# IMAGE CLASSIFICATION: CLASSIFYING DIFFERENT TYPES OF SPECIES

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# *INTRODUCTION*

## Dataset

*Inaturalist 2017 and 2018*

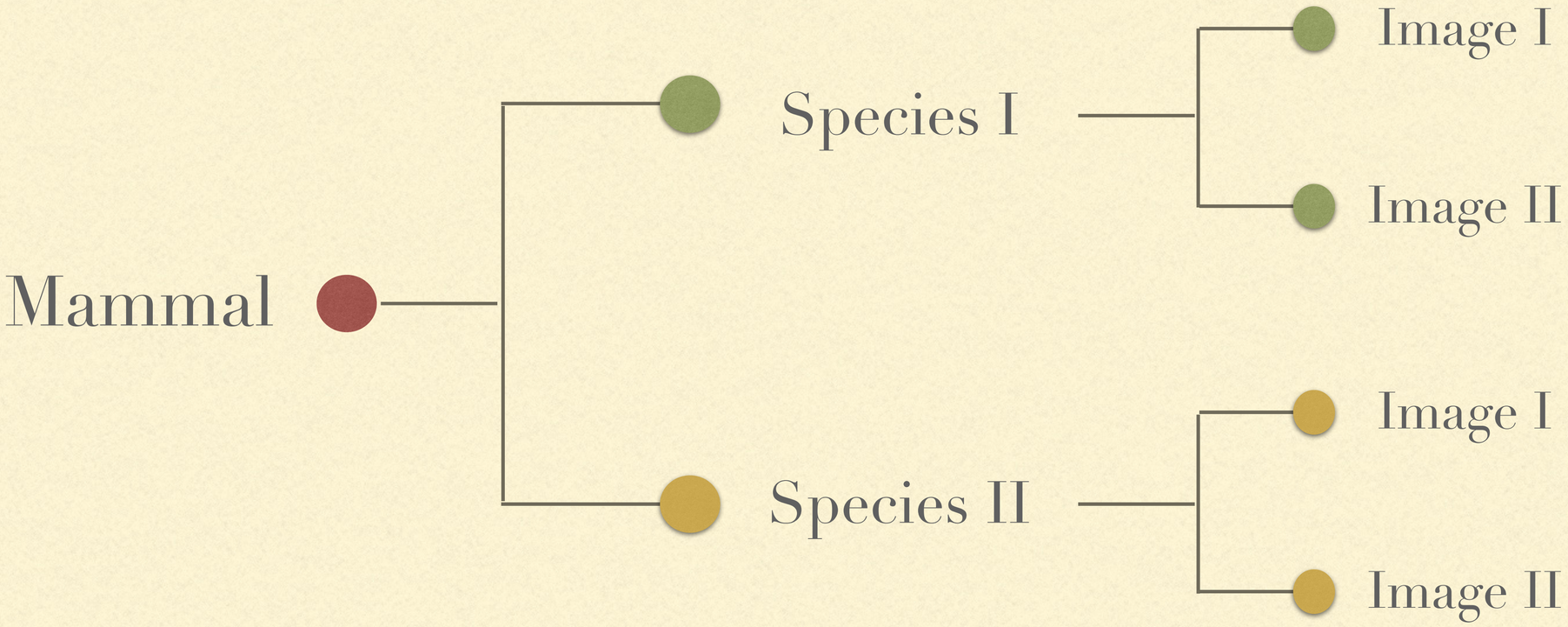
Entire Training Set: 7,655
Entire Testing Set: 5, 396

Number of Class in Entire Training Set: 42
Number of Classes in Entire Testing Set: 61

