Motion Detection

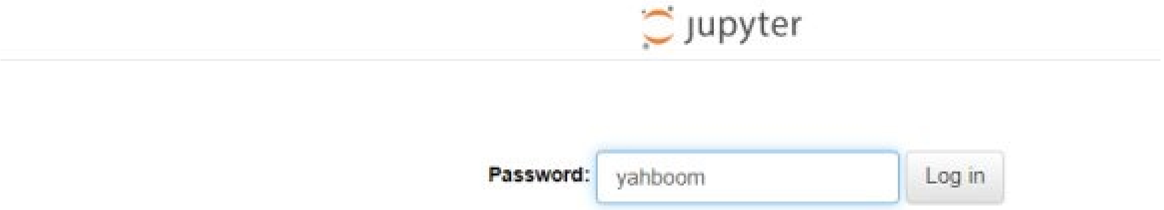
This tutorial is specific to the CM5 version and will not work directly with the CM4 version

1. Experimental Purpose

Learn to use the robot dog's camera and screen to create a health assistant that counts motion. The counting here primarily involves counting detected human motions.

2. Experimental Steps

Log in to the robot dog's system, exit the robot dog program, and enter "ip (the robot dog's IP address):8888" in your browser. Once logged in, enter the password "yahboom"



Password: yahboom

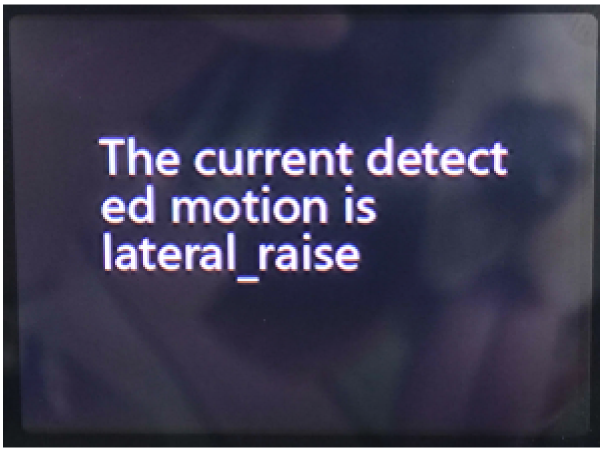
Then log in.
Go to the directory **cd ~/DOGZILLA_Lite_class/5.AI Visual Recognition Course/20. Motion Detection** and run **mian.ipynb**.

Finally, run the program.

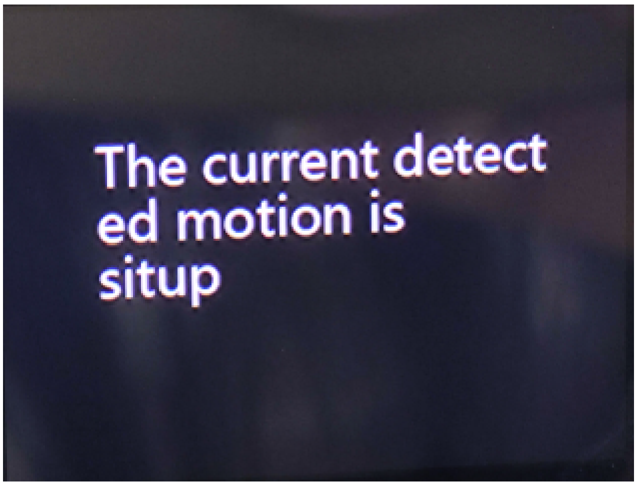
3. Experimental Results

1. After running the program, select the exercise to be monitored using the button in the upper right corner of the screen. The following exercises can be monitored:

- Squats
- Push-ups
- Sit-ups
- Biceps Curls
- Lateral Raises
- Overhead Presses
- Leg Raises
- Knee Raises
- Left Knee Presses
- Right Knee Presses

