Dog Breed Identification

CSYE 7200 Final Project Team 10

Xin Wen, Shaowen Cui

Goals

- This app aims at helping users to identify dog's breed based on their uploaded image;
- System would list the top three most possible breeds for that dog, according to dog's face inside image;
- System could also detect human faces within the images and mark them out;
- This system would be useful for classifying photos into categories based on different breeds of dog.

Use Case

General users:

By uploading image to app, they can

- **Identify Dog's Breed:** app will help identify image with dog and give Top 3 guesses of dog's breed along with probability.
- **Recognize Human Face:** app can also mark all human faces inside the image.

Business users:

By sending large amount of photos, they can

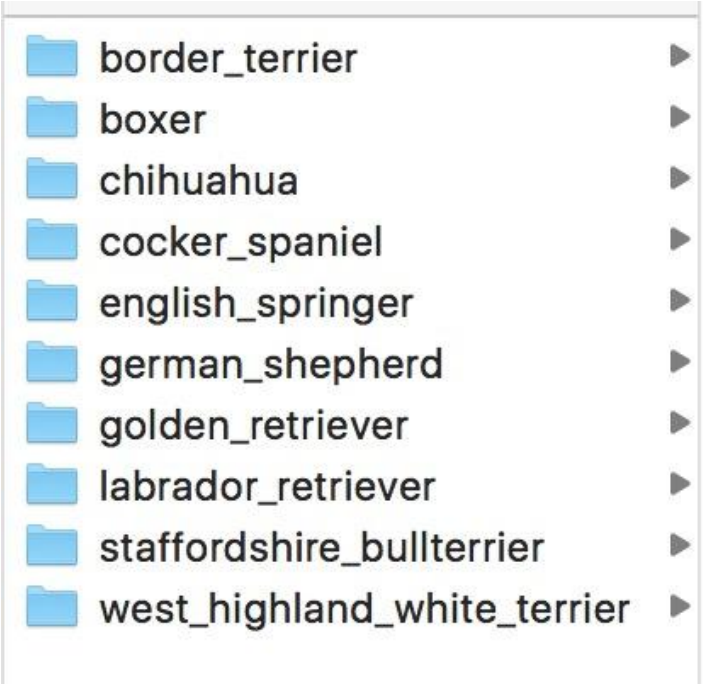
- **Classify Images:** app can differentiate images according to dog’s breed and classify the images into categories.

Methodology

- **Data Preprocessing:** OpenCV -- Mat, Grey Scale, Equalize Histogram
- **Model Re-Training:** CNN (Convolutional Neural Network) using Transfer Learning
- **Dog Breed Identification**: CNN (Convolutional Neural Network) based on retrained Inception-V3 Model

Data Source

- Mainly from Kaggle's competition -- "Dog Breed Identification"; including training dataset (1,000+ images) https://www.kaggle.com/c/dog-breed-identification/data
- Additional data sources would come from several pets websites. eg: http://www.akc.org/dog-breeds/



Criteria

- The Possibility of getting correct breed of dog within 3 guess >= 60%

Actual: 98% (test: 1000+ images)

- The Precision of human face recognition >= 90%

Actual: 91% (test: 200+ images)

- and the Recall of human face recognition >= 85%

Actual: 86% (test: 200+ images)

Output-Example

Label1

(golden retriever,0.948752)

Label2

(labrador retriever,0.021431418)

Label3

(cocker spaniel,0.010588616)

