

# RESULTAT AVEC LE DATASET COCO2018 ET LE MODÈLE YOLOV5

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### Méthodologie

- 1- **Préparation des données** : Le jeu de données COCO128 contient 128 images annotées avec des objets appartenant à plusieurs catégories. Les annotations sont fournies au format JSON, qui est converti au format YOLO pour l'entraînement.
- 2- **Configuration du modèle** : YOLOv5 est configuré avec les hyperparamètres suivants : 50 époques, une taille d'image de 640 pixels, et une taille de lot de 16. Le modèle est initialisé avec des poids pré-entraînés sur COCO.
- 3- **Entraînement** : Le modèle est entraîné sur le jeu de données COCO128 avec un optimiseur SGD. Des techniques d'augmentation des données comme le retournement, la rotation et la mise à l'échelle sont utilisées pour améliorer la robustesse du modèle.
- 4- **Évaluation** : La performance du modèle est réalisée en termes de mAP (mean Average Precision) sur les images du jeu de données COCO128.

## IMPLEMENTATION

### 1-entraînement du modèle

```
Administrateur : Anaconda Prompt - python C:/Users/USER/Documents/tppython/yolov5-master/train.py --img 640 --epochs 3 --data coco128.yaml --weights yolov5s.pt --cache ram

(base) C:\WINDOWS\system32>conda activate object_detection

(object_detection) C:\WINDOWS\system32>cd C:/Users/USER/Documents/tppython

(object_detection) C:\WINDOWS\system32>python train.py --img 640 --epochs 3 --data coco128.yaml --weights yolov5s.pt --cache ram
python: can't open file 'C:/Users/USER/Documents/tppython/train.py': [Errno 2] No such file or directory

(object_detection) C:\WINDOWS\system32>python C:/Users/USER/Documents/tppython/yolov5-master/train.py --img 640 --epochs 3 --data coco128.yaml --weights yolov5s.pt --cache ram
train: weights=yolov5s.pt, cfg=, data=coco128.yaml, hyp=yolov5-master\data\hyp\hyp_scratch-low.yaml, epochs=3, batch_size=16, imgsz=640, rect=False, resume=False, nosave=False, noautoanchor=False, noplots=False, evolve=None, evolve_population=yolov5-master\data\hyp\, resume_evolve=None, bucket=, cache=ram, image_weights=False, device=, multi_scale=False, single_cls=False, optimizer=SGD, sync_bn=False, workers=8, project=yolov5-master\runs\train, name=exp, exist_ok=False, quad=False, cos_lr=False, label_smoothing=0.0, patience=100, freeze=[0], save_period=-1, seed=0, local_rank=-1, entity=None, upload_dataset=False, bbox_interval=-1, artifact_alias=latest, ndjson_console=False, ndjson_file=False
github: skipping check (not a git repository), for updates see https://github.com/ultralytics/yolov5
YOLOv5 2024-7-29 Python-3.10.13 torch-2.4.0 CPU

hyperparameters: lr=0.01, lr_f=0.01, momentum=0.937, weight_decay=0.0005, warmup_epochs=3.0, warmup_momentum=0.8, warmup_bias_lr=0.1, box=0.05, cls=0.5, cls_pw=1.0, obj=1.0, obj_pw=1.0, iou_t=0.2, anchor_t=4.0, fl_gamma=0.0, hsv_h=0.015, hsv_s=0.7, hsv_v=0.4, degrees=0.0, translate=0.1, scale=0.5, shear=0.0, perspective=0.0, flipud=0.0, fliplr=0.5, mosaic=1.0, mixup=0.0, copy_paste=0.0
Comet: run 'pip install comet_ml' to automatically track and visualize YOLOv5 runs in Comet
TensorBoard: Start with 'tensorboard --logdir yolov5-master\runs\train', view at http://localhost:6006/

from n      params  module  arguments
0          -1 1      3520  models.common.Conv  [3, 32, 6, 2, 2]
1          -1 1     18560  models.common.Conv  [32, 64, 3, 2]
2          -1 1     18816  models.common.C3    [64, 64, 1]
3          -1 1     73984  models.common.Conv  [64, 128, 3, 2]
4          -1 2    115712  models.common.C3    [128, 128, 2]
5          -1 1    295424  models.common.Conv  [128, 256, 3, 2]
6          -1 3    625152  models.common.C3    [256, 256, 3]
7          -1 1    1180672  models.common.Conv  [256, 512, 3, 2]
8          -1 1    1182720  models.common.C3    [512, 512, 1]
9          -1 1     656896  models.common.SPPF  [512, 512, 5]
10         -1 1    131584  models.common.Conv  [512, 256, 1, 1]
11         -1 1      0  torch.nn.modules.upsampling.Upsample  [None, 2, 'nearest']
12        [-1, 6] 1      0  models.common.Concat  [1]
13         -1 1    361984  models.common.C3    [512, 256, 1, False]
14         -1 1    33624  models.common.Conv  [256, 128, 1, 1]
15         -1 1      0  torch.nn.modules.upsampling.Upsample  [None, 2, 'nearest']
16        [-1, 4] 1      0  models.common.Concat  [1]
17         -1 1     90880  models.common.C3    [256, 128, 1, False]
18         -1 1    147712  models.common.Conv  [128, 128, 3, 2]
19        [-1, 14] 1      0  models.common.Concat  [1]
20         -1 1    296448  models.common.C3    [256, 256, 1, False]
21         -1 1    590336  models.common.Conv  [256, 256, 3, 2]
22        [-1, 10] 1      0  models.common.Concat  [1]
23         -1 1    1182720  models.common.C3    [512, 512, 1, False]
24        [17, 20, 23] 1    229245  models.yolo.Detect  [80, [[10, 13, 16, 30, 33, 23], [30, 61, 62, 45, 59, 119], [116, 90, 156, 198, 373, 326]], [128, 256, 512]]
Model summary: 214 layers, 7235389 parameters, 7235389 gradients, 16.6 GFLOPs

Transferred 349/349 items from yolov5s.pt
optimizer: SGD(lr=0.01) with parameter groups 57 weight(decay=0.0), 60 weight(decay=0.0005), 60 bias
train: Scanning C:/Users/USER/Documents/tppython/datasets/coco128\labels\train2017.cache... 126 images, 2 backgrounds,
train: Caching images (0.1GB ram): 100%|#####| 120/128 [00:01<00:00, 64.86it/s]
vol: Scanning C:/Users/USER/Documents/tppython/datasets/coco128\labels\train2017.cache... 126 images, 2 backgrounds, 0
```

```

Transferred 349/349 items from yolov5s.pt
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train: Scanning C:\Users\USER\Documents\tpython\datasets\coco128\labels\train2017.cache... 126 images, 2 backgrounds,
train: Caching images (0.1GB ram): 100%|██████████| 128/128 [00:01<00:00, 64.86it/s]
val: Scanning C:\Users\USER\Documents\tpython\datasets\coco128\labels\train2017.cache... 126 images, 2 backgrounds, 0
val: Caching images (0.1GB ram): 100%|██████████| 128/128 [00:00<00:00, 390.25it/s]

AutoAnchor: 4.27 anchors/target, 0.994 Best Possible Recall (BPR). Current anchors are a good fit to dataset
Plotting labels to yolov5-master\runs\train\exp14\labels.jpg...
C:\Users\USER\Documents\tpython\yolov5-master\train.py:355: FutureWarning: `torch.cuda.amp.GradScaler(args...)` is deprecated. Please use `torch.amp.GradScaler('cuda', args...)` instead.
  scaler = torch.cuda.amp.GradScaler(enabled=amp)
Image sizes 640 train, 640 val
Using 4 dataloader workers
Logging results to yolov5-master\runs\train\exp14
Starting training for 3 epochs...

