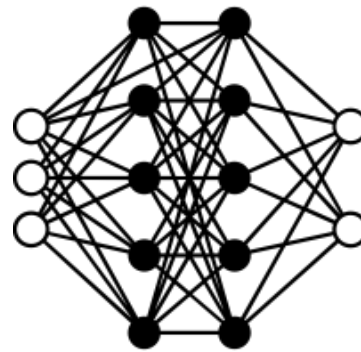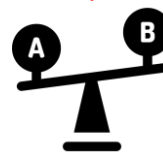# You only look once (YOLO)

Network

```
17 0.597835 0.63755 0.342283 0.36886
17 0.324291 0.64808 0.219711 0.3164
0 0.620039 0.5939 0.172415 0.14608
0 0.385525 0.58557 0.14937 0.12586
0 0.328898 0.70199 0.0313386 0.06714
58 0.622546 0.89961 0.185932 0.09446
0 0.760577 0.69423 0.0285564 0.05486
0 0.510709 0.69215 0.0187927 0.04682
0 0.929554 0.67602 0.0388451 0.01844
```

Feedback

Loss calculation

```
17 0.597835 0.63755 0.342283 0.36886
17 0.324291 0.64808 0.219711 0.3164
0 0.620039 0.5939 0.172415 0.14608
0 0.385525 0.58557 0.14937 0.12586
0 0.328898 0.70199 0.0313386 0.06714
58 0.622546 0.89961 0.185932 0.09446
0 0.760577 0.69423 0.0285564 0.05486
0 0.510709 0.69215 0.0187927 0.04682
0 0.929554 0.67602 0.0388451 0.01844
```

Materials

https://bit.ly/ai-ml-yolo

Ref.
https://docs.ultralytics.com/models/yolov9/

You only look once (YOLO)

Training file structure

datasets	Dataset
yolov5	System (yolo9)
Detection(custom)	Example of using code
Train(custom)	

You only look once (YOLO)

Training file structure (1. Data info)

```
Parent
├── yolov9
│   └── data
│       └── my_coco.yaml
│
└── datasets
    └── custom
        ├── images
        └── labels
```
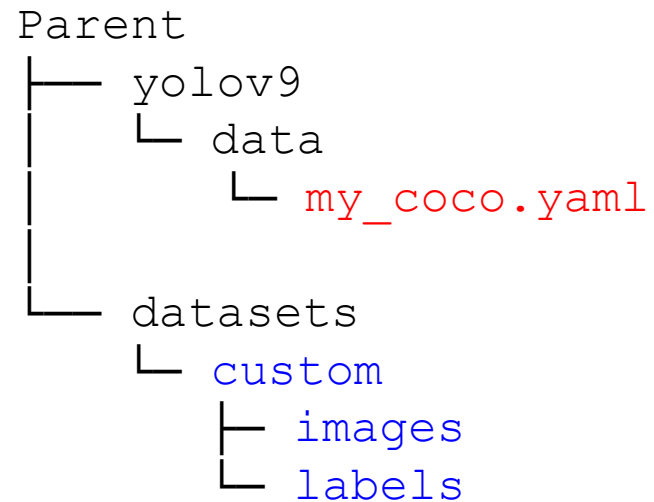
Ex. coco128.yaml

```
path: ../datasets/coco128  # dataset root dir
train: images/train2017  # train images (relative to 'path') 128 images
val: images/train2017   # val images (relative to 'path') 128 images
test:  # test images (optional)

# Classes
names:
  0: person
  1: bicycle
  2: car
  3: motorcycle
  4: airplane
  5: bus
```
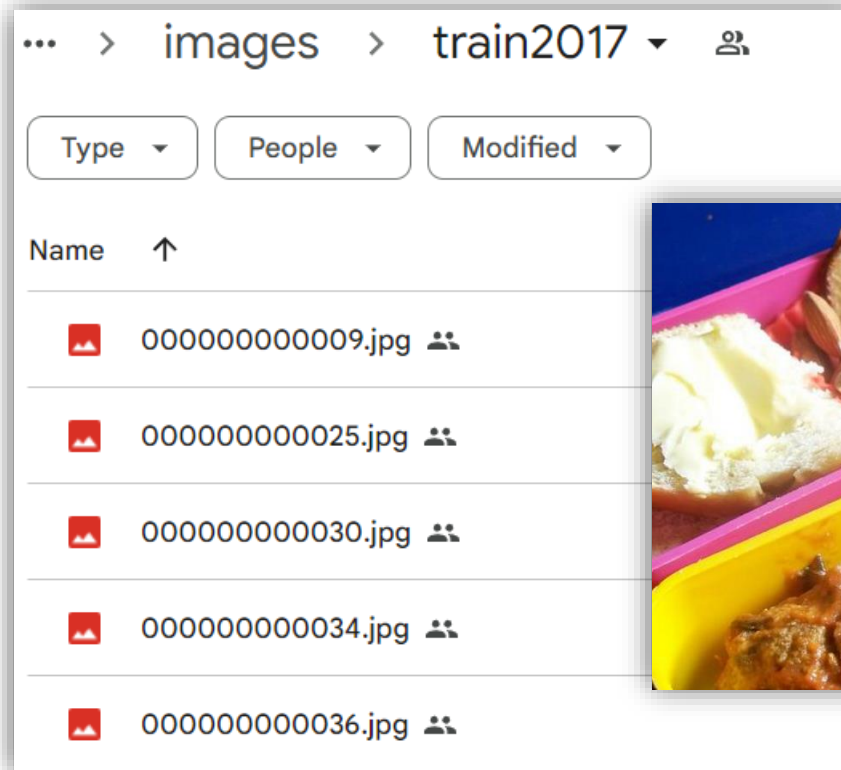
You only look once (YOLO)

