

Object Tracking

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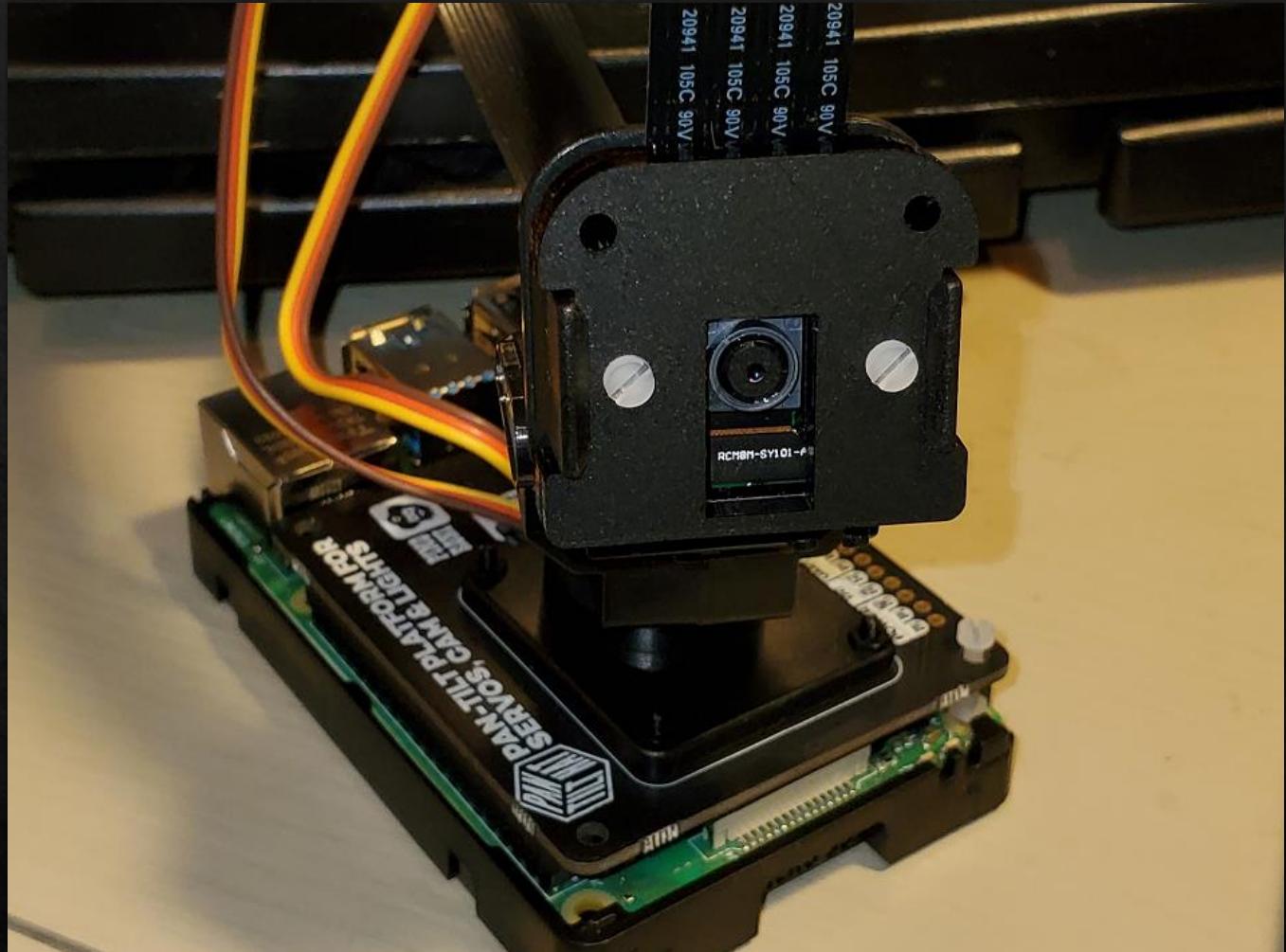


Is it possible to
track a person
and their
movement with a
moving camera?