```

```

Epoch   GPU_mem   box_loss   obj_loss   cls_loss   Instances   Size
0%|      | 0/8 [00:00<?, ?it/s]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cu
da', args...)` instead.
  with torch.cuda.amp.autocast(amp):
    0/2      0G   0.04429   0.06439   0.01391      197      640: 12%|███████| 1/8 [16:48<1:57:36, 1008.02s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWa
rning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
  with torch.cuda.amp.autocast(amp):
    0/2      0G   0.04407   0.05901   0.01749      154      640: 25%|███████| 2/8 [1:12:13<3:57:05, 2370.86s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: Future
Warning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
  with torch.cuda.amp.autocast(amp):
    0/2      0G   0.04451   0.05735   0.01674      150      640: 38%|███████| 3/8 [1:13:09<1:49:31, 1314.26s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: Future
Warning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
  with torch.cuda.amp.autocast(amp):
    0/2      0G   0.04477   0.06103   0.01689      248      640: 50%|███████| 4/8 [1:13:58<54:18, 814.57s/it] C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: Future
Warning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
  with torch.cuda.amp.autocast(amp):
    0/2      0G   0.04414   0.05842   0.01644      157      640: 62%|███████| 5/8 [1:14:45<26:53, 537.77s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWar
ning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
  with torch.cuda.amp.autocast(amp):