Subset of Training Data: 519
Subset Testing Data: 349

Number of Class in Training Subset: 4
Number of Classes in Testing Subset: 4

# *DATASET OVERVIEW*



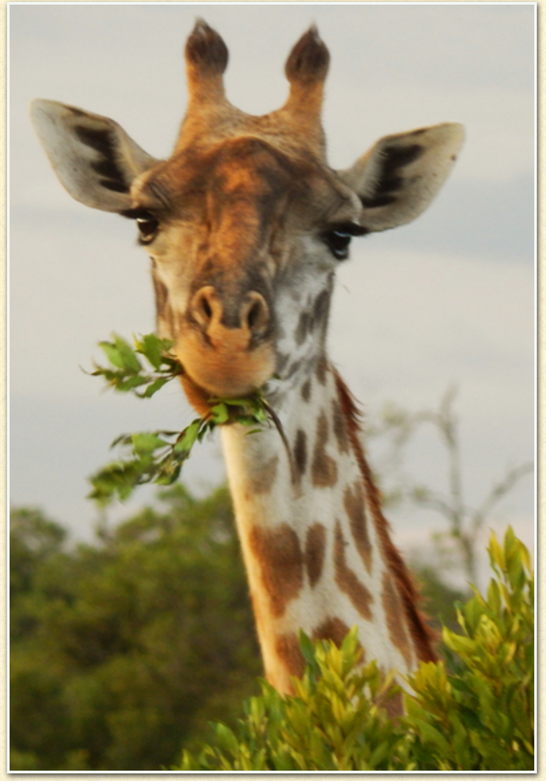
# *ANIMAL CLASSIFICATION*

## Mammals

- Cheetah
- Antelope
- Coyote
- Zebra
- Peccary
- Hippopotamus
- Giraffe

## Birds

- Chachalaca
- Great Curassow
- Western Yellow Wagtail
- Limpkin
- Crested Guan
- Ostrich
- Swainson's Thrush



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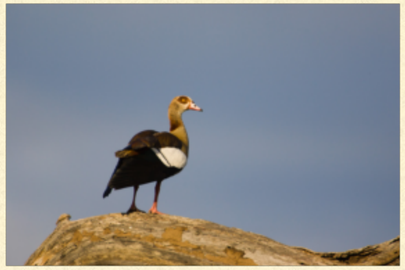
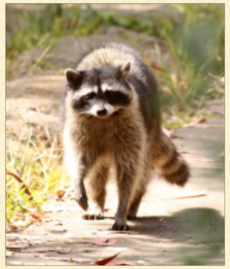
Train Images

