Setting up VespAI from GitHub repo from scratch on Raspberry Pi 4

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1 Requirements

- Raspberry Pi 4 with at least 2GB of RAM.

- Micro SD card with at least 16GB of storage.

- SD card reader and a separate computer to flash the OS to the SD card.

2 OS Installation

1. Download the Raspberry Pi Imager from www.raspberrypi.com/software.

2. Flash the 64 bit installation of Ubuntu onto the SD card.

3. With SD card in Pi, turn on and set up. Username: `detector`; computer name: `vespai`; pw: `alert`.

4. Upgrade software

   ```
   $ sudo apt update
   $ sudo apt upgrade -y
   ```

   Then search for `Software Updater` and follow instructions.

3 Basic installation

Open terminal and check software

```
$ sudo apt-get update -y
```

Install or update pip3:

```
$ sudo apt-get install -y python3-pip
```

4 VespAI software

Save VespAI repo into home either by file transfer or cloning the GitHub repo

```
$ sudo apt install -y git
$ git clone https://github.com/andrw3000/vespai --recursive
```

5 PyTorch and dependencies

Install complimentary image libraries as not included in `torchvision>=10.0`:

```
$ sudo apt-get install -y zlib1g-dev
$ sudo apt-get install -y libjpeg-dev
$ sudo apt-get install -y libpng-dev
```

Install numpy and pandas:

```
$ sudo pip3 install numpy
$ sudo pip3 install pandas
$ sudo pip3 install tqdm
$ sudo pip3 install matplotlib
$ sudo pip3 install seaborn
```

Install a nightly build of PyTorch and Torchvision for compatibility with the Pi's aarch64 (ARM) CPU. This currently gives versions 1.12.0 and 0.13.0, respectively.

```
$ sudo pip3 install --pre torch torchvision torchaudio \
--extra-index-url https://download.pytorch.org/whl/nightly/cpu
```

Amend installation for YOLOv5 compatibility as follows:

```
$ sudo nano /usr/local/lib/python3.10/...
dist-packages/torch/nn/modules/activation.py
```

1. Search with CTRL+W and type `return F.hardswish`

2. Delete `self.inplace` from the arguments. (Exit and save with CTRL+X.)

Perform test on importing torch and torchvision.

```
$ python3 -c "import torch, torchvision; \
print(torch.__version__, torchvision.__version__)"
```

The returned output should read

```
UserWarning: Failed to load image Python extension"
```

We can live with that. This manual was written with

```
torch.__version__=1.12.0
torchvision.__version__=0/13/0
```

Check compatibility of these two packages at: https://github.com/pytorch/vision#instillation. To check package info:

```
$ pip3 show [package]
```

This will respond differently if one used sudo to install (and one should).

Install requirements file for YOLOv5:

```
$ sudo pip3 install -r \
/home/detector/vespai/models/yolov5/requirements.txt
```

6   For motion detection

Install Open CV and imutils

6.1   Fix for OpenCV function `cv2.imshow()`

Responding to

```
Warning: Ignoring XDG_SESSION_TYPE=wayland on Gnome.
Use QT_QPA_PLATFORM=wayland to run on Wayland anyway
```

1. Disable Wayland by uncommenting `WaylandEnable=false` in

   ```
   $ sudo nano /etc/gdm3/custom.conf
   ```

2. Add `QT_QPA_PLATFORM=xcb` in

   ```
   $ sudo nano /etc/environment
   ```

3. Check whether you are on Wayland or Xorg using:

   ```
   $ echo $XDG_SESSION_TYPE
   ```

7 Run monitor

```
sudo python3 vespai/monitor/monitor_run.py \
-m -p -s -rd /home/detector/vespai \
-v /home/detector/data/jersey.mp4
```