```

## - Epoch 0/2

```

Logging results to yolov5-master\runs\train\exp14
Starting training for 3 epochs...

Epoch   GPU_mem   box_loss   obj_loss   cls_loss   Instances   Size
0%|      | 0/8 [00:00<?, ?it/s]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cu
da', args...)` instead.
  with torch.cuda.amp.autocast(amp):
    0/2      0G   0.04429   0.06439   0.01391      197      640: 12%|███████| 1/8 [16:48<1:57:36, 1008.02s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWa
rning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
  with torch.cuda.amp.autocast(amp):
    0/2      0G   0.04407   0.05901   0.01749      154      640: 25%|███████| 2/8 [1:12:13<3:57:05, 2370.86s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: Future
Warning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
  with torch.cuda.amp.autocast(amp):
    0/2      0G   0.04451   0.05735   0.01674      150      640: 38%|███████| 3/8 [1:13:09<1:49:31, 1314.26s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: Future
Warning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
  with torch.cuda.amp.autocast(amp):
    0/2      0G   0.04477   0.06103   0.01689      248      640: 50%|███████| 4/8 [1:13:58<54:18, 814.57s/it] C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: Future
Warning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
  with torch.cuda.amp.autocast(amp):
    0/2      0G   0.04414   0.05842   0.01644      157      640: 62%|███████| 5/8 [1:14:45<26:53, 537.77s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWar
ning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
  with torch.cuda.amp.autocast(amp):
    0/2      0G   0.04414   0.05835   0.01667      189      640: 75%|███████| 6/8 [1:15:29<12:20, 370.10s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWar
ning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
  with torch.cuda.amp.autocast(amp):
    0/2      0G   0.04468   0.05868   0.01669      187      640: 88%|███████| 7/8 [1:16:11<04:22, 262.60s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWar
ning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
  with torch.cuda.amp.autocast(amp):
    0/2      0G   0.04437   0.05843   0.01733      164      640: 100%|██████████| 8/8 [1:16:54<00:00, 576.83s/it]
      Class      Images      Instances      P      R      mAP50      mAP50-95
      Class      Images      Instances      P      R      mAP50      mAP50-95
    all          128          929      0.631      0.526      0.579      0.377

```

## - EPOCH 1/2

```
Epoch GPU_mem box_loss obj_loss cls_loss Instances Size
0% | 0/8 [00:00<?, ?it/s]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cu
da', args...)` instead.
with torch.cuda.amp.autocast(amp):
  1/2 0G 0.04782 0.06813 0.01766 205 640: 12% | 1/8 [00:41<04:50, 41.50s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarnin
g: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
with torch.cuda.amp.autocast(amp):
  1/2 0G 0.04442 0.06213 0.0159 147 640: 25% | 2/8 [01:20<04:00, 40.06s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarnin
g: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
with torch.cuda.amp.autocast(amp):
  1/2 0G 0.04494 0.06298 0.01673 220 640: 38% | 3/8 [01:58<03:15, 39.00s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarnin
g: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
with torch.cuda.amp.autocast(amp):
  1/2 0G 0.04609 0.06947 0.01705 311 640: 50% | 4/8 [02:35<02:33, 38.42s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarnin
g: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
with torch.cuda.amp.autocast(amp):
  1/2 0G 0.0463 0.06815 0.01668 192 640: 62% | 5/8 [03:20<02:01, 40.61s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarnin
g: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
with torch.cuda.amp.autocast(amp):
  1/2 0G 0.04616 0.06753 0.01605 219 640: 75% | 6/8 [04:01<01:21, 40.80s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarnin
g: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
with torch.cuda.amp.autocast(amp):
  1/2 0G 0.04551 0.06469 0.016 171 640: 88% | 7/8 [04:44<00:41, 41.47s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarnin
g: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
with torch.cuda.amp.autocast(amp):
  1/2 0G 0.04507 0.06348 0.0157 185 640: 100% | 8/8 [05:26<00:00, 40.86s/it]
Class Images Instances P R mAP50 mAP50-95: 100% | 4/4 [01:26<00:00, 21.74s/it]
all 128 929 0.752 0.61 0.715 0.471
```

## - EPOCH 2/2

```
Epoch GPU_mem box_loss obj_loss cls_loss Instances Size
0% | 0/8 [00:00<?, ?it/s]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cu
da', args...)` instead.
with torch.cuda.amp.autocast(amp):
  2/2 0G 0.04411 0.06451 0.01535 278 640: 12% | 1/8 [00:40<04:40, 40.05s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarnin
g: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
with torch.cuda.amp.autocast(amp):
  2/2 0G 0.0439 0.07822 0.01434 238 640: 25% | 2/8 [01:21<04:05, 40.96s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarnin
g: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
with torch.cuda.amp.autocast(amp):
  2/2 0G 0.04419 0.06893 0.01485 176 640: 38% | 3/8 [02:02<03:24, 40.80s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarnin
g: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
with torch.cuda.amp.autocast(amp):
  2/2 0G 0.04386 0.06668 0.01504 212 640: 50% | 4/8 [02:42<02:41, 40.47s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarnin
g: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
with torch.cuda.amp.autocast(amp):
  2/2 0G 0.04435 0.06791 0.01532 236 640: 62% | 5/8 [03:27<02:06, 42.19s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarnin
g: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
with torch.cuda.amp.autocast(amp):
  2/2 0G 0.04381 0.06637 0.01537 203 640: 75% | 6/8 [04:09<01:24, 42.08s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarnin
g: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
with torch.cuda.amp.autocast(amp):
  2/2 0G 0.04404 0.06465 0.01556 176 640: 88% | 7/8 [04:48<00:41, 41.08s/it]C:\Users\USER\Documents\tpython\yolov5-master\train.py:412: FutureWarnin
g: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.
with torch.cuda.amp.autocast(amp):
  2/2 0G 0.04333 0.06397 0.01573 182 640: 100% | 8/8 [05:27<00:00, 40.89s/it]
Class Images Instances P R mAP50 mAP50-95: 100% | 4/4 [01:28<00:00, 22.20s/it]
all 128 929 0.783 0.632 0.744 0.489

3 epochs completed in 1.548 hours.
Optimizer stripped from yolov5-master\runs\train\exp14\weights\last.pt, 14.9MB
Optimizer stripped from yolov5-master\runs\train\exp14\weights\best.pt, 14.9MB
```