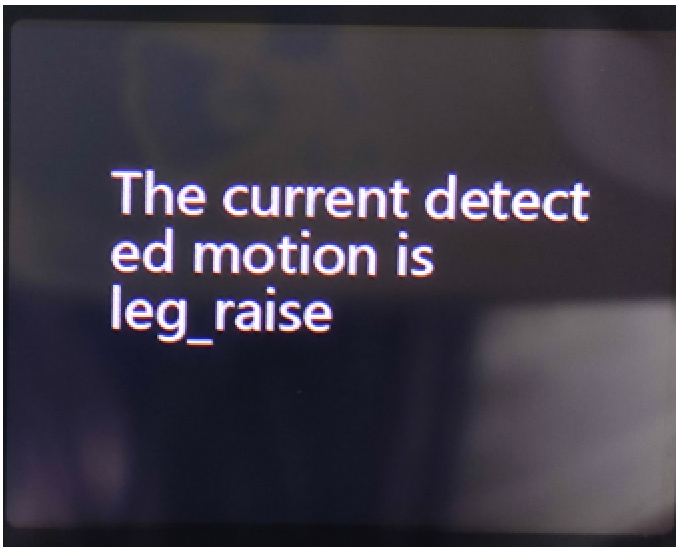


```
The current detect
ed motion is
lateral_raise
```

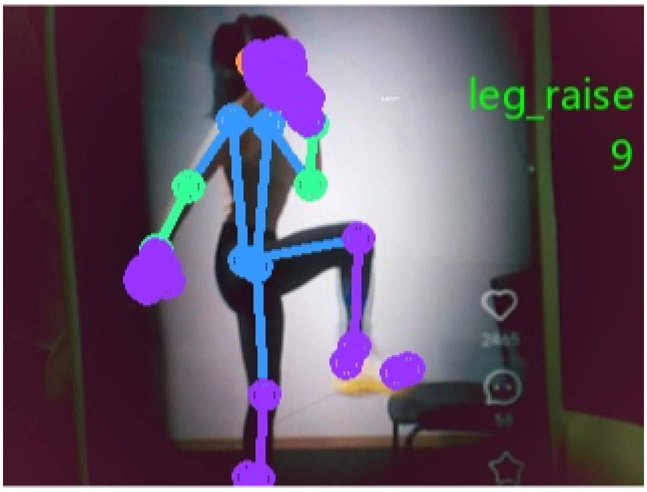


```
The current detect
ed motion is
situp
```

2. After selecting the corresponding mode, press the button in the upper left corner of the screen to start monitoring the exercise.



```
The current detect
ed motion is
leg_raise
```



3. If you want to change the detected motion, restart the program and reselect the mode.

4. Experimental Source Code Analysis

```
while True:
    frame = picam2.capture_array()
    processed_frame, current_angle, keypoints = 
pose_processor.process_frame(frame, exercise_type)

    # 将OpenCV图像转为PIL图像 # Convert OpenCV images to PIL images
    pil_img = Image.fromarray(cv2.cvtColor(processed_frame, cv2.COLOR_BGR2RGB))
    draw = ImageDraw.Draw(pil_img)

    current_count = exercise_counter.counter

    # 计算文本位置 Calculate text position
    text_width = draw.textlength(display_text, font=pil_font)
    count_width = draw.textlength(str(current_count), font=pil_font)
    right_margin = 5
    text_x = processed_frame.shape[1] - text_width - right_margin
    count_x = processed_frame.shape[1] - count_width - right_margin

    # 绘制文本 Drawing Text
    draw.text((text_x, 30), display_text, font=pil_font, fill=(0, 255, 0))
    draw.text((count_x, 60), str(current_count), font=pil_font, fill=(0, 255, 
0))

    # 转换回OpenCV格式 Convert back to OpenCV format
    processed_frame = cv2.cvtColor(np.array(pil_img), cv2.COLOR_RGB2BGR)

    image_widget.value = bgr8_to_jpeg(myimg)

    if button.press_b():
        break
```

This **while** loop is the main business logic for detecting motion, and the detection is exited by detecting the button in the lower left corner of the screen.