Test Images



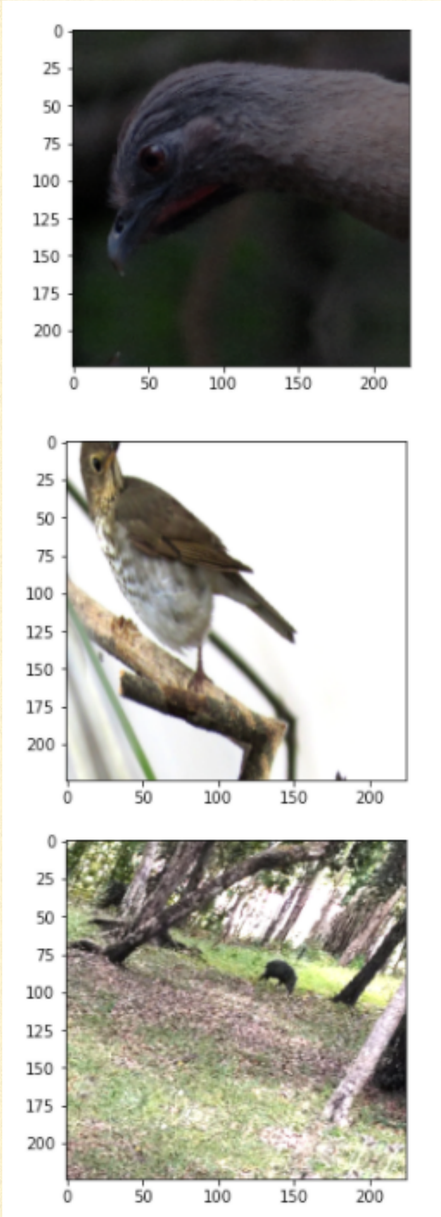


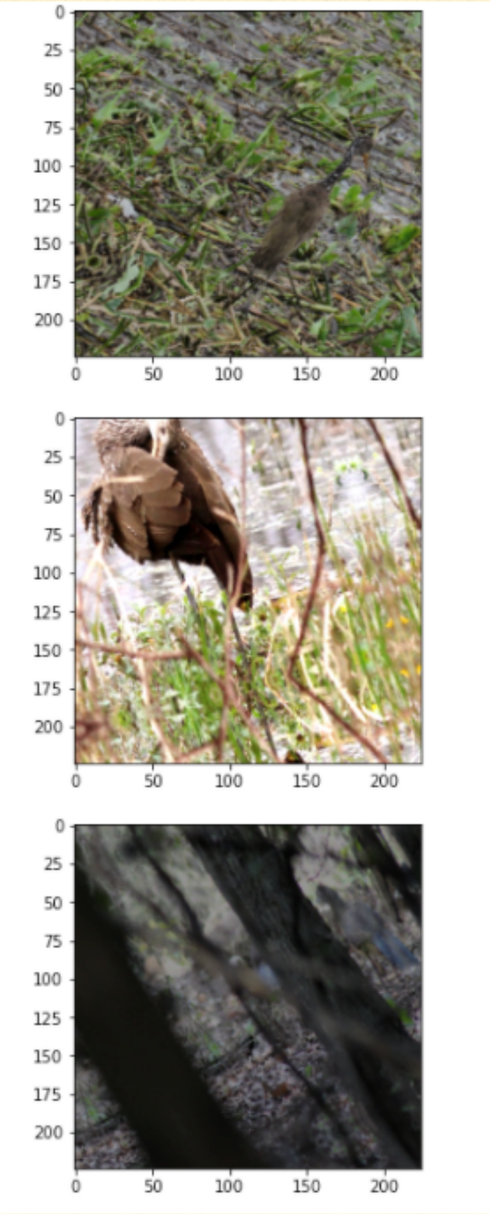
# *IMAGE PROCESSING*

01 - Import Image Data Generator

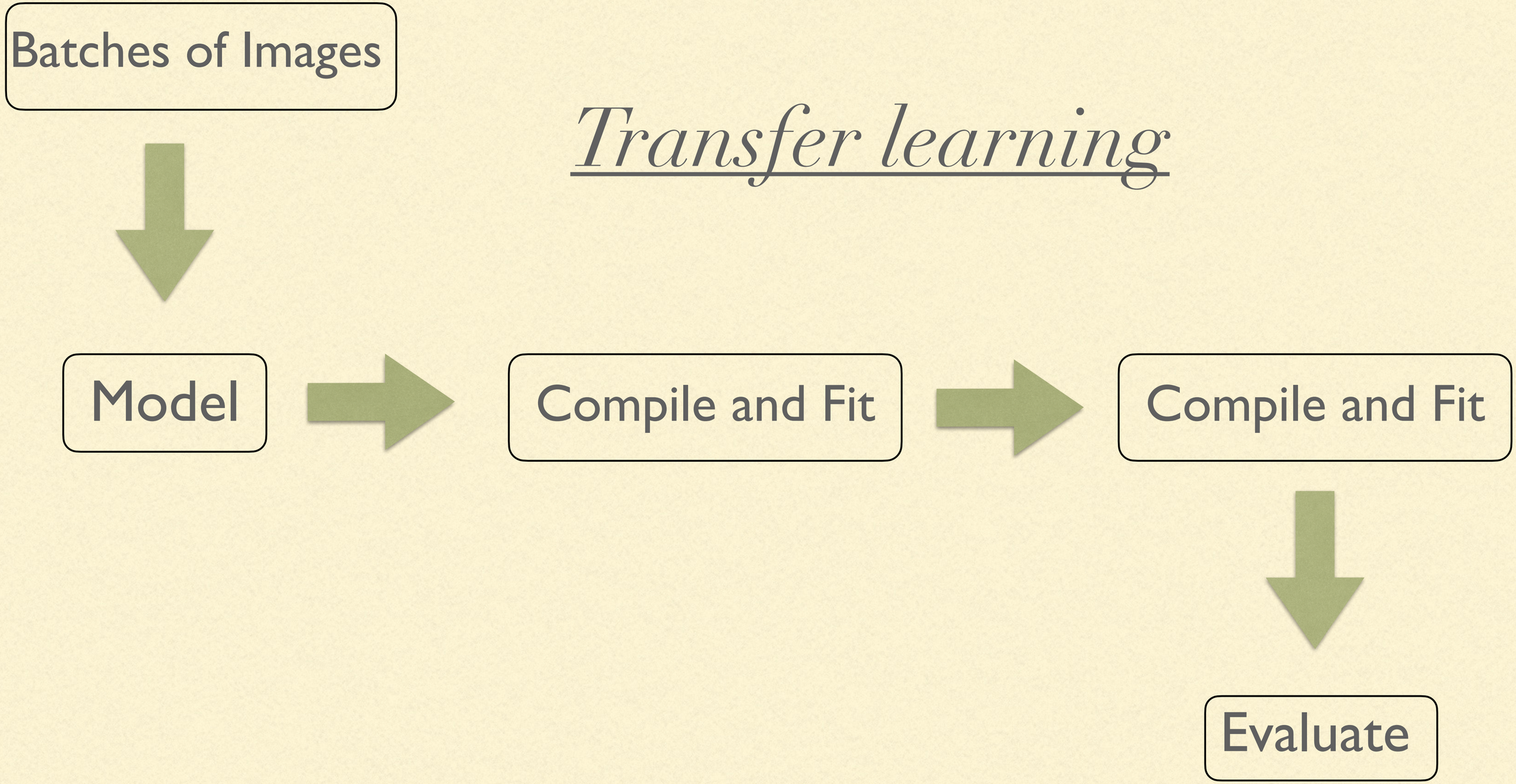
02 - Create separate generators for training and testing sets