Training file structure (2. Dataset - images)

Ex. Coco128 dataset

```
Parent
├── yolov9
└── datasets
    └── custom
        ├── images
        │   ├── train
        │   │   ├── img01.jpg
        │   │   ├── img02.jpg
        │   │   └── img03.jpg
        │   ├── val
        │   └── test
        └── labels
            ├── train
            ├── val
            └── test
```


... > images > train2017 ▾ 👥

Type ▾   People ▾   Modified ▾

Name ↑

🖼 000000000009.jpg 👥

🖼 000000000025.jpg 👥

🖼 000000000030.jpg 👥

🖼 000000000034.jpg 👥

🖼 000000000036.jpg 👥

You only look once (YOLO)

Training file structure (Downloaded Pre-trained weight)

```
Parent
├── yolov9
│     └── yolov9c.pt
└── datasets
```

... > Custom train > yolov9 ▾

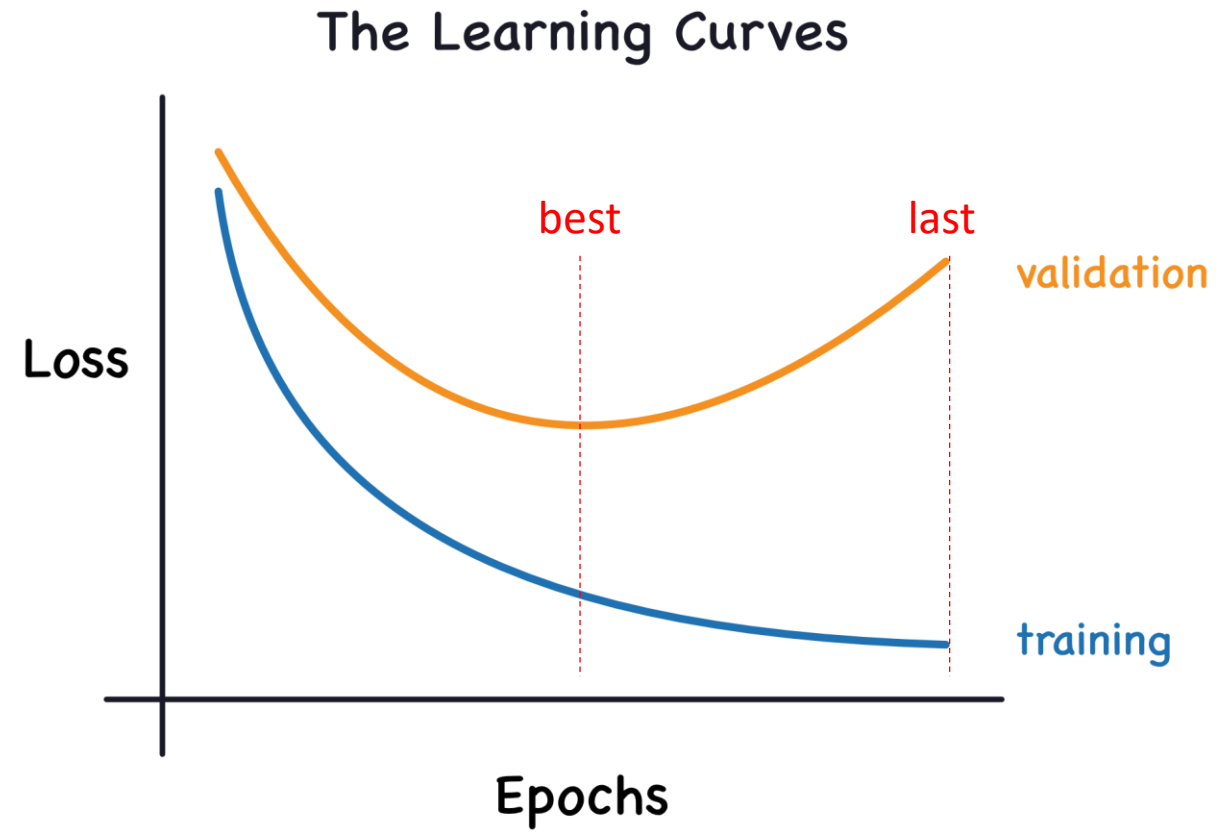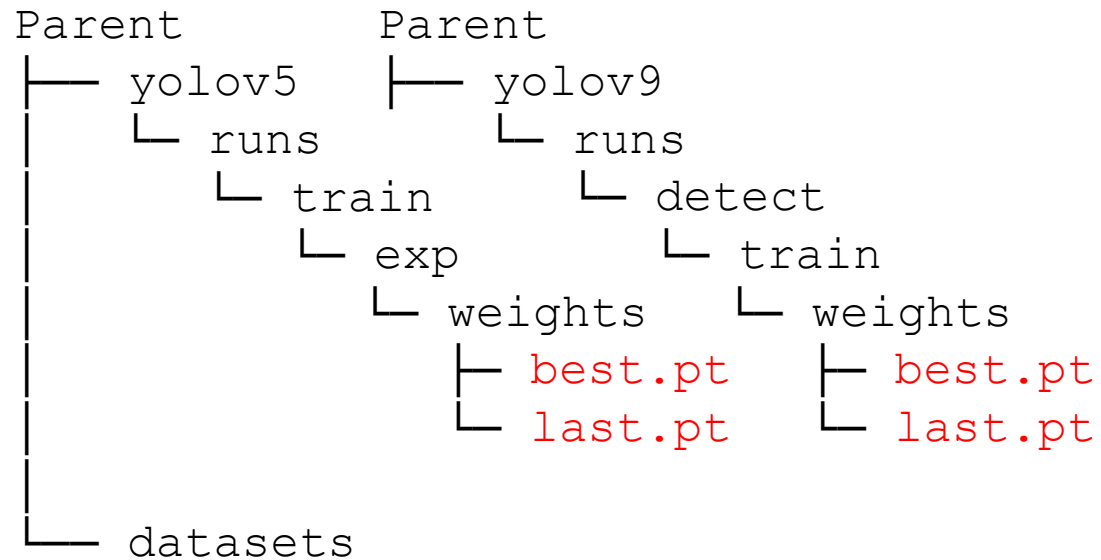Type ▾   People ▾   Modified ▾

