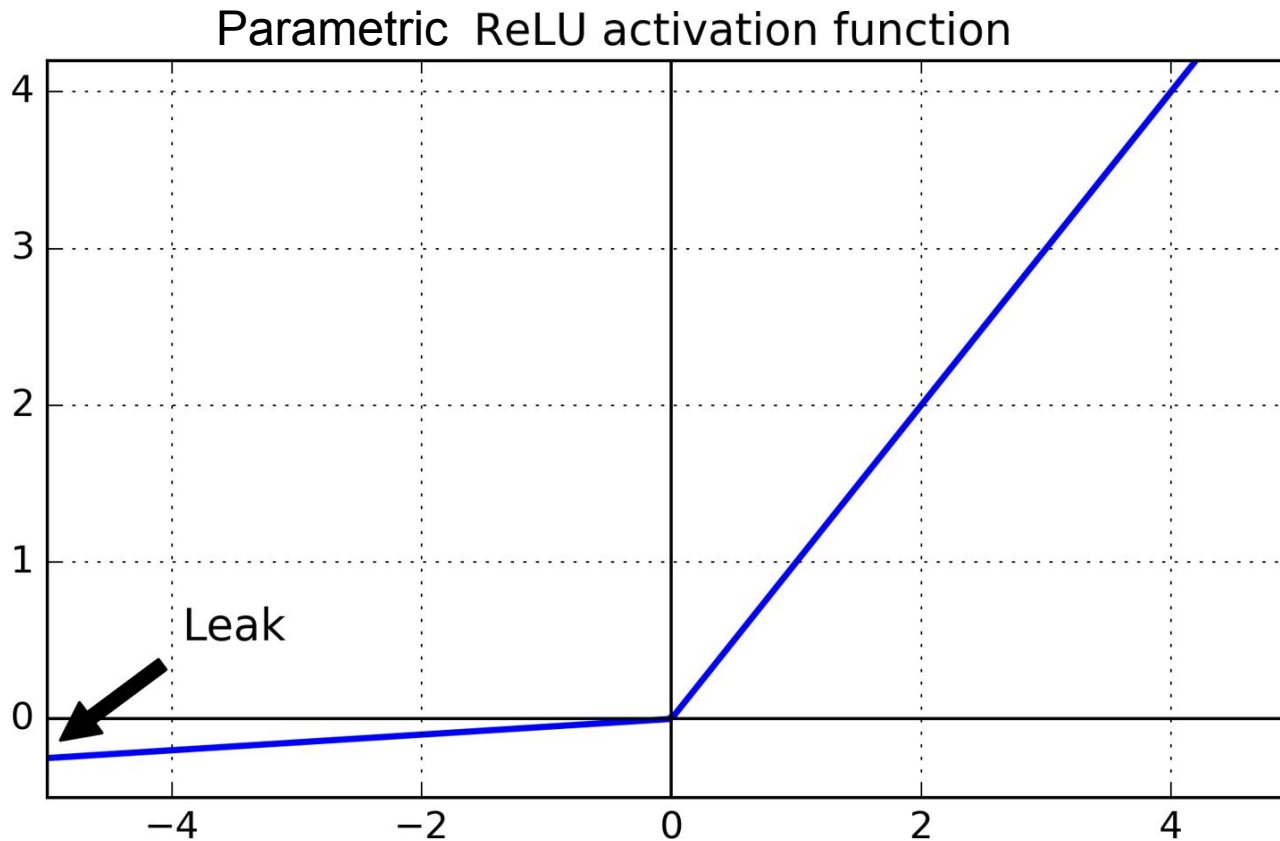
American Robin: 0.04511
Barn Swallow: 0.01147
Bewick's Wren: 0.00331
Black Headed Gull: 0.01477
Blackish Tapaculo: 0.00676
Bluethroat: 0.01451
Brn Crested Flycatcher: 0.0251
Common Blackbird: 0.01116
Common Chaffinch: 0.18940**
Common Cuckoo: 0.01387
...
Spotted Towhee: 0.01018
Swainson's Thrush: 0.00586
Tree Pipit: 0.02388
White Wagtail: 0.00135
Willow Warbler: 0.00108
Wood Warbler: 0.03100

	Accuracy	13,438 validation samples 40 classes
Guess	2.5%	Amatuer birder about 5%
CNN	**63.5%**	25x better than guessing 13x better than amatuer birder

Future

Great Horned Owl
Bubo virginianus

- Smartphone App.

- Web site for inputting bird calls.

- Apply all new inputs to updating model and database .

- Improving accuracy of model.

📌 Questions?

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github.com/lippertr/bird-call-classifier

linkedin/in/ralphlippert

CREDITS

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