03 - Load images using flow from data frame



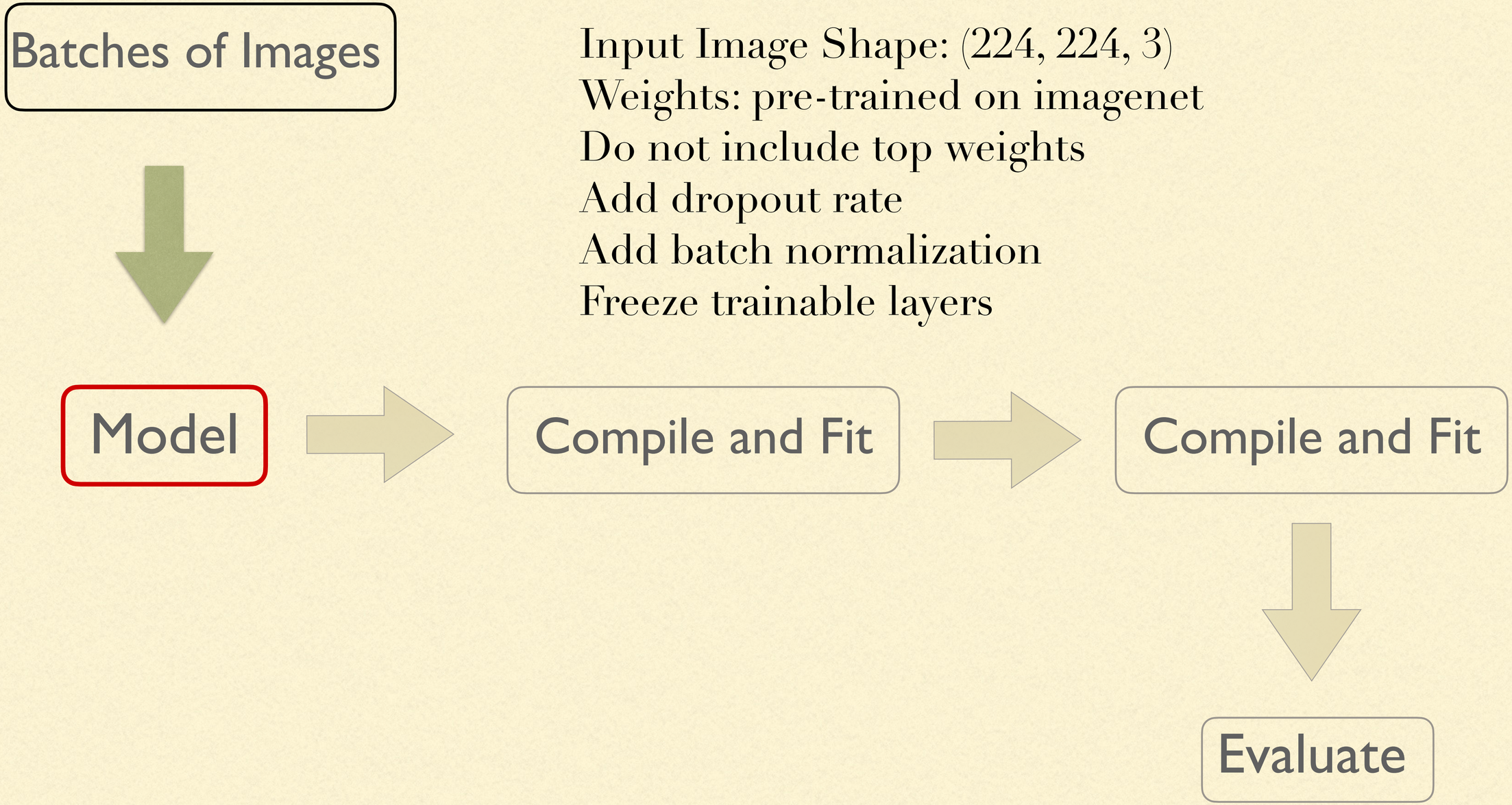


# *Transfer learning*



# EfficientNet B0

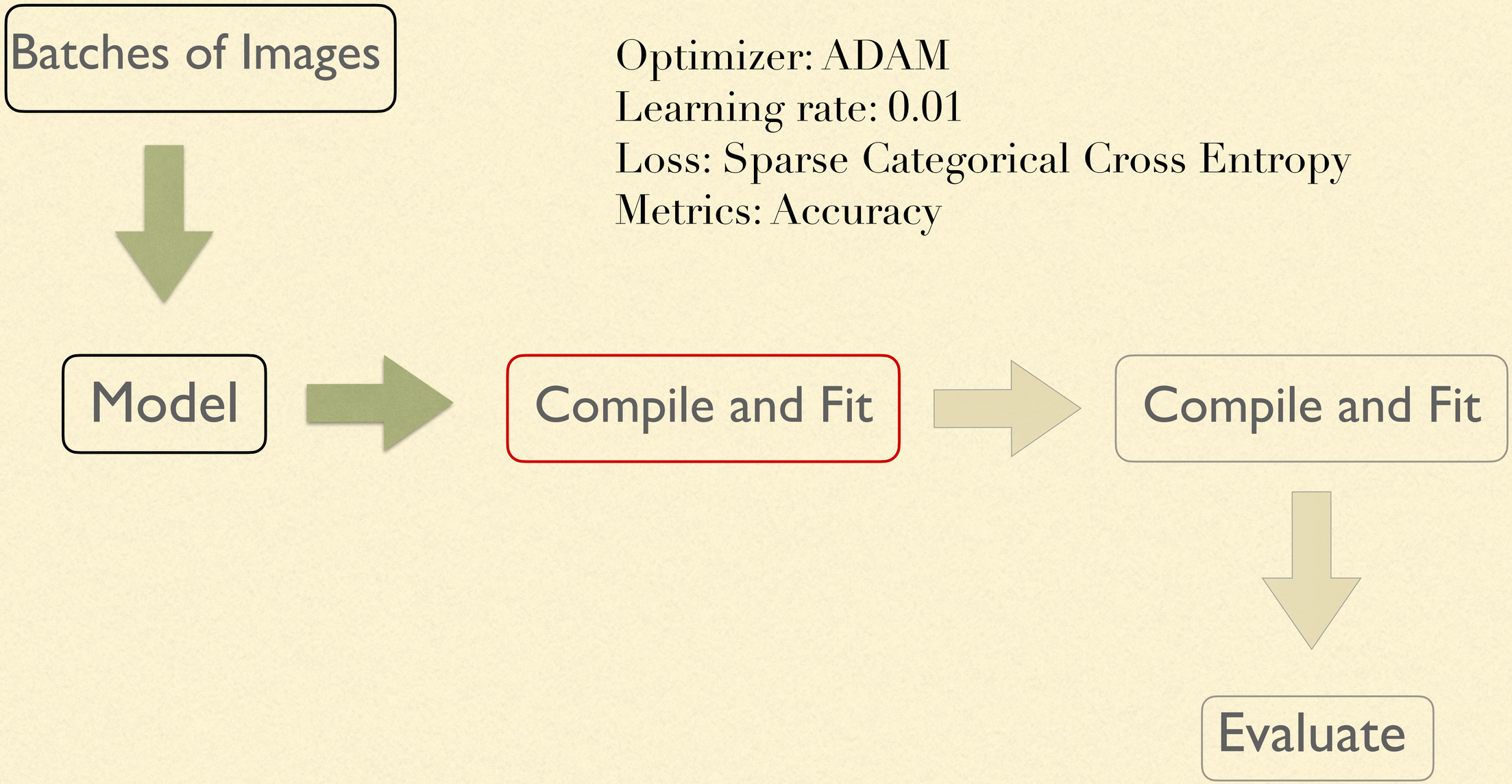
Input Image Shape: (224, 224, 3)
Weights: pre-trained on imagenet
Do not include top weights
Add dropout rate
Add batch normalization
Freeze trainable layers