Program

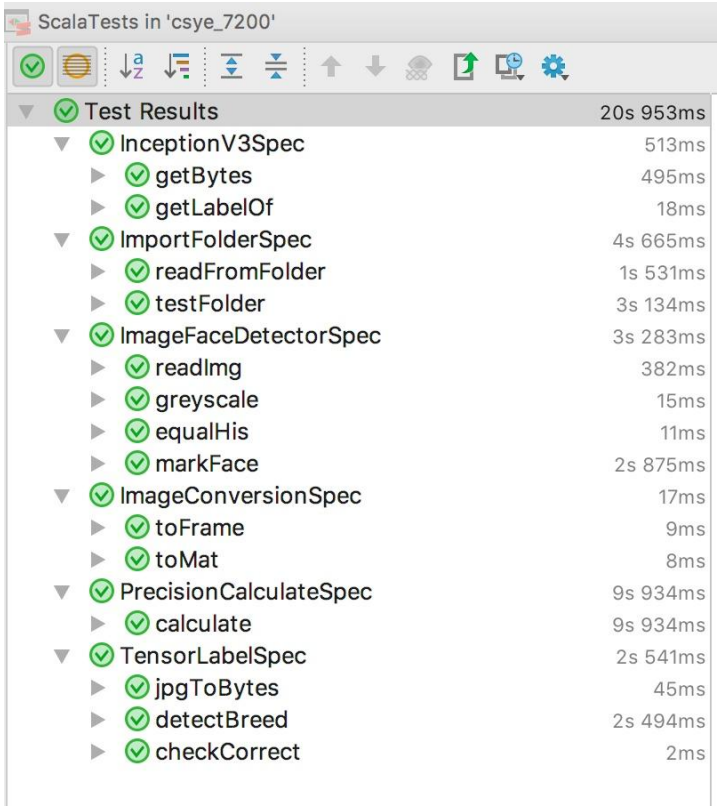
&

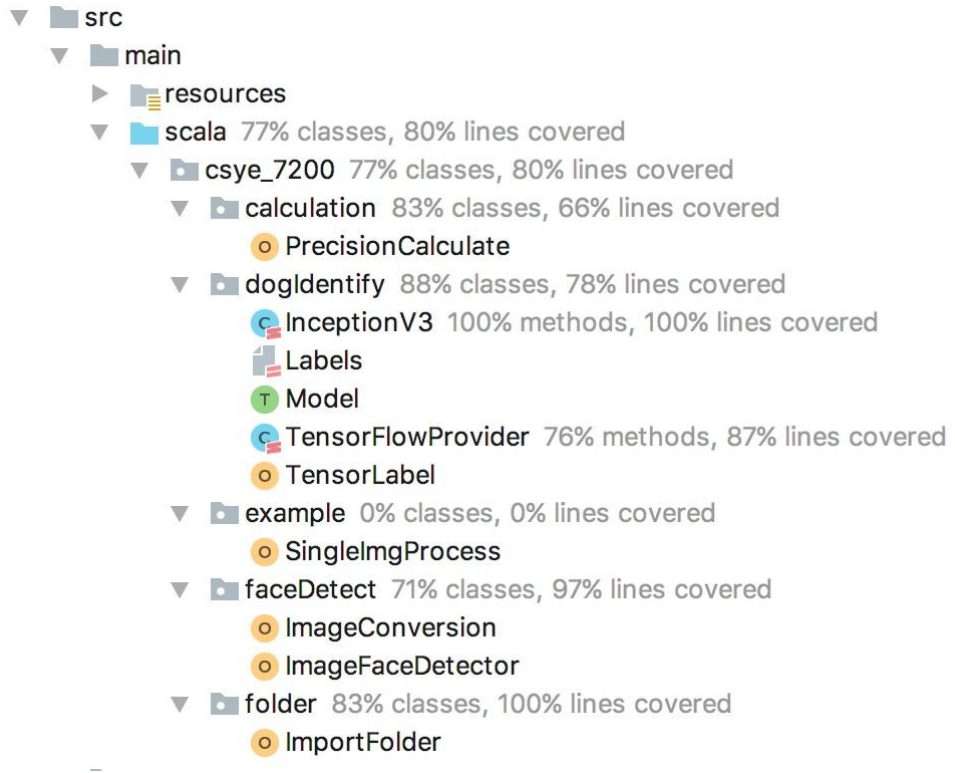
Repository

- **Programming in Scala:**
  - Data ingestion and preprocessing
  - Facial detection
  - Dog Breed Identification

- https://github.com/cicioutofspace/CSYE7200_FinalProject

Unit Test


ScalaTests in 'csye_7200'
Test Results 20s 953ms
InceptionV3Spec 513ms
getBytes 495ms
getLabelOf 18ms
ImportFolderSpec 4s 665ms
readFromFolder 1s 531ms
testFolder 3s 134ms
ImageFaceDetectorSpec 3s 283ms
readImg 382ms
greyscale 15ms
equalHis 11ms
markFace 2s 875ms
ImageConversionSpec 17ms
toFrame 9ms
toMat 8ms
PrecisionCalculateSpec 9s 934ms
calculate 9s 934ms
TensorLabelSpec 2s 541ms
jpgToBytes 45ms
detectBreed 2s 494ms
checkCorrect 2ms


src
main
resources
scala 77% classes, 80% lines covered
csye_7200 77% classes, 80% lines covered
calculation 83% classes, 66% lines covered
PrecisionCalculate
dogIdentify 88% classes, 78% lines covered
InceptionV3 100% methods, 100% lines covered
Labels
Model
TensorFlowProvider 76% methods, 87% lines covered
TensorLabel
example 0% classes, 0% lines covered
SingleImgProcess
faceDetect 71% classes, 97% lines covered
ImageConversion
ImageFaceDetector
folder 83% classes, 100% lines covered
ImportFolder