

OpenDogNet

Dog breed detection app



OPENCLASSROOMS

colab
kaggle

 Android
Studio

Outline

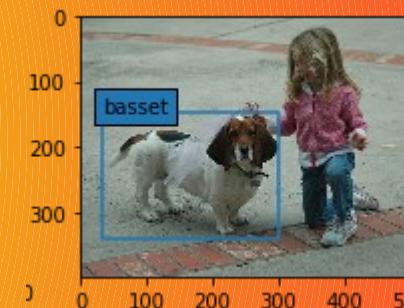
- Introduction
 - Why this app, what do we want to achieve ?
- The theory
 - How does such an app work ?
 - Convolutional neural networks (CNN) : the artificial intelligence (AI) technology powering the breed identification
 - How do I cast a the neural network into a simple intuitive Android app ?
- The practice
 - Let's test it in real life !
- Conclusions
 - does this stuff work or maybe it would be better to get something else even if will cost me money or time watching ads ?

The goal

We use the technology of supervised deep learning to :



- Identify with good accuracy ($P > 80\%$) the breed of a dog on a photo
- Build a small app (< 20 MB) that will make run the AI program on an Android device



All to be done using Open Souce software only, the app will be free of charge and will not display ads

The data

- Where do I get photos etc. ?
- Preprocessing – prepare the data for the AI

The data to train our model

Data Explorer

751.55 MB

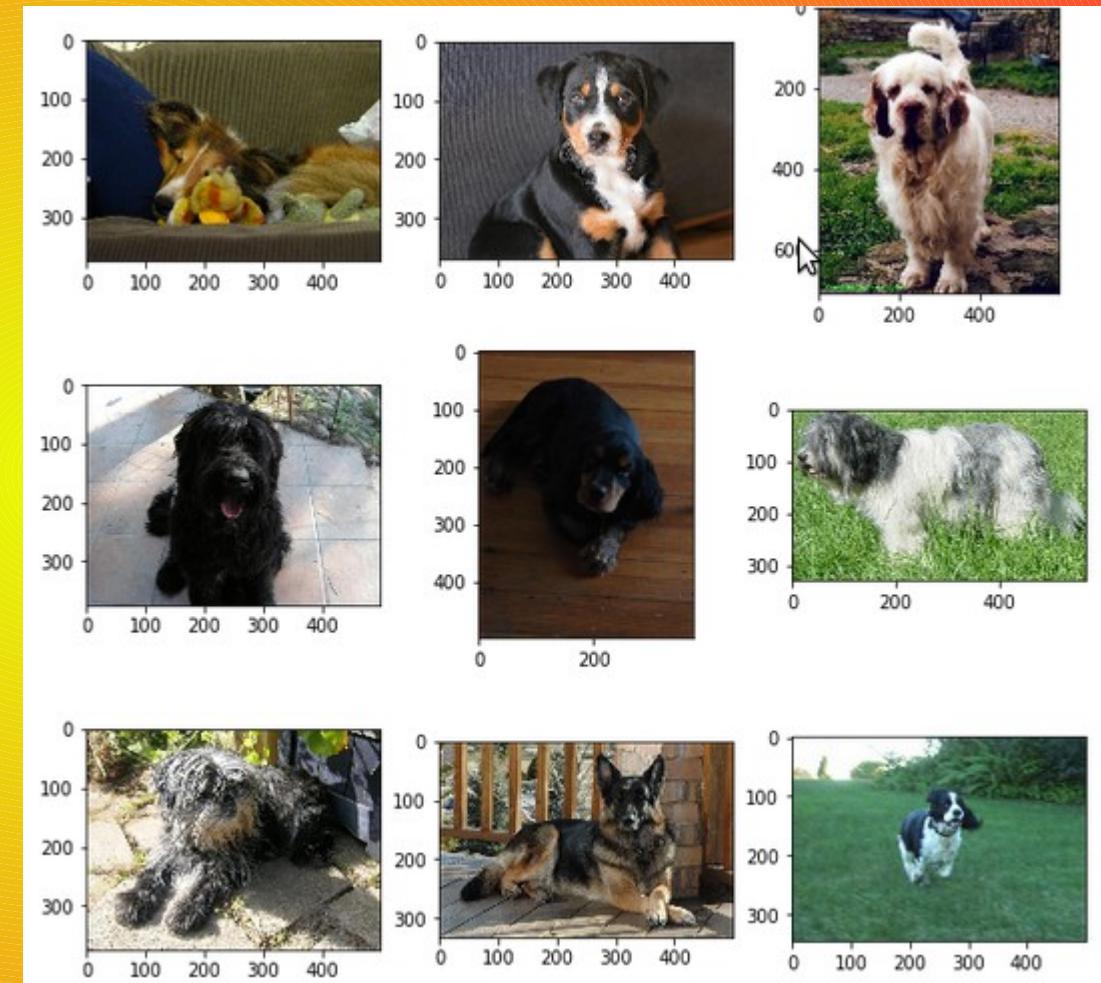
- annotations
- Annotation
- images
- Images