YES!

Overview

- Hardware
- Operating System
- Environments
- Machine Learning
- Deep Learning
- Performance
- Pitfalls and Ideas for the Future



Making my Pi

Hardware



Operating System

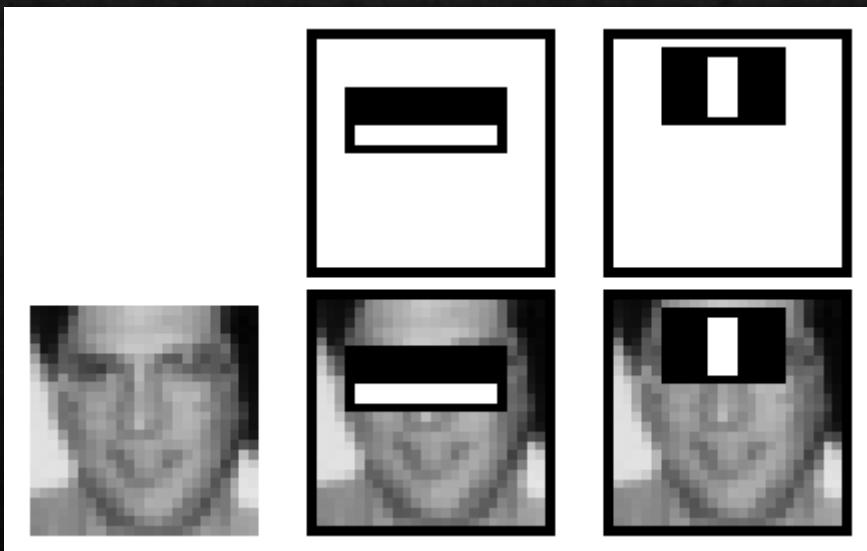


Object Detection Algorithms

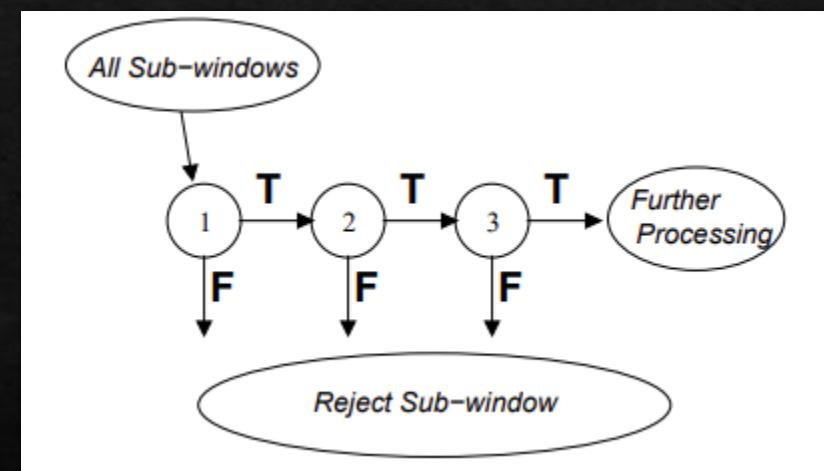


Haar Cascade

Haar Wavelet

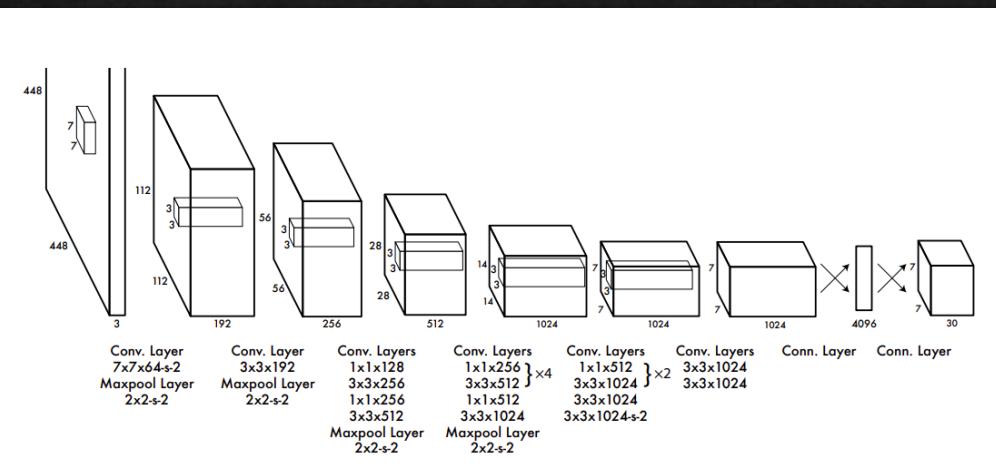


