YOLOv7 vs YOLOv8

(Compare performance between YOLOv7, YOLO 8l and YOLOv8m)

1. **Approach:**
   Training YOLOv7, YOLOv8l and YOLOv8m (300 epochs)with COCO128 dataset until models converge and then compare (image size = 640, batch size = 8). All training was done in a Google Colab environment with nVidia Tesla T4 GPUs.

2. **Object:**
   - Performace of 3 model: YOLOv7, YOLOv8l and YOLOv8m.

	YOLOv7	**YOLOv8l**	**YOLOv8m**
Layer	407	365	295
Parameter (M)	37.62	43.69	25.90
GFLOPs	106.5	165.7	79.3

3. **Result:**

   3.1. Training time (200 epochs):

	YOLOv7	**YOLOv8l**	**YOLOv8m**
Layer	407	365	295
Parameter (M)	37.62	43.69	25.9
Training time	0.673 hours	0.658 hours	0.509 hours

In spite of the large-sized model of YOLOv8 (YOLOv8l) is bigger than YOLOv7 , faster training time than YOLOv7. YOLOv8m size is the smallest so training time can be small

=> YOLOv8 model need training time less than YOLOv7 with the same size (number of parameters).

3.2. Inference time:

	YOLOv7	**YOLOv8l**	**YOLOv8m**
Layer	407	365	295
Parameter (M)	37.62	43.69	25.9
Inference time	16.9ms	50.2 ms	28.1 ms

YOLOv7 has inference time less than YOLO8

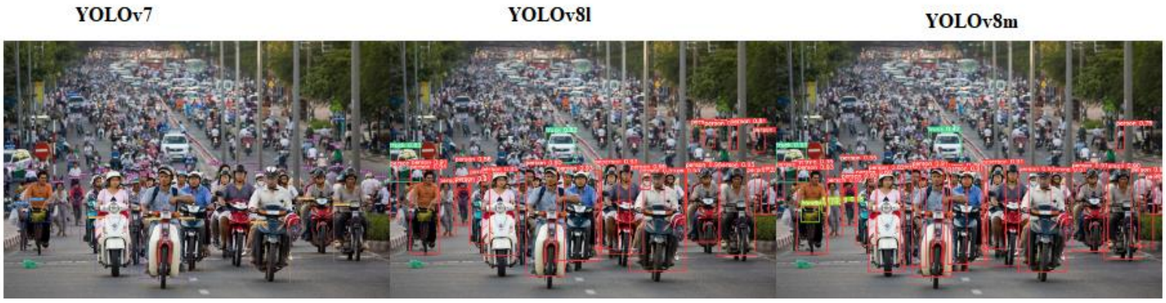
3.3. Acccuracy:

COCO128.yaml, 50 epochs, imgsize=640,batch=8

	YOLOv7	YOLOv8l	YOLOv8m
Layer	407	365	295
Parameter (M)	37.62	43.69	25.9
Presion	0.936	0.948	0.962
Recall	0.903	0.943	0.926
F1 score	0.919	0.946	0.944
mAP@0.5	0.962	0.97	0.97
mAP@0.5:0.95	0.764	0.909	0.904

=> YOLOv8 is better YOLOv7 when compare F1 score, mAP. YOLOv8 size l is better size m in this case.