Stanford dogs
dataset

A screenshot of a file explorer interface titled "Data Explorer". It shows a total size of 751.55 MB. Under the "Images" category, there are 120 directories representing different dog breeds. The breeds listed are Chihuahua, Japanese, Shih-Tzu, and Blenheim. Each directory contains a specific number of files, such as 152 for Chihuahua and 214 for Shih-Tzu.

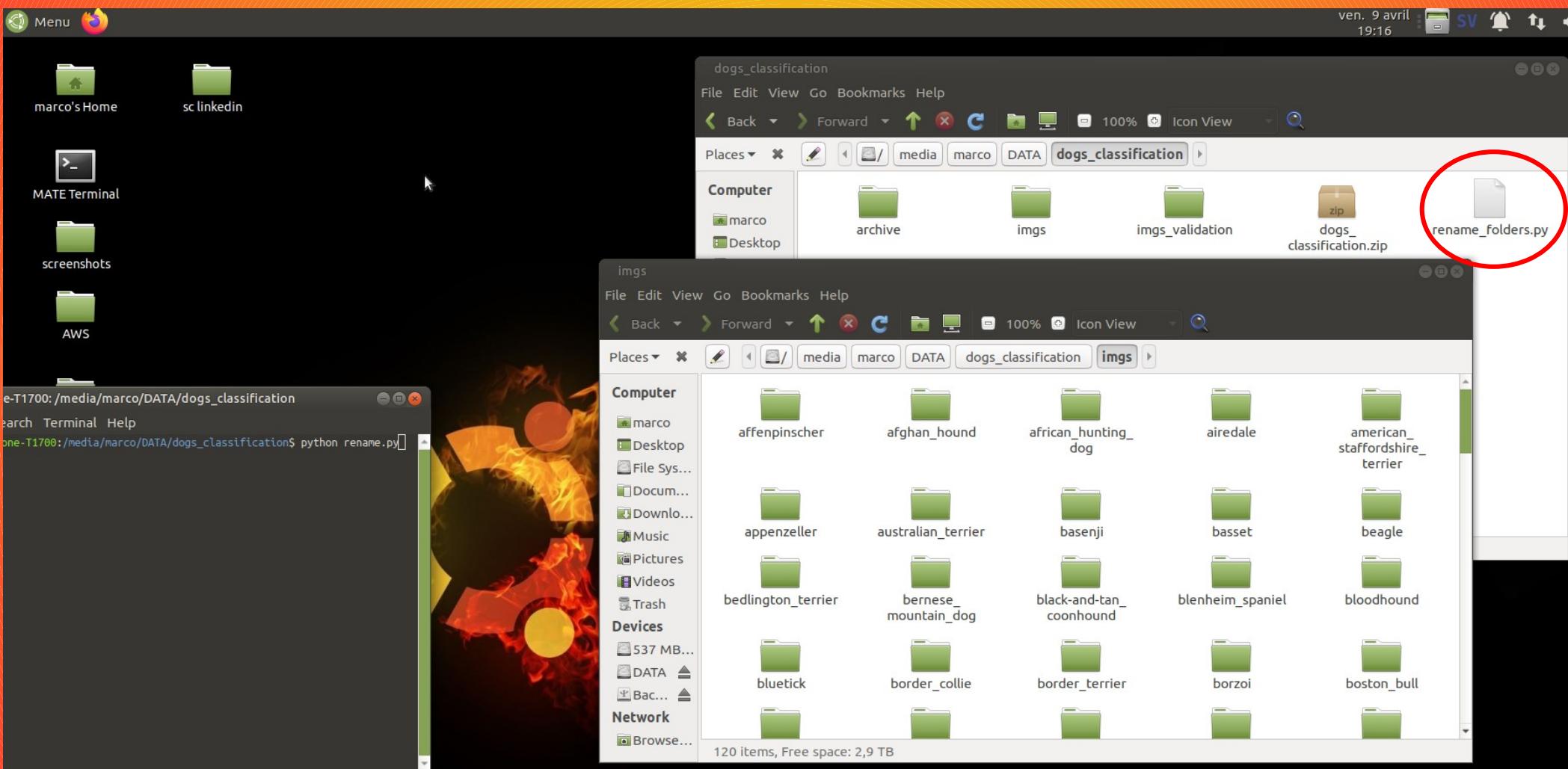
Breed	Number of Files
n02085620-Chihuahua	152 files
n02085782-Japanese...	185 files
n02086240-Shih-Tzu	214 files
n02086646-Blenheim...	188 files