Cascade with AdaBoost

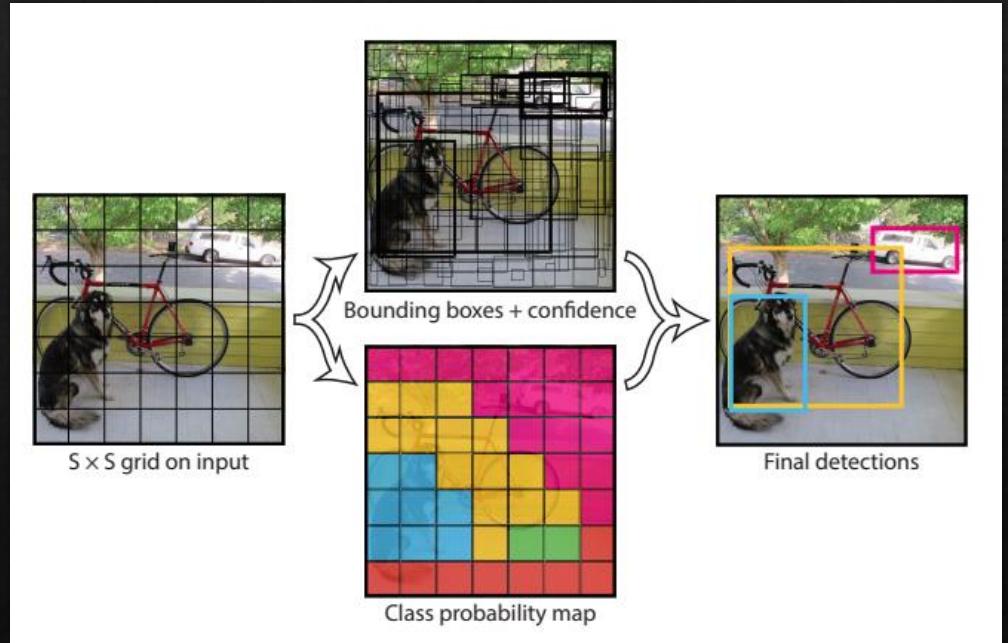


YOLO

One Neural Network



Predicts bounding boxes



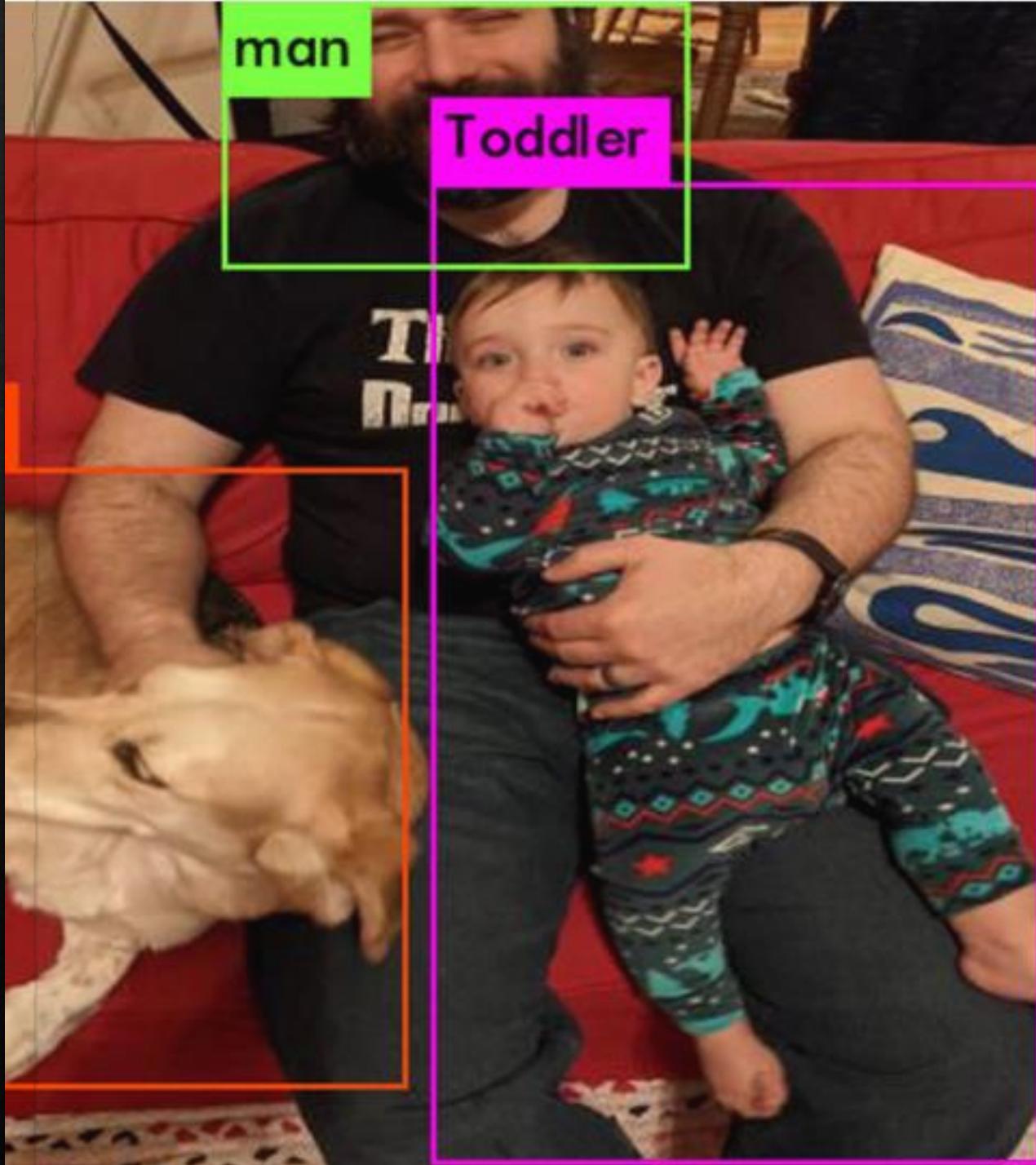
Using YOLOv4-tiny for full-body detection