3.4. Actual results:

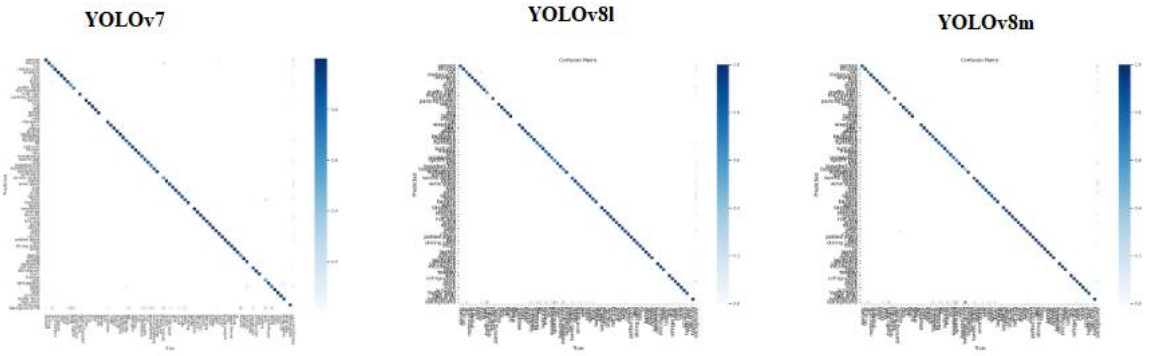


YOLOv7

YOLOv8l

YOLOv8m

YOLOv7 is better YOLOv8 with detecting distant objects



YOLOv7

YOLOv8l

YOLOv8m

=> YOLOv7's multilayer false rate is greater than YOLOv8. The error rate in each wrong class of YOLOv8m is greater than YOLOv8l

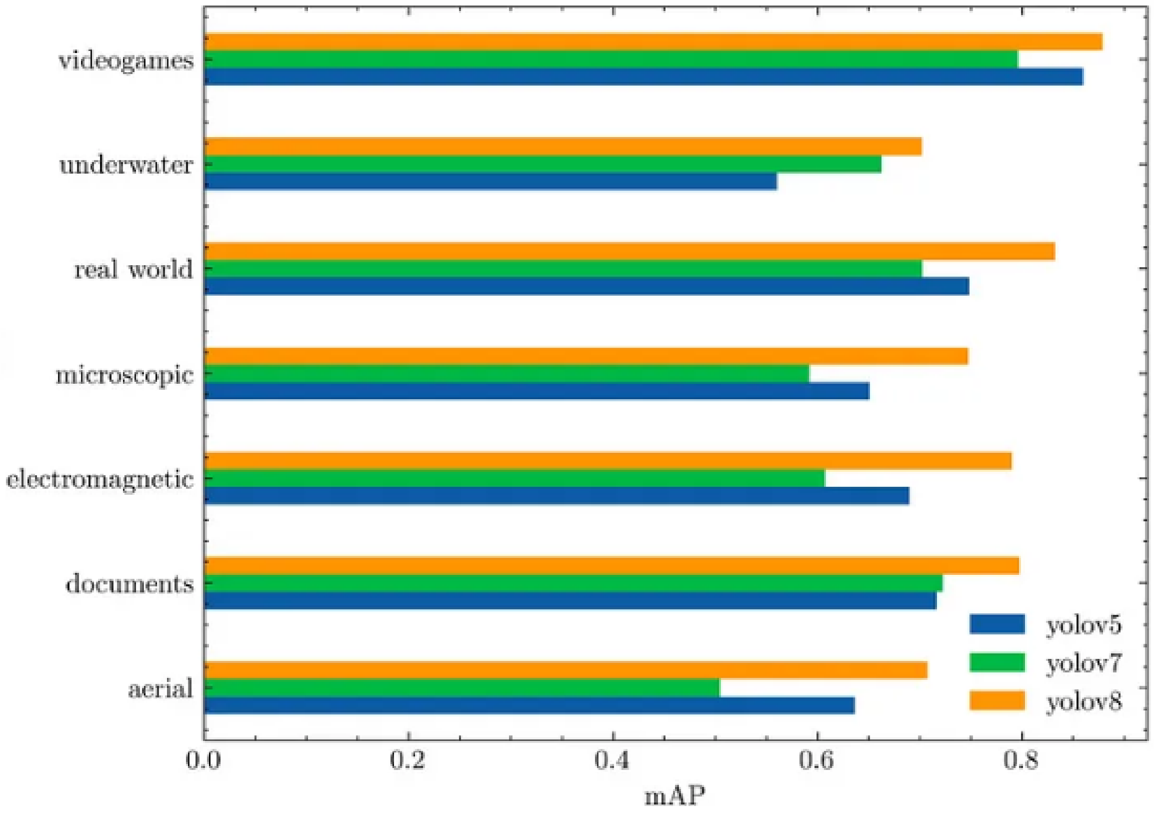
4. Conclusion:

- YOLOv7 has the shortest inference time, then YOLOv8m and finally YOLOv8l has the largest inference time.
- YOLOv8m has less training time than YOLOv8l, YOLOv7 has the largest training time among the 3 models.
- YOLOv7 can detect distant objects better than YOLOv8l and YOLOv8m, but when detecting nearby overlapping objects, YOLOv7 is the worst compared to the other 2 models.
- Both YOLOv8l and YOLOv8m detect close and overlapping objects well. In this case (train with COCO128 data), YOLOv8m can detect many nearby objects and has higher accuracy than YOLOv8l

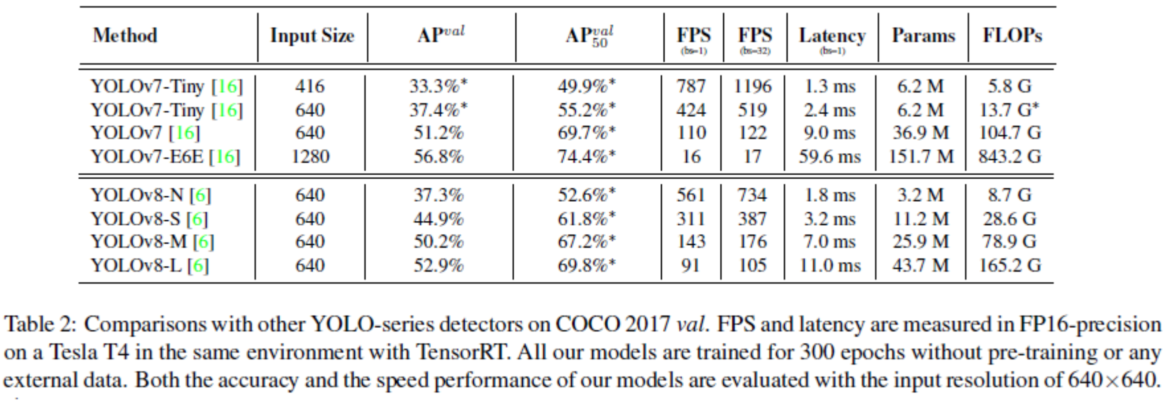
5. Inferences:

5.1. https://medium.com/@juneta.tao/yolov8-4b1c330f8c90

- Roboflow fine-tuned and compared YOLOv5, YOLOv7 and YOLOv8 on 100 different datasets. YOLOv8 performs the best over all datasets.



5.1. Research: YOLOv6 v3.0: A Full-Scale Reloading



Method	Input Size	AP^{val}	AP^{val}_{50}	FPS (bs=1)	FPS (bs=32)	Latency (bs=1)	Params	FLOPs
YOLOv7-Tiny [16]	416	33.3%*	49.9%*	787	1196	1.3 ms	6.2 M	5.8 G
YOLOv7-Tiny [16]	640	37.4%*	55.2%*	424	519	2.4 ms	6.2 M	13.7 G*
YOLOv7 [16]	640	51.2%	69.7%*	110	122	9.0 ms	36.9 M	104.7 G
YOLOv7-E6E [16]	1280	56.8%	74.4%*	16	17	59.6 ms	151.7 M	843.2 G
YOLOv8-N [6]	640	37.3%	52.6%*	561	734	1.8 ms	3.2 M	8.7 G
YOLOv8-S [6]	640	44.9%	61.8%*	311	387	3.2 ms	11.2 M	28.6 G
YOLOv8-M [6]	640	50.2%	67.2%*	143	176	7.0 ms	25.9 M	78.9 G
YOLOv8-L [6]	640	52.9%	69.8%*	91	105	11.0 ms	43.7 M	165.2 G

Table 2: Comparisons with other YOLO-series detectors on COCO 2017 *val*. FPS and latency are measured in FP16-precision on a Tesla T4 in the same environment with TensorRT. All our models are trained for 300 epochs without pre-training or any external data. Both the accuracy and the speed performance of our models are evaluated with the input resolution of 640×640.