## VALIDATION

```

3 epochs completed in 1.548 hours.
Optimizer stripped from yolov5-master\runs\train\exp14\weights\last.pt, 14.9MB
Optimizer stripped from yolov5-master\runs\train\exp14\weights\best.pt, 14.9MB

Validating yolov5-master\runs\train\exp14\weights\best.pt...
Fusing layers...
Model summary: 157 layers, 7225885 parameters, 0 gradients, 16.4 GFLOPs

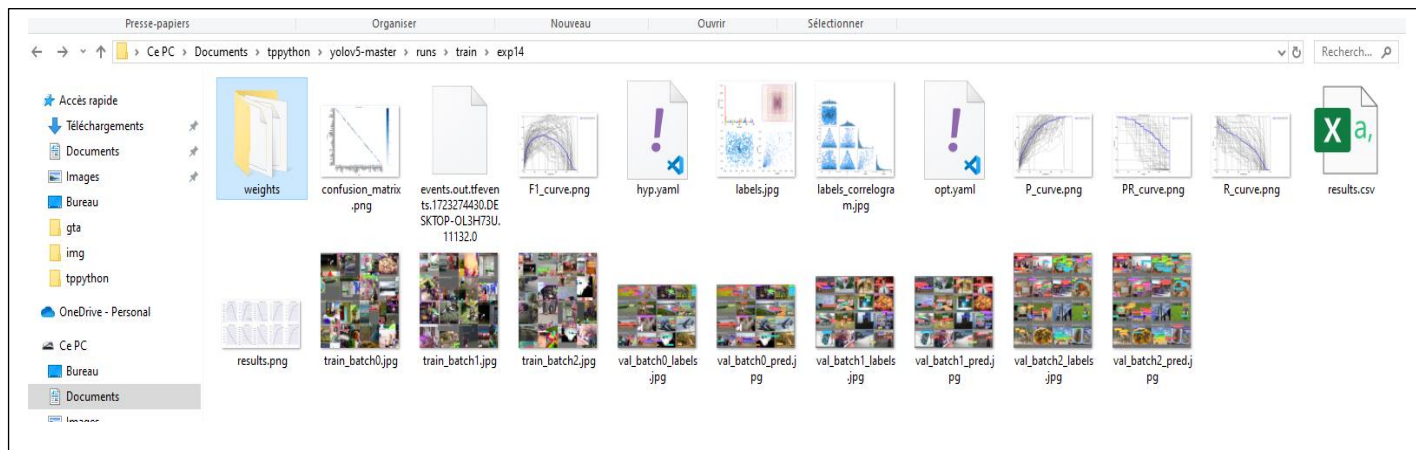
```

Class	Images	Instances	P	R	mAP50	mAP50-95
all	128	929	0.781	0.633	0.744	0.489
person	128	254	0.895	0.704	0.806	0.531
bicycle	128	6	0.767	0.557	0.725	0.428
car	128	46	0.752	0.37	0.549	0.229
motorcycle	128	5	0.56	0.8	0.845	0.64
airplane	128	6	1	0.994	0.995	0.7
bus	128	7	0.649	0.714	0.788	0.697
train	128	3	0.673	0.333	0.753	0.479
truck	128	12	0.698	0.417	0.498	0.279
boat	128	6	0.949	0.333	0.528	0.217
traffic light	128	14	0.759	0.227	0.374	0.208
stop sign	128	2	0.815	1	0.995	0.821
bench	128	9	0.824	0.526	0.628	0.259
bird	128	16	0.963	1	0.995	0.672
cat	128	4	0.886	1	0.995	0.772
dog	128	9	0.993	0.667	0.893	0.639
horse	128	2	0.863	1	0.995	0.622
elephant	128	17	0.916	0.882	0.937	0.708
bear	128	1	0.698	1	0.995	0.995
zebra	128	4	0.842	1	0.995	0.905
giraffe	128	9	0.78	0.788	0.908	0.702
backpack	128	6	0.72	0.5	0.739	0.31
umbrella	128	18	0.864	0.709	0.869	0.503
handbag	128	19	0.79	0.2	0.344	0.171
tie	128	7	0.826	0.684	0.764	0.485
suitcase	128	4	0.881	1	0.995	0.588
frisbee	128	5	0.722	0.8	0.8	0.67
skis	128	1	0.839	1	0.995	0.115
snowboard	128	7	0.819	0.652	0.828	0.538
sports ball	128	6	0.66	0.667	0.602	0.31
kite	128	10	0.702	0.474	0.589	0.213
baseball bat	128	4	1	0.494	0.544	0.213
baseball glove	128	7	0.543	0.429	0.466	0.309
skateboard	128	5	1	0.59	0.715	0.476
tennis racket	128	7	0.76	0.429	0.538	0.32
bottle	128	18	0.567	0.365	0.54	0.267
wine glass	128	16	0.757	0.875	0.914	0.499
cup	128	36	0.806	0.556	0.781	0.521
fork	128	6	1	0.326	0.452	0.311
knife	128	16	0.778	0.659	0.717	0.398
spoon	128	22	0.841	0.481	0.631	0.383
bowl	128	28	0.841	0.536	0.711	0.515