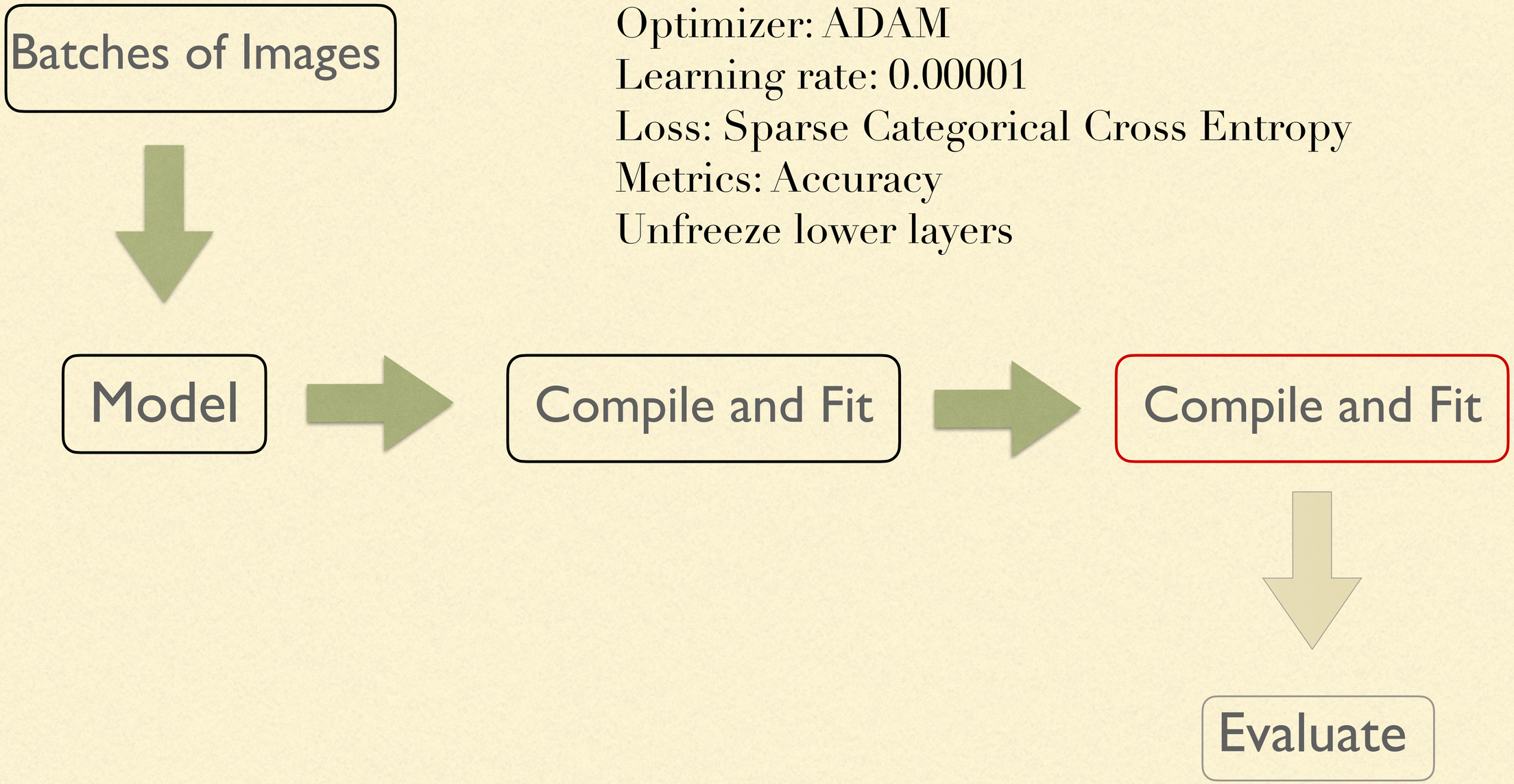


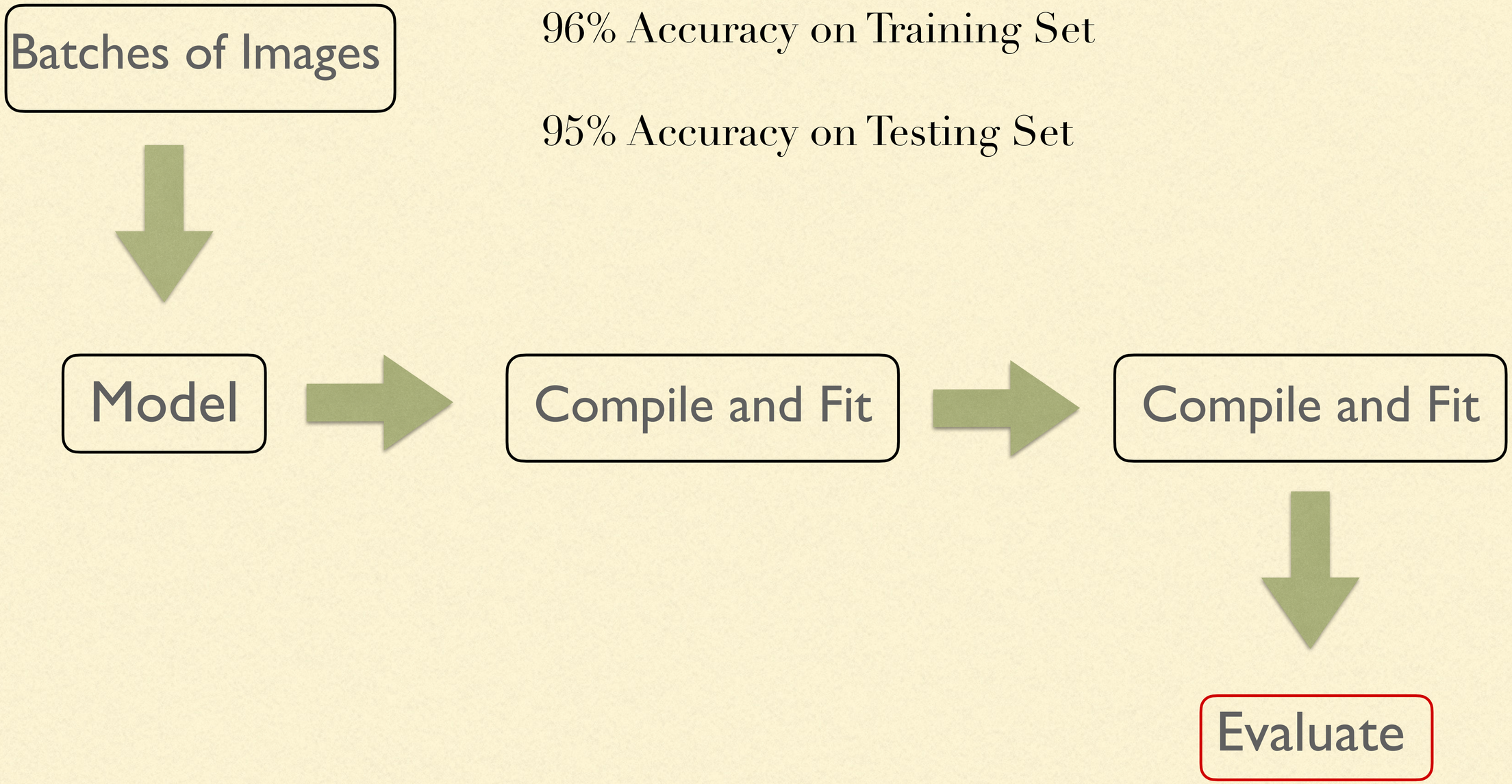
Batches of Images

```
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
efficientnetb0 (Functional)  (None, 1280)              4049571
_________________________________________________________________
batch_normalization_1 (Batch (None, 1280)              5120
_________________________________________________________________
dense_1 (Dense)              (None, 4)                 5124
=================================================================
Total params: 4,059,815
Trainable params: 7,684
Non-trainable params: 4,052,131
```