Name ↓

📁 runs

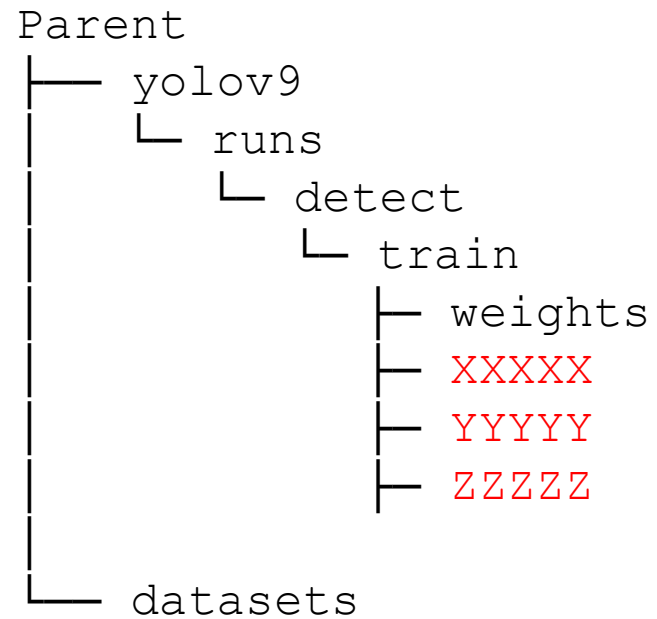⬇ yolov9c.pt

⬇ yolov8n.pt

🖼 result.jpg

📄 my_coco.yaml

You only look once (YOLO)

Training file structure (Saved weight)

```
Parent              Parent
├── yolov5          ├── yolov9
│   └── runs        │   └── runs
│       └── train   │       └── detect
│           └── exp │           └── train
│               └── weights       └── weights
│                   ├── best.pt       ├── best.pt
│                   └── last.pt       └── last.pt
│
│
│
└── datasets
```

The Learning Curves

Loss

best   last

validation

training

Epochs

You only look once (YOLO)

Training file structure (Training Statistic)

```
Parent
├── yolov9
│   └── runs
│       └── detect
│           └── train
│               ├── weights
│               ├── XXXXX
│               ├── YYYYY
│               ├── ZZZZZ
│               │
│
└── datasets
```

Name

📁 weights

📄 hyp.yaml 👥

📄 opt.yaml 👥

🖼 labels_correlogram.jpg 👥

🖼 labels.jpg 👥

🖼 train_batch0.jpg 👥

🖼 train_batch1.jpg 👥

You only look once (YOLO)

Type of Yolo v.5
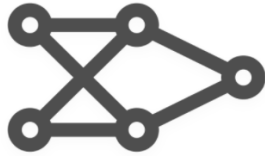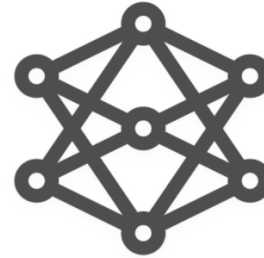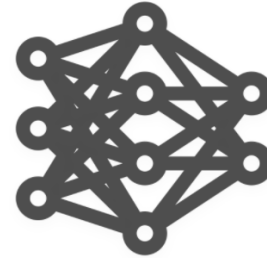
Small	Medium	Large	XLarge
YOLOv5s	**YOLOv5m**	**YOLOv5l**	**YOLOv5x**
$14\ MB_{FP16}$	$41\ MB_{FP16}$	$90\ MB_{FP16}$	$168\ MB_{FP16}$
$2.2\ ms_{V100}$	$2.9\ ms_{V100}$	$3.8\ ms_{V100}$	$6.0\ ms_{V100}$
$36.8\ mAP_{COCO}$	$44.5\ mAP_{COCO}$	$48.1\ mAP_{COCO}$	$50.1\ mAP_{COCO}$

You only look once (YOLO)

Type of Yolo v.9

Model	size (pixels)	mAP^{val} 50-95	mAP^{val} 50	params (M)	FLOPs (B)
YOLOv9t	640	38.3	53.1	2.0	7.7
YOLOv9s	640	46.8	63.4	7.2	26.7
YOLOv9m	640	51.4	68.1	20.1	76.8
YOLOv9c	640	53.0	70.2	25.5	102.8
YOLOv9e	640	55.6	72.8	58.1	192.5

Ref: https://docs.ultralytics.com/models/yolov9/#performance-on-ms-coco-dataset