giraffe	128	9	0.78	0.788	0.908	0.702
backpack	128	6	0.72	0.5	0.739	0.31
umbrella	128	18	0.864	0.709	0.869	0.503
handbag	128	19	0.79	0.2	0.344	0.171
tie	128	7	0.826	0.684	0.764	0.485
suitcase	128	4	0.881	1	0.995	0.588
frisbee	128	5	0.722	0.8	0.8	0.67
skis	128	1	0.839	1	0.995	0.115
snowboard	128	7	0.819	0.652	0.828	0.538
sports ball	128	6	0.66	0.667	0.602	0.31
kite	128	10	0.702	0.474	0.589	0.213
baseball bat	128	4	1	0.494	0.544	0.213
baseball glove	128	7	0.543	0.429	0.466	0.309
skateboard	128	5	1	0.59	0.715	0.476
tennis racket	128	7	0.76	0.429	0.538	0.32
bottle	128	18	0.567	0.365	0.54	0.267
wine glass	128	16	0.757	0.875	0.914	0.499
cup	128	36	0.806	0.556	0.781	0.521
fork	128	6	1	0.326	0.452	0.311
knife	128	16	0.778	0.659	0.717	0.398
spoon	128	22	0.841	0.481	0.631	0.383
bowl	128	28	0.841	0.536	0.711	0.515
banana	128	1	0.872	1	0.995	0.205
sandwich	128	2	1	0	0.662	0.579
orange	128	4	1	0.958	0.995	0.604
broccoli	128	11	0.635	0.364	0.436	0.33
carrot	128	24	0.69	0.583	0.693	0.469
hot dog	128	2	0.393	1	0.995	0.92
pizza	128	5	0.809	0.8	0.962	0.791
donut	128	14	0.651	1	0.961	0.826
cake	128	4	0.857	1	0.995	0.822
chair	128	35	0.567	0.599	0.619	0.328
couch	128	6	0.884	0.667	0.822	0.546
potted plant	128	14	0.732	0.786	0.821	0.468
bed	128	3	0.885	0.333	0.83	0.455
dining table	128	13	0.817	0.346	0.582	0.363
toilet	128	2	1	0.98	0.995	0.846
tv	128	2	0.569	1	0.995	0.746
laptop	128	3	1	0	0.592	0.311
mouse	128	2	1	0	0.106	0.0531
remote	128	8	1	0.624	0.635	0.539
cell phone	128	8	0.654	0.375	0.435	0.216
microwave	128	3	0.773	1	0.995	0.733
oven	128	5	0.329	0.4	0.448	0.264
sink	128	6	0.498	0.333	0.346	0.246
refrigerator	128	5	0.551	0.8	0.798	0.559
book	128	20	0.627	0.233	0.361	0.162
clock	128	9	0.778	0.889	0.932	0.755
vase	128	2	0.353	1	0.995	0.895
scissors	128	1	1	0	0.497	0.0498
teddy bear	128	21	0.844	0.517	0.763	0.512
toothbrush	128	5	0.711	0.6	0.853	0.576

Results saved to yolov5-master\runs\train\exp14

On constate que le résultat est stocké dans le répertoire train avec pour chemin d'accès 'Results saved to yolov5-master\runs\train\exp14'