Model → Compile and Fit → Compile and Fit → Evaluate


Batches of Images
Optimizer: ADAM
Learning rate: 0.01
Loss: Sparse Categorical Cross Entropy
Metrics: Accuracy
Model
Compile and Fit
Compile and Fit
Evaluate


Batches of Images
Optimizer: ADAM
Learning rate: 0.00001
Loss: Sparse Categorical Cross Entropy
Metrics: Accuracy
Unfreeze lower layers
Model
Compile and Fit
Compile and Fit
Evaluate


Batches of Images
96% Accuracy on Training Set
95% Accuracy on Testing Set
Model
Compile and Fit
Compile and Fit
Evaluate

# *INCORRECT PREDICTIONS*

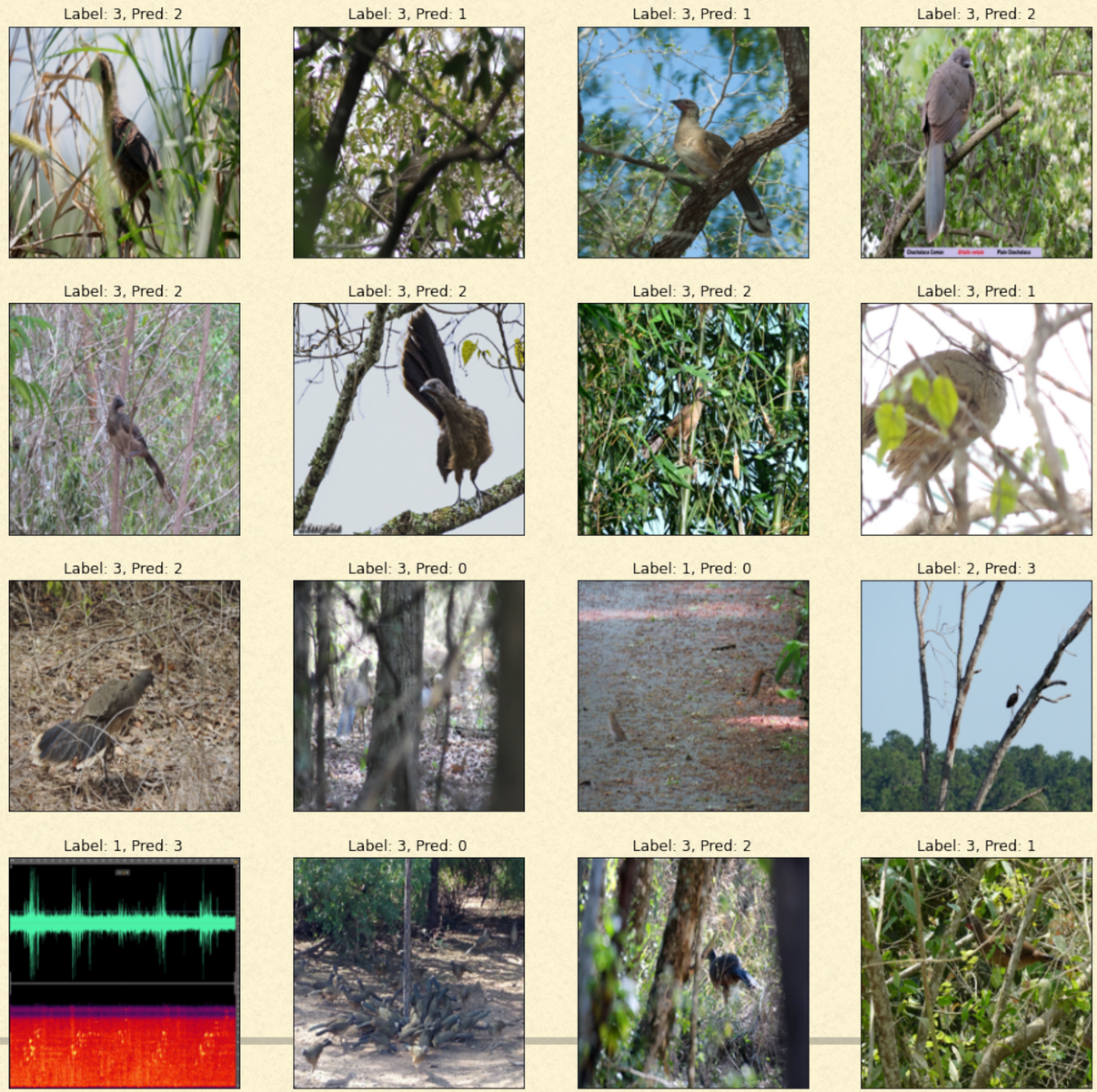
Class 0: Peccary

Class 1: Swainson's Thrush

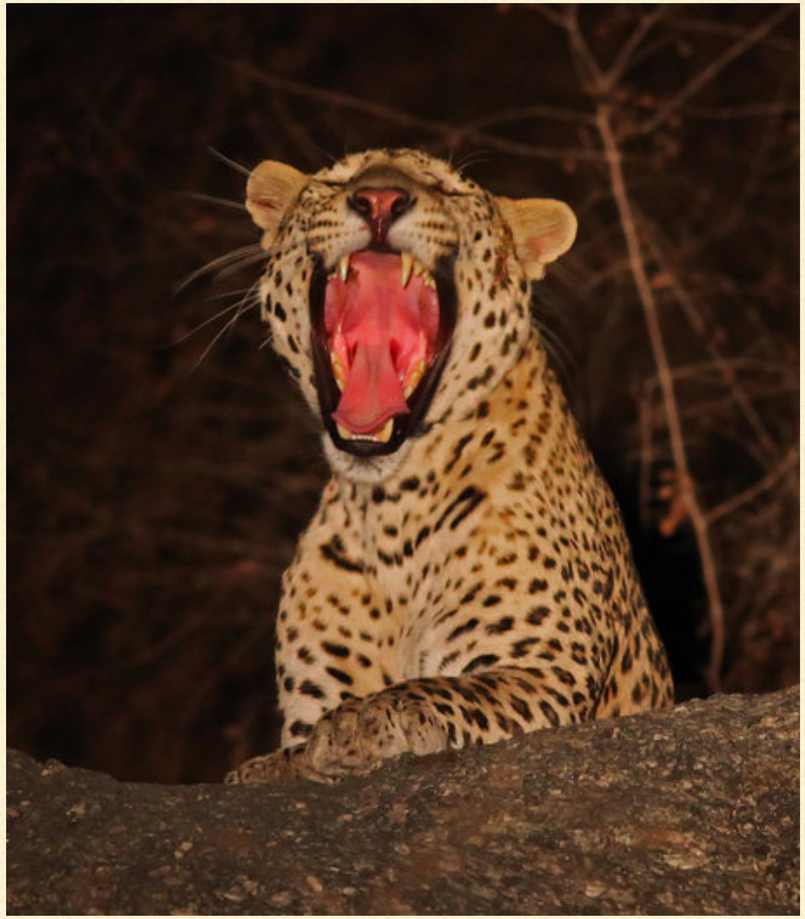
Class 2: Limpkin

Class 3: Chachalaca

Class 0: All images correctly predicted
Class 1: Two incorrect predictions
Class 2: One incorrect predictions
Class 3: 13 incorrect predictions



# *CONCLUSION*



To make this model better I could remove the images that aren't animals.

I can use AWS to scale up this model and train all of the images.