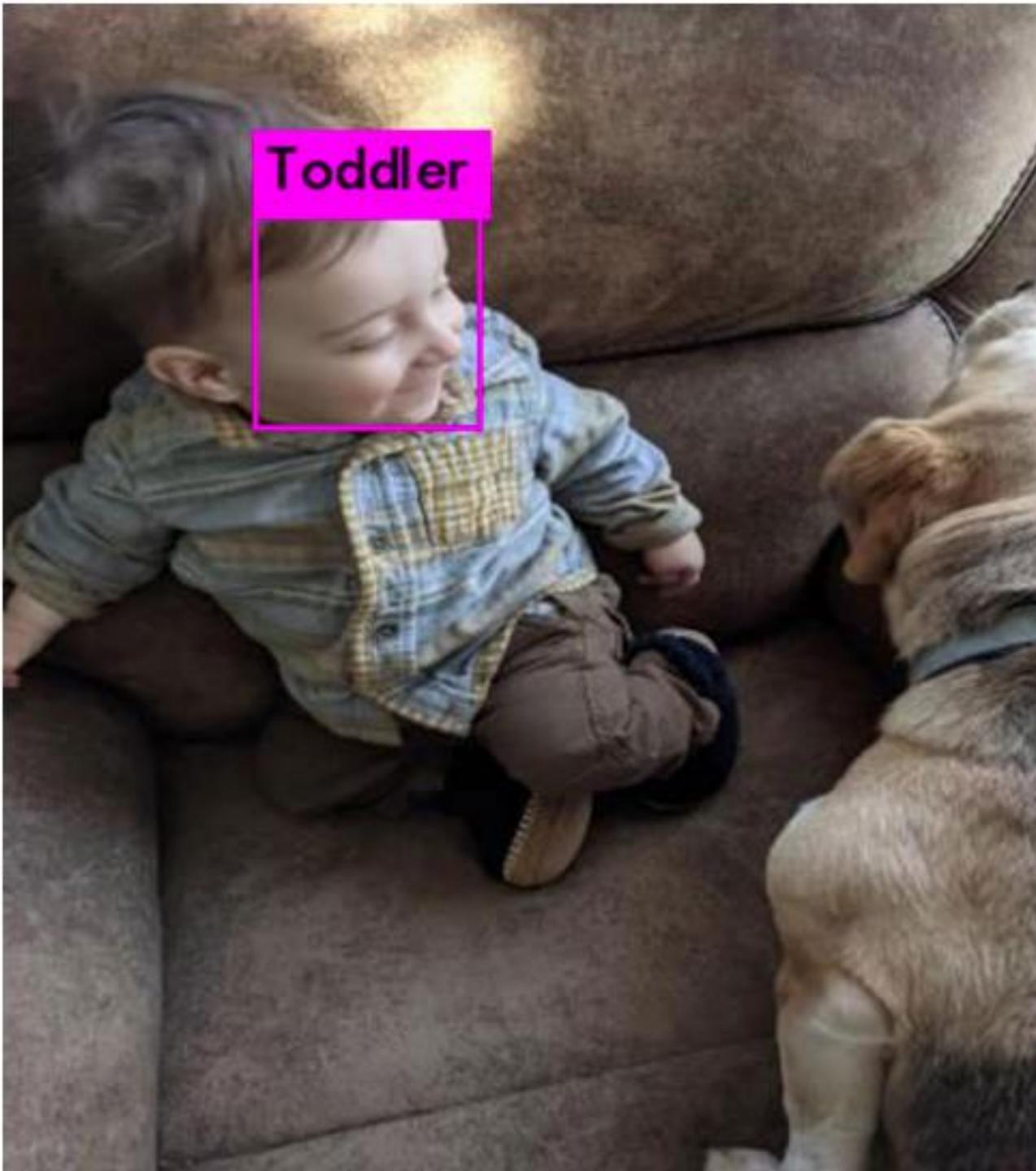
Predicted in 11.278000 milli-seconds.

