

AVANTIX

Avancement Simulateur IQ

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pdw2h5

```
git clone ssh://git@10.222.5.234:32000/elint-dev/pdw2h5.git
```

PDW2H5

pdw2h5 is a Python library allowing to generate a HDF5 MC file from a list of pdw generated via the iq2pdw library.

Installation

In the pdw2h5 folder:

```
chmod +x setup.sh
./setup.sh
```

Usage

```
from pdw2h5 import pdw2h5

mc_filename = "mc_filename.mc"

# Create a copy of the mc_filename with _output suffix with PDW dataset and required link tables
pdw2h5(mc_filename=mc_filename)
```

pdw2h5

mydev > format_multi_capteurs > chrip+_202 - original_output.mc

chrip+_202 - original_output.mc

- Capteurs
 - ELIT
 - V1
 - Configurations
 - IQ
 - ProduitsInterceptionsRadar
 - PDW**
 - SignauxAcquisOuEmis
 - SignauxIQ
 - VoiesAcquisitions
 - OutilsAT
 - Liens
 - DescriptionsLiens
 - Liens_0

ELIT > V1 > ProduitsInterceptionsRadar > PDW

Matrix Cell width 150 Notation Auto Scientific Fixed-point Freeze indices Export

n	38		idConfiguration	idSignal	TOA	DI	frequence
x	D0	0	0	0	746	31.788	8.8566e+10
		1	0	0	1219	127.64	8.3057e+11
		2	0	0	1290	0.481	1.8707e+11
		3	0	0	1560	128.56	-5.77e+9
		4	0	0	9924	7.772	2.879e+11
		5	0	0	9966	0.419	3.2422e+11
		6	0	0	10072	0.249	2.9423e+11
		7	0	0	20403	5.699	-1.036e+10
		8	0	0	20637	6.255	-8.7264e+9
		9	0	0	21120	109.73	7.8111e+11
		10	0	0	21262	2.093	2.0552e+11
		11	0	0	24059	0.04	4.4386e+11
		12	0	0	24940	53.51	7.175e+11
		13	0	0	27648	73.855	7.801e+11
		14	0	0	31844	0.79	1.9359e+11
		15	0	0	35123	49.387	-4.821e+10
		16	0	0	40318	43.905	-5.9087e+10
		17	0	0	47813	8.571	3.7542e+11
		18	0	0	47871	6.784	3.755e+11

mydev > format_multi_capteurs > chrip+_202 - original.mc

chrip+_202 - original.mc

Capteurs

Matrix Cell width 450

n	1	nom
x	D0	0
		ELIT

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BT-202c

- 40 680 images 80% train, 20% val et 20% test
- $\sigma_{\text{noise}} = 1\text{mV}$, $f_{\text{c_rec}} = 2,5\text{GHz}$, $f_{\text{s}} = 1\text{GSps}$
- RADAR & RADAR+COM : 50 / 50
- $n_{\text{perseg}} = [128, 256, 512, 1024]$, $n_{\text{fft}} = 1024$, $n_{\text{overlap}} = n_{\text{perseg}}/2$
- $\text{snr_eff_db_min} = -5\text{dB}$
- Mise à l'échelle : $\text{min} = 1^{\text{er}} \text{ décile}$, $\text{max} = 3000 * 1^{\text{er}} \text{ décile}$
- **Aspect ratio max = 10:1**
- **width x height : 256 x 1024**

Problèmes possibles pour YOLO :

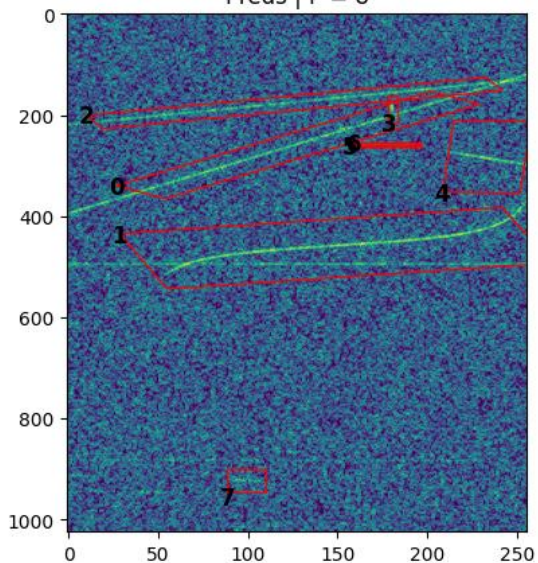
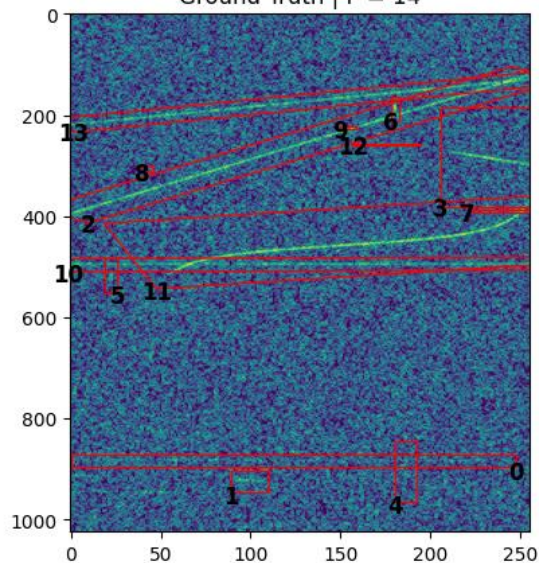
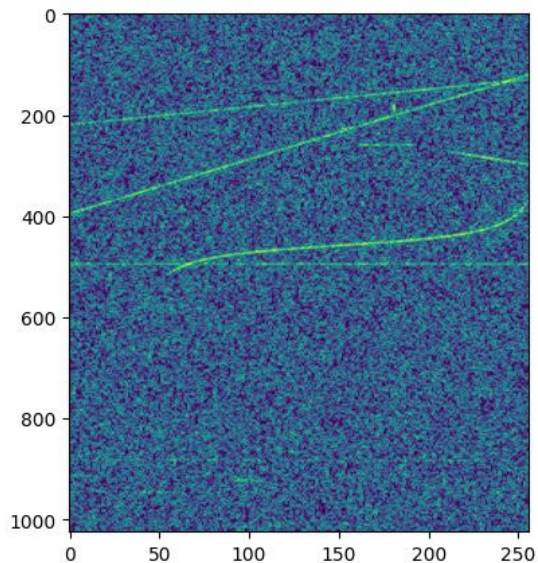
- Largeur ou hauteur de certains objets trop fins
- OBB non rectangulaires dans certains cas

Inférence sur test

seed:0, rec_3723_fs_1000.0MSps_nperseg_256.txt

Ground Truth | P = 14

Preds | P = 8

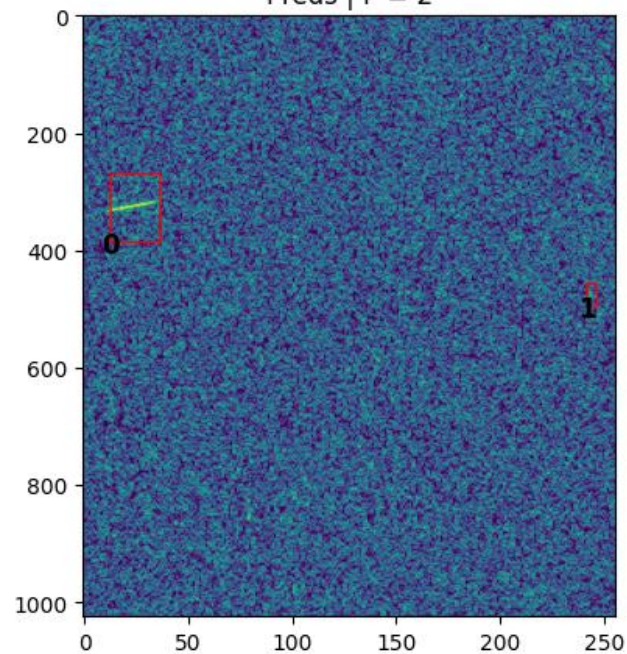