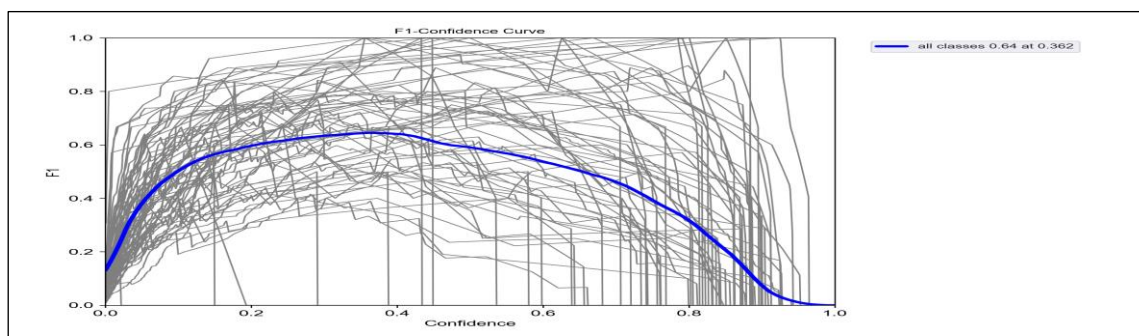
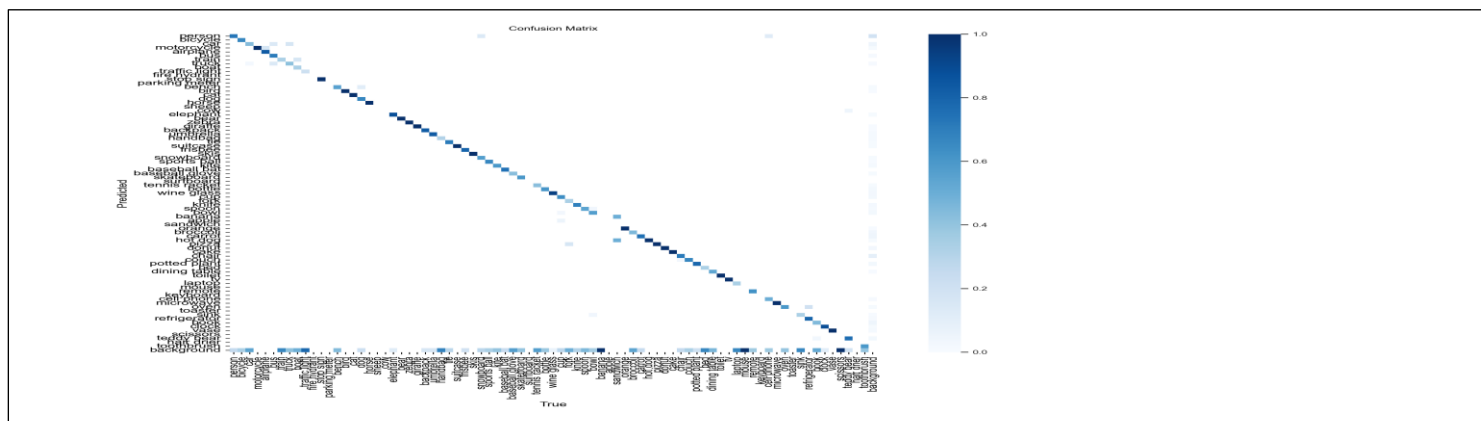