dog: 32%

man: 83%

Toddler: 69%





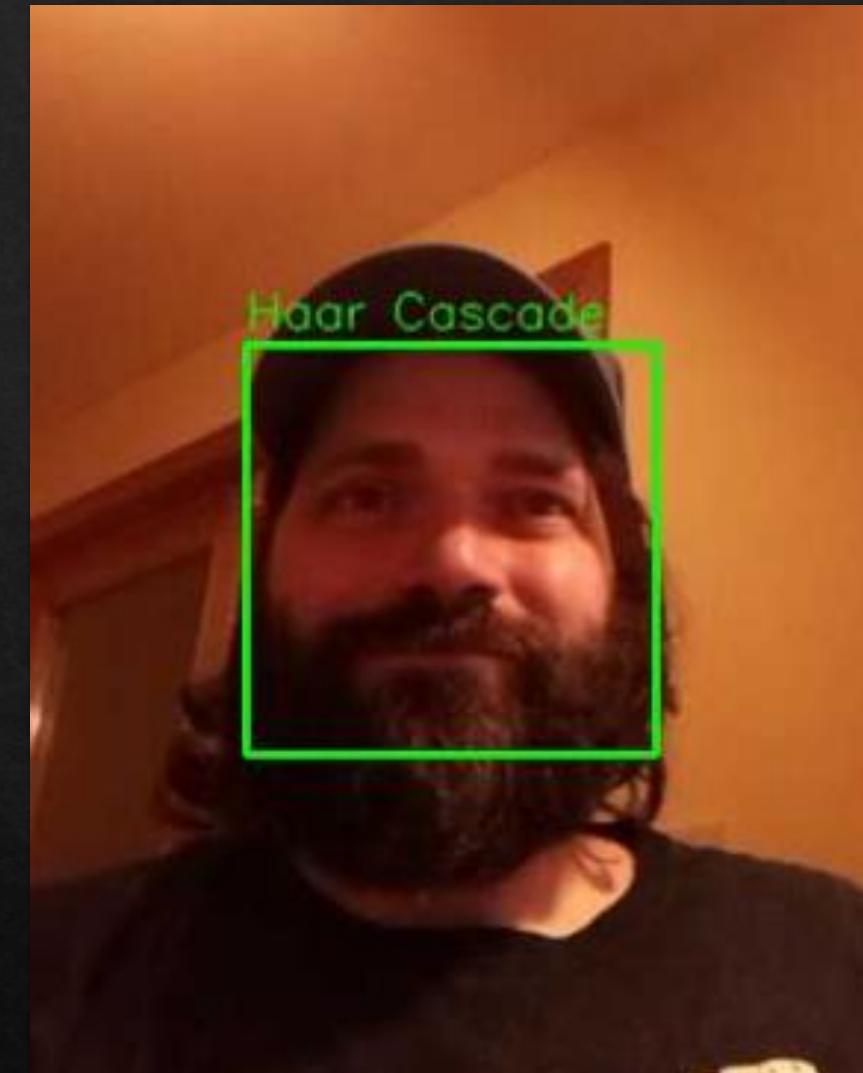
Using YOLOv4-tiny for Face Detection

Predicted in 5.150000 milli-seconds.