120 folders (one for each breed) containing a total of 20000+ photos
All available for free from Kaggle.com



Data pre-processing

Our algorithm needs labels to understand what a photo corresponds to



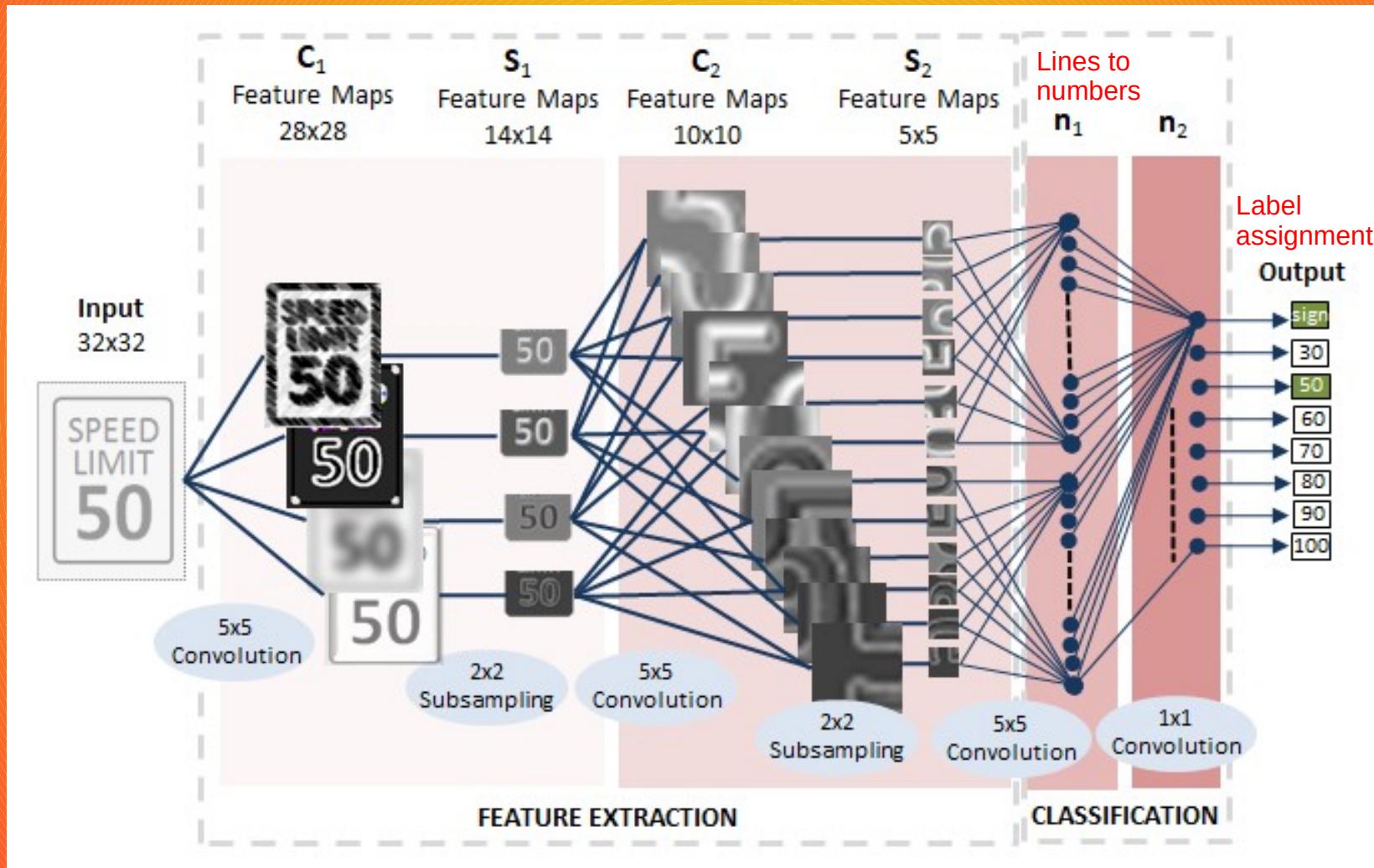
Solution : rename each folder and I state that the folder name is the label for each photo that is inside it

How does it work

- What is deep learning ? What is a CNN ?
- Where do we get the pictures to train our AI?
- How can I build and train a deep learning alghorithm ?
- How do can I deploy the trained AI to an Android app ?

From images to probabilities

Extract edges from the image, identify which edges are most important (neuron weight), pass over to the next layer

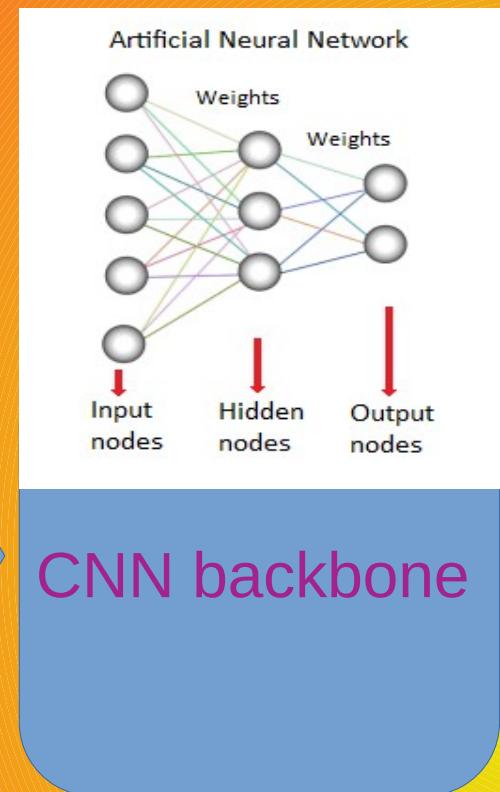


How an AI learns

Input



299 X
299 X
3



flatten

Fully
Connected

Class name	Output	Labels
chihuahua	0.75	1
basset	0.11	0
labrador	0.05	0
kelpie	0.02	0

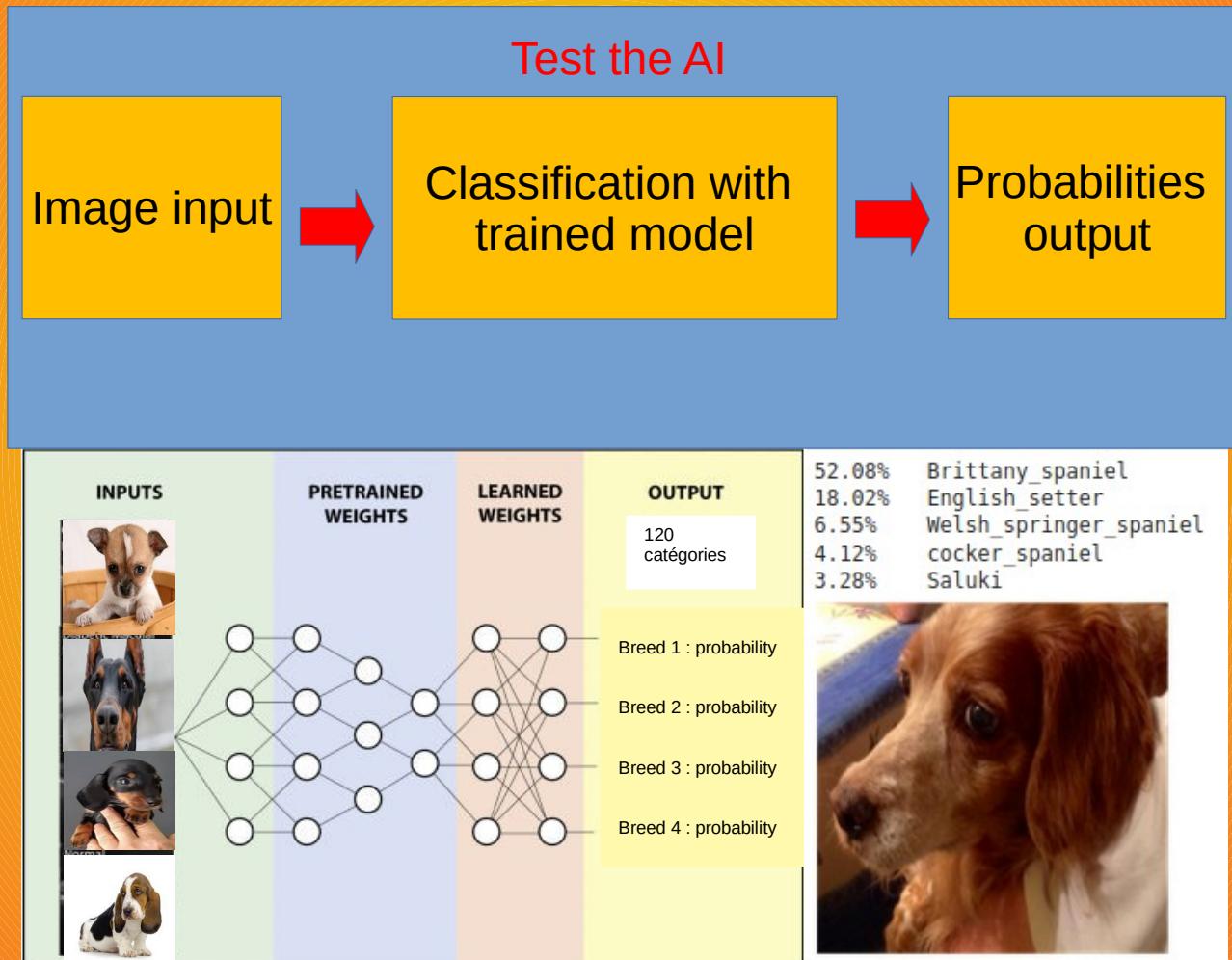
Labels
119 classes = False (0)
1 class = True (1)

Image features selection

Classification

Check output with labels and update weights to have a better match

Deep learning applied to breeds



How do I build an AI



- Program in Python and use already written code (libraries) made for deep learning



- Run the program on a powerful server (cloud computing) so that it processes data much faster than my home PC

Deploy it to Android

- Fully trained
- Precise (85% accuracy)
- Lightweight (<50 MB)
- Works offline

From the PC to the phone

Build the CNN



Train it on dogs photos
(Colabs GPU)

CO

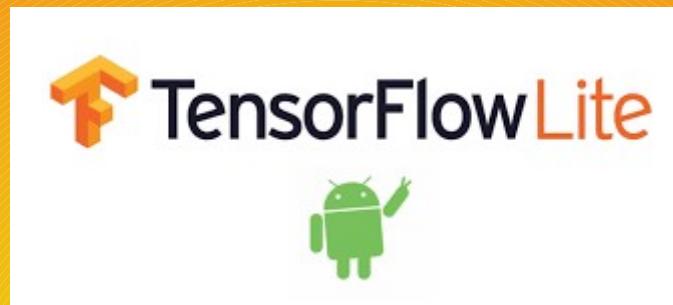


85 %
accuracy

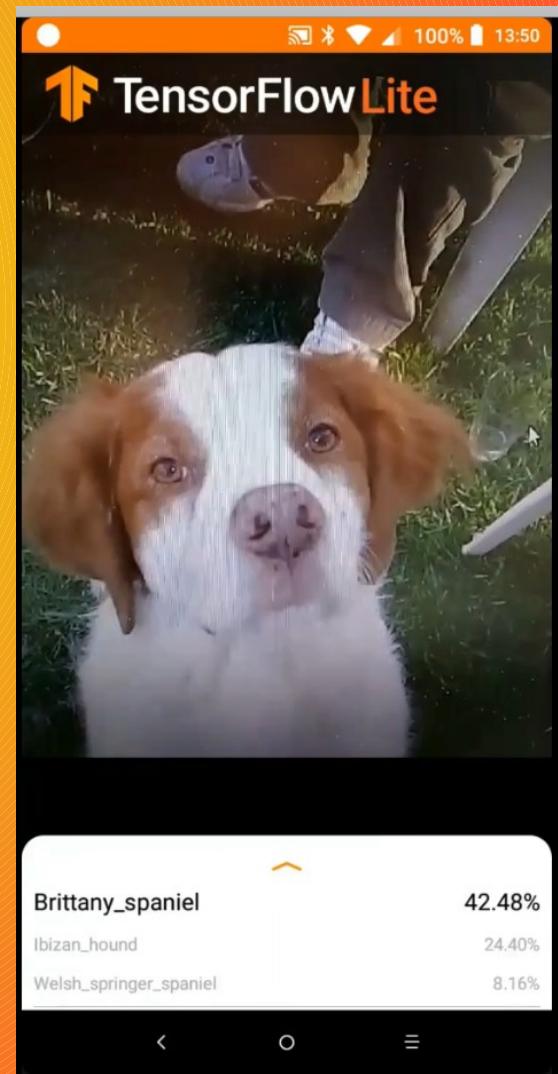
Tensorflow-Lite
converter



Model file
.tflite



APK
file

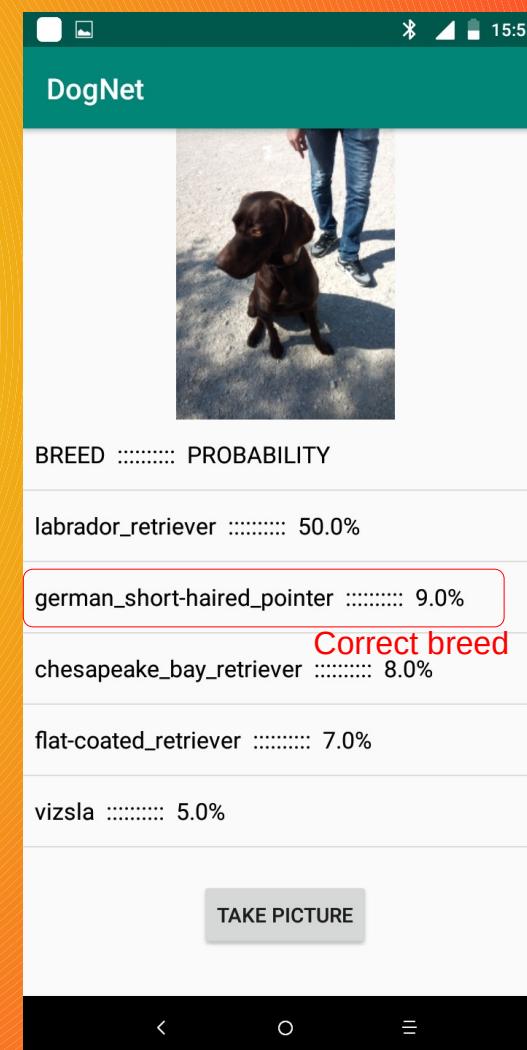
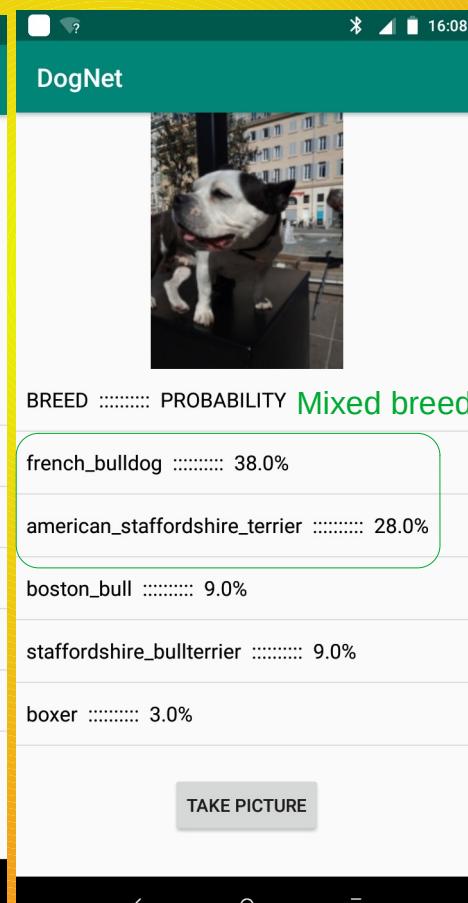
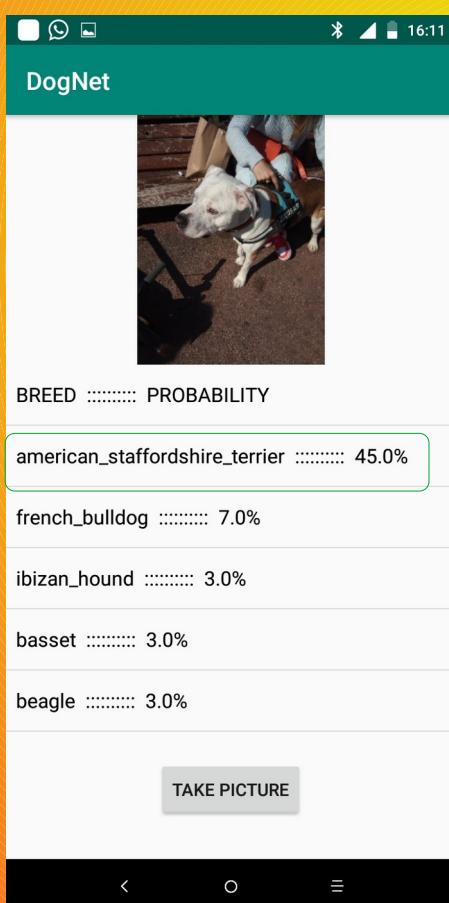
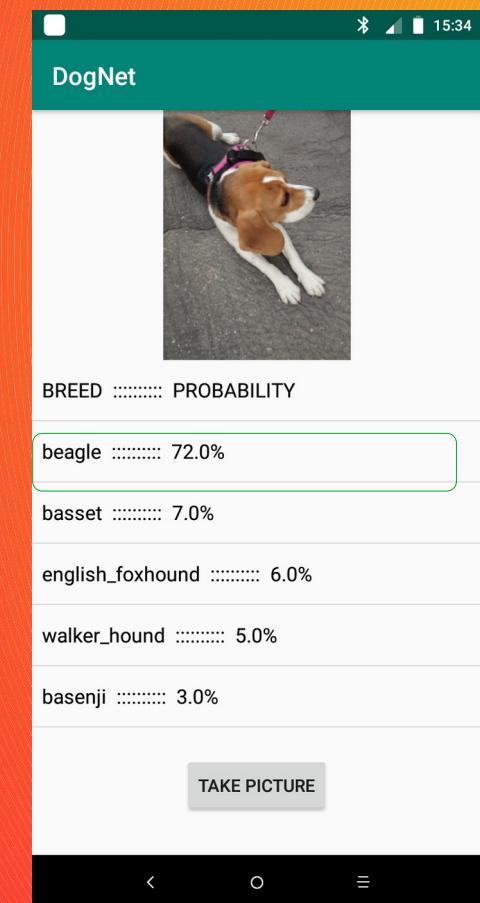


Test it on the field !!!

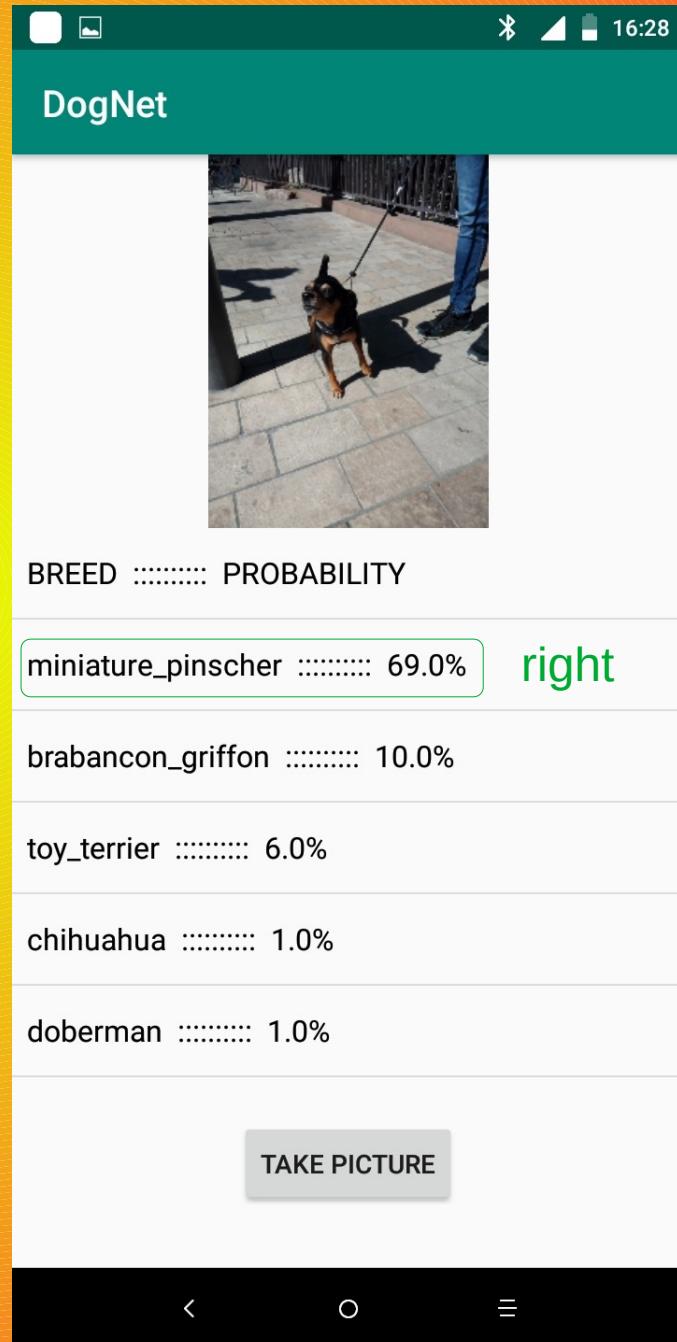
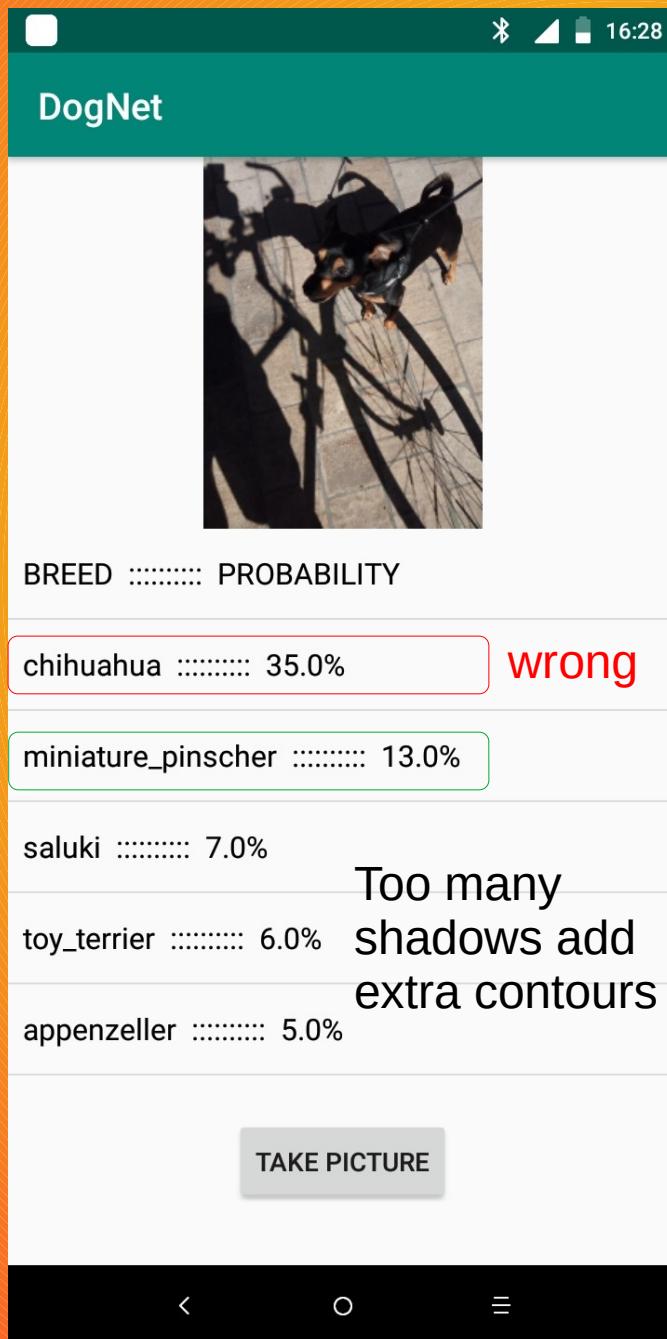


Walk around Marseille old harbour (Vieux Port) and kindly ask dog owners

The aftermath



Shadows can confuse an AI



Conclusions

- Deep learning model developed with Tensorflow light works like a charm (85 % accuracy on test set)
- When deployed to Android, we obtain a lightweight app (14 MB) that recognises correctly most breeds
- Dog owners get quite interested and ask questions when they see the app in action

Links to Python codes, references etc. can be found below,
in the video description

Credits

- Android developer : Giulio Giandonato
- Main model for test photos: Ala (Giulio's dog)
- Video editing : Giovanni Brajato
- Translations :



Leszek Spalek : Polish
Kani Pae : Thai
Roberto di Pace : Swedish
Amine Hocine : Arabic
Belinda Verhagen : Dutch
Susan Barnes : German
Yulia Rokotova : Russian
Joana Sadio : Portuguese