# RÉSULTATS :

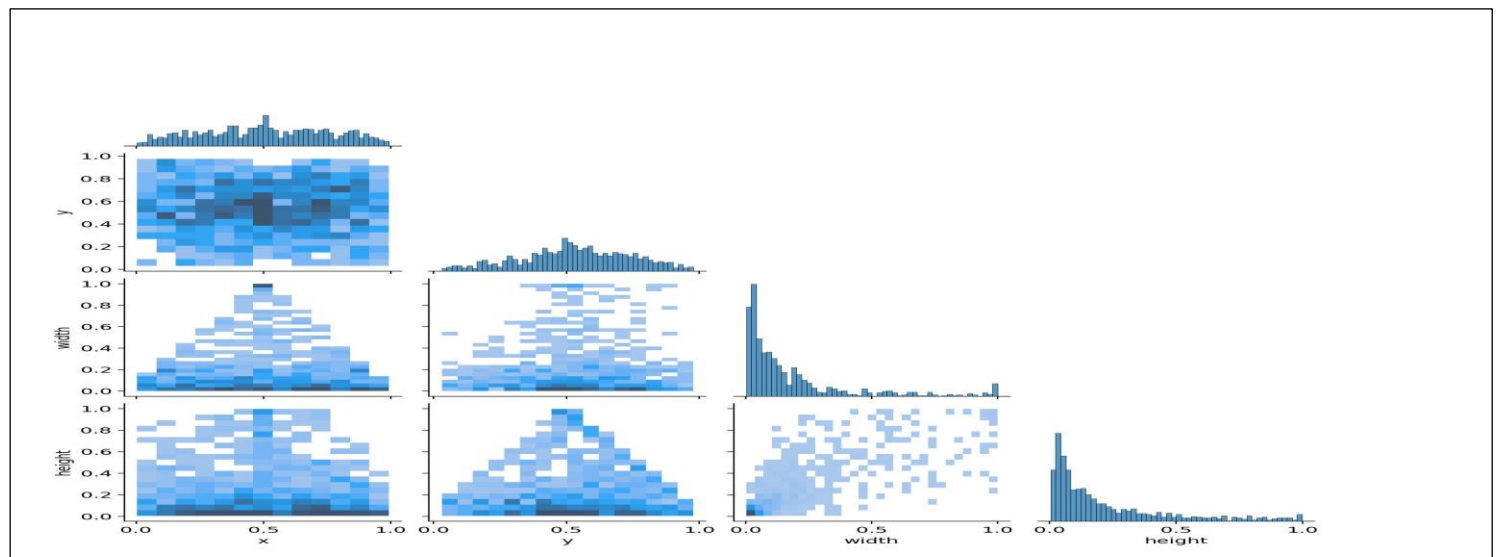
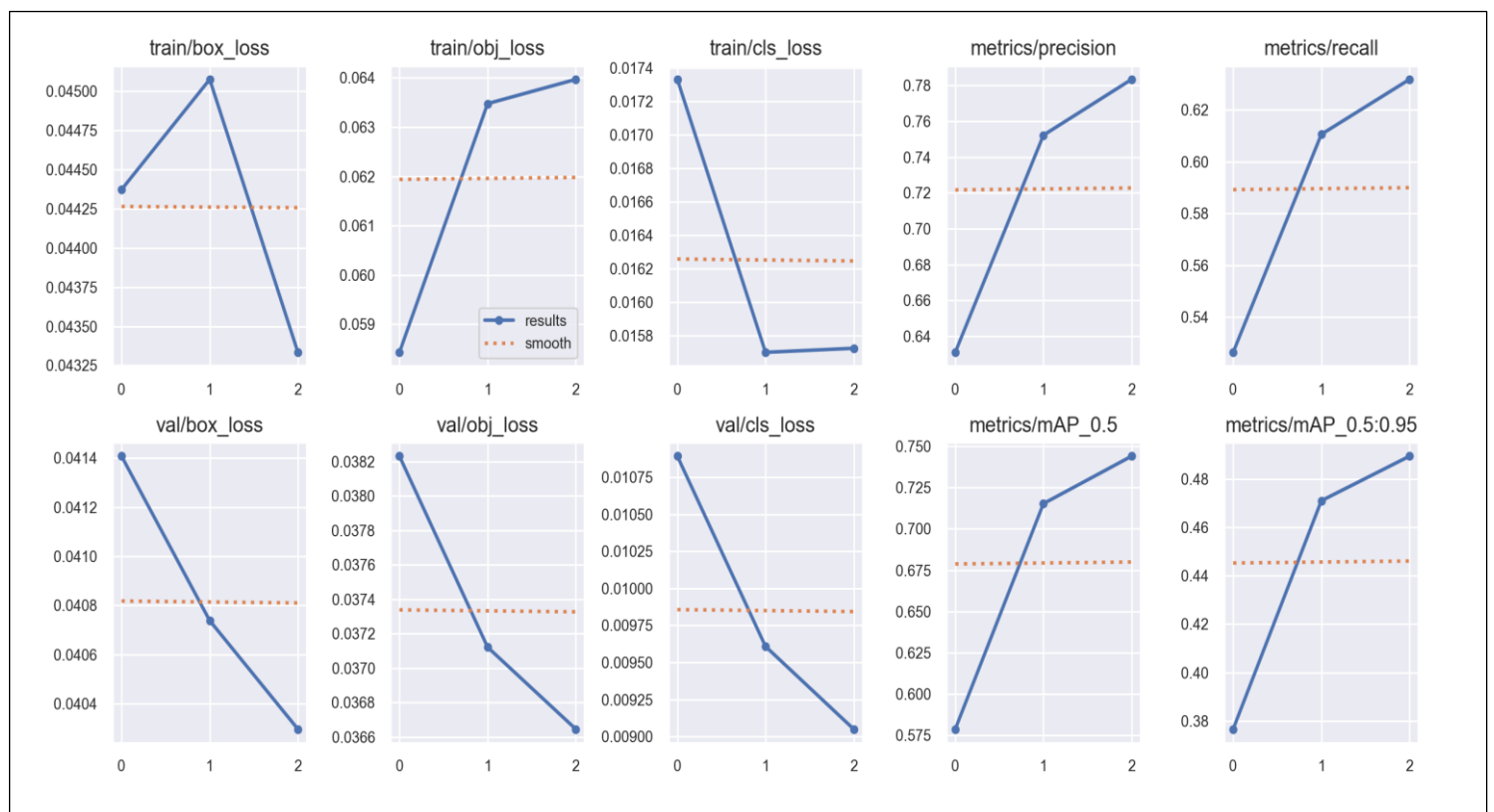
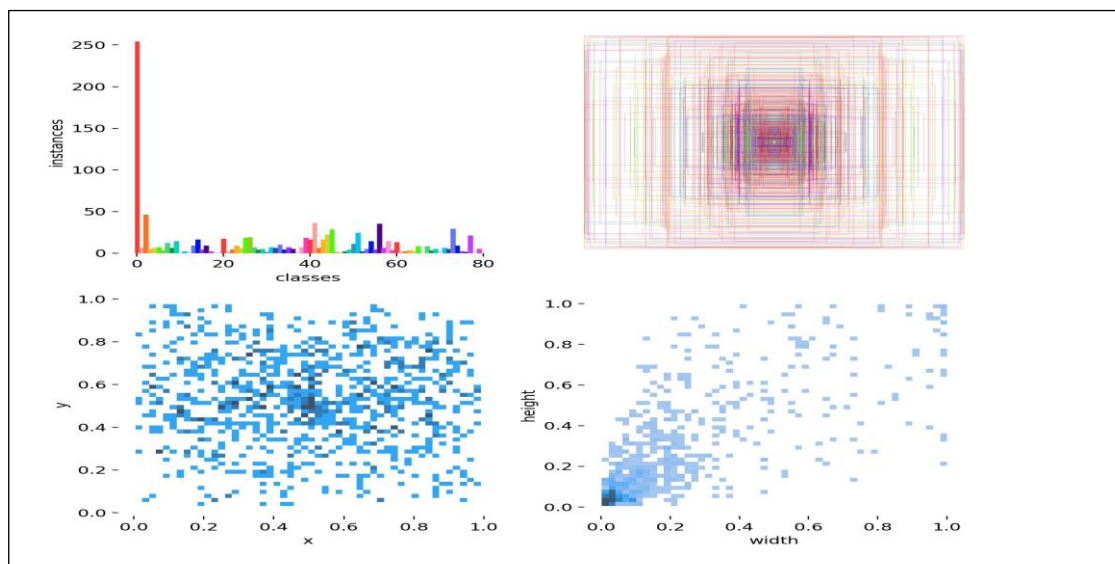
## 1- Métriques