Toddler: 97%

Haar Cascade

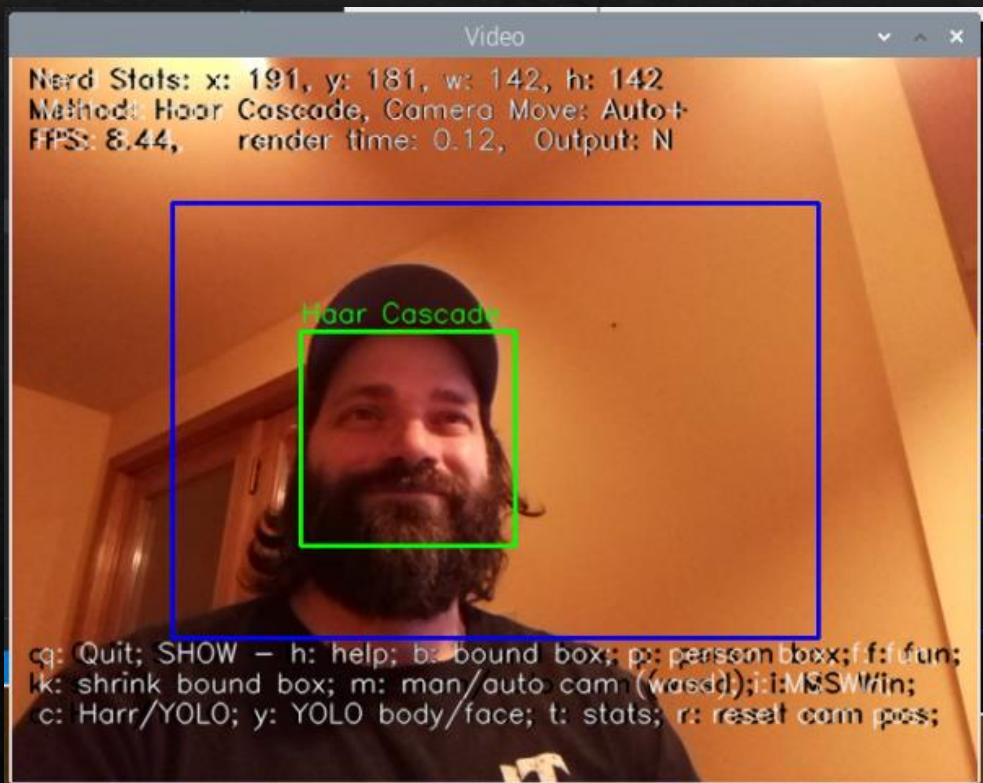
		FPS	time
Device	Model		
Laptop	Haar Cascade	43.831705	0.027543
	YOLO-Body	23.610659	0.047073
Ras-Pi	YOLO-Face	26.130075	0.041805
	Haar Cascade	7.896255	0.128951
	YOLO-Body	1.530603	0.654779
	YOLO-Face	1.539430	0.651276



Pitfalls



Add ons!



Stats and Settings!
Keyboard Shortcuts!!

Ideas for the Future

- ❖ 64-bit OS (e.g. Ubuntu)
- ❖ Intel Compute Stick
- ❖ Google Coral USB Accelerator
- ❖ Other Hardware with moving camera
- ❖ Stream video to Flask

Conclusion

❖ Yes!

...and we can do more.

❖ Is it possible to track a person and their movement with a moving camera?

Questions?



Sources

- ❖ **Installing opencv on raspberry pi:**
- ❖ <https://www.pyimagesearch.com/2019/09/16/install-opencv-4-on-raspberry-pi-4-and-raspbian-buster/>
- ❖ **OpenCV**
- ❖ <https://opencv-tutorial.readthedocs.io/en/latest/yolo/yolo.html> https://docs.opencv.org/3.4/db/d30/classcv_1_1dnn_1_1Net.html
- ❖ **Camera Pan-Tilt-Hat**
- ❖ <https://pantilt-hat.readthedocs.io/en/latest/> <https://learn.pimoroni.com/tutorial/sandyj/assembling-pan-tilt-hat> <https://learn.pimoroni.com/tutorial/electromechanical/building-a-pan-tilt-face-tracker> <https://github.com/pimoroni/pantilt-hat> https://github.com/pimoroni/PanTiltFacetracker/blob/master/facetracker_lbp.py
- ❖ **Intel Neural Compute Stick 2:**
- ❖ https://docs.openvinotoolkit.org/latest/openvino_docs_install_guides_installing_openvino_raspbian.html <https://www.hackster.io/news/getting-started-with-the-intel-neural-compute-stick-2-and-the-raspberry-pi-6904ccfe963> <https://www.youtube.com/watch?v=LmtHEBuJfII> <https://www.youtube.com/watch?v=joEIT3UfspA>

Sources

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- ❖ **Roboflow.com (and CVAT)**
- ❖ <https://towardsdatascience.com/how-to-train-a-custom-object-detection-model-with-yolo-v5-917e9ce13208> <https://blog.roboflow.com/cvat/> <https://blog.roboflow.com/train-yolov4-tiny-on-custom-data-lighting-fast-detection/> <https://www.youtube.com/watch?v=NTnZgLsk> DA&t=212s