Detect 'em!

Tensorflow on RPi3

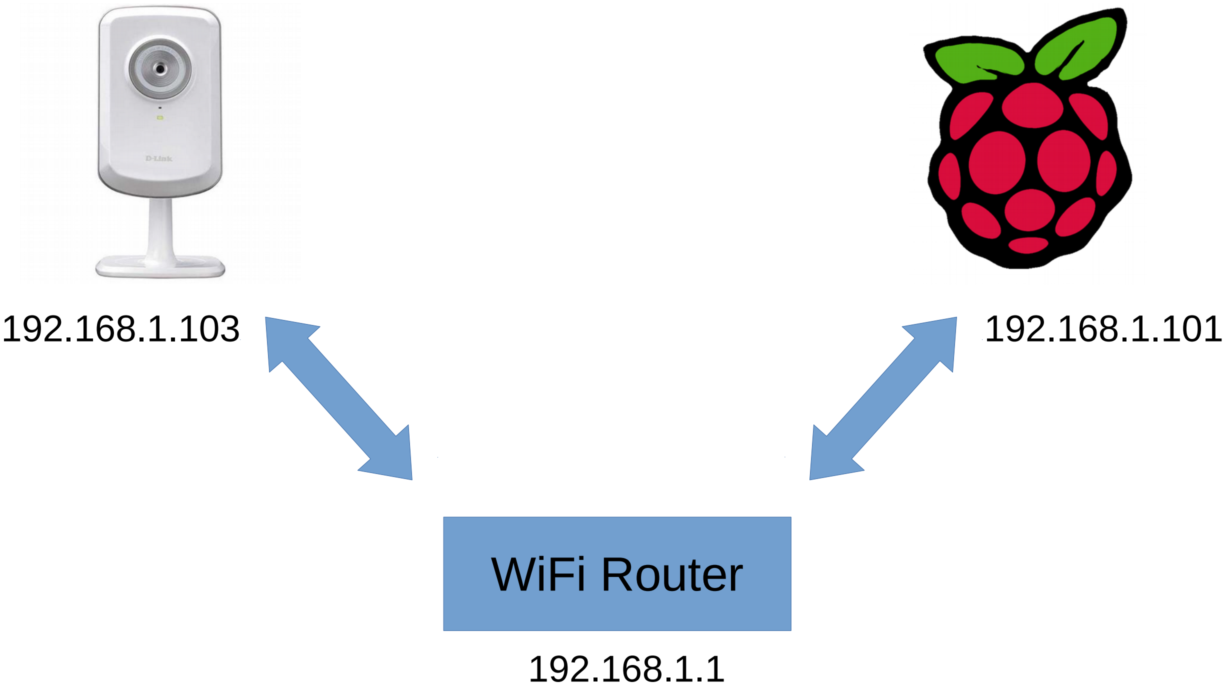
What?

- IP webcam(s)
- RPi3
- store images on disk only if following present
  - cat/dog (sneaky little buggers!)
  - burglar (any person if I'm not home)
- in the past: OpenCV + diffs between images

How?

- rapid advances in deep learning
- no longer requires grunty GPUs to run on (sadly, still for training)
- can detect objects in images
- aim to run models on mobile phones, eg:
  - TensorFlow Lite
  - Caffee2Go
- pre-trained models available

Network setup



192.168.1.103

192.168.1.101

WiFi Router

192.168.1.1

RPi setup

- Instructions and code are based on:
  - https://github.com/EdjeElectronics/TensorFlow-Object-Detection-on-the-Raspberry-Pi
  - https://raw.githubusercontent.com/EdjeElectronics/TensorFlow-Object-Detection-on-the-Raspberry-Pi/master/Object_detection_picamera.py
- Base image is Raspbian Stretch lite 2018-11-13:
  - https://www.raspberrypi.org/downloads/raspbian/
  - http://director.downloads.raspberrypi.org/raspbian_lite/images/raspbian_lite-2018-11-15/2018-11-13-raspbian-stretch-lite.zip

RPi setup (2)

- Install packages to run Python virtual envs and TensorFlow

```
sudo apt-get install virtualenv
sudo apt-get install git
sudo apt-get install libatlas-base-dev
sudo apt-get install python3-tk python3-dev
sudo apt-get install libjpeg-dev libtiff5-dev libjasper-dev libpng12-dev
sudo apt-get install libavcodec-dev libavformat-dev libswscale-dev libv4l-dev
sudo apt-get install libxvidcore-dev libx264-dev
sudo apt-get install qt4-dev-tools
sudo apt-get install protobuf-compiler
sudo apt-get install libilmbase12
sudo apt-get install libopenexr22
sudo apt-get install ibgstreamer1.0-0
```

RPi setup (3)

- create tensorflow dir:

```
cd ~
mkdir tf
cd tf
```

- get tensorflow (https://github.com/lhelontra/tensorflow-on-arm/releases):

```
wget https://github.com/lhelontra/tensorflow-on-arm/releases/download/v1.8.0/tensorflow-1.8.0-cp35-none-linux_armv7l.whl
```

- create virtualenv:

```
virtualenv -p /usr/bin/python3.5 venv
venv/bin/pip install tensorflow-1.8.0-cp35-none-linux_armv7l.whl
venv/bin/pip install opencv-python
venv/bin/pip install matplotlib
venv/bin/pip install pillow
```

RPi setup (4)

- clone tensorflow models:

```
git clone --recurse-submodules https://github.com/tensorflow/models.git
```

- update PYTHONPATH (~/.bashrc):

```
export PYTHONPATH=$PYTHONPATH:/home/pi/tf/models/research:/home/pi/tf/models/research/slim
```

RPi setup (5)

- compile the protobufs (for serializing structured data):

```
cd ~/tf/models/research
protoc object_detection/protos/*.proto --python_out=.
```

- download SSD model from tensorflow model zoo:

```
cd ~/tf/models/research/object_detection/
wget http://download.tensorflow.org/models/object_detection/ssdlite_mobilenet_v2_coco_2018_05_09.tar.gz
tar -xzvf ssdlite_mobilenet_v2_coco_2018_05_09.tar.gz
```

- place *object_detection_webcam.py* in

```
~/tf/models/research/object_detection
```

Go!

- change into

  ```
  ~/tf/models/research/object_detection
  ```

- run the script

  ```
  ~/tf/venv/bin/python object_detection_webcam.py
  ```