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	epoch,	train/box_loss,	train/obj_loss,	train/cls_loss,	metrics/precision,	metrics/recall,	metrics/mAP_0.5,	metrics/mAP_0.5:0.95,	val/box_loss,	val/obj_loss,	val/cls_loss,	x/lr0,	x/lr1,	x/lr2					
2	0,	0.044372,	0.058429,	0.017331,	0.63095,	0.52644,	0.57865,	0.37662,	0.041408,	0.038231,	0.010893,	0.0937,	0.0007,	0.0007					
3	1,	0.045075,	0.063476,	0.015702,	0.7522,	0.61049,	0.71532,	0.471,	0.040738,	0.037121,	0.0096083,	0.086005,	0.001005,	0.001005					
4	2,	0.043334,	0.063968,	0.015726,	0.78337,	0.63168,	0.74408,	0.48942,	0.040296,	0.036645,	0.00905,	0.077782,	0.000782,	0.000782					
5																			
6																			
7																			
8																			

## 2- Graphiques

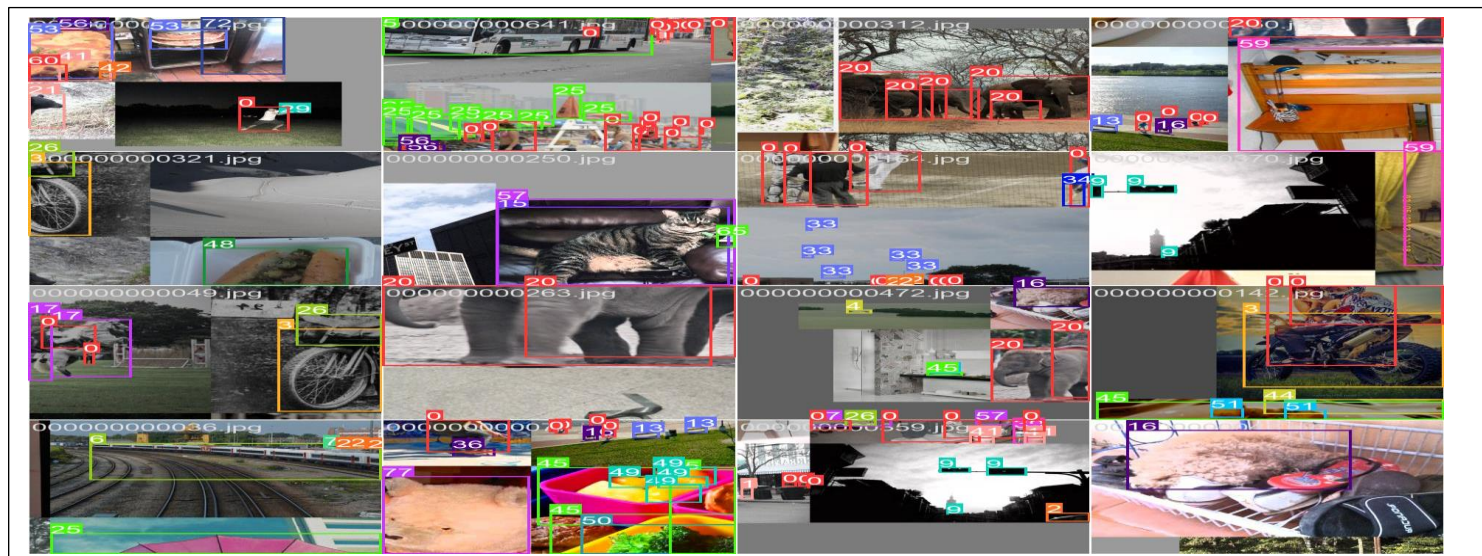












Référence : 1- Documentation Ultralytics YOLOv5. (nd). <https://docs.ultralytics.com>

2- Ensemble de données COCO. (nd). Objets communs en contexte. <http://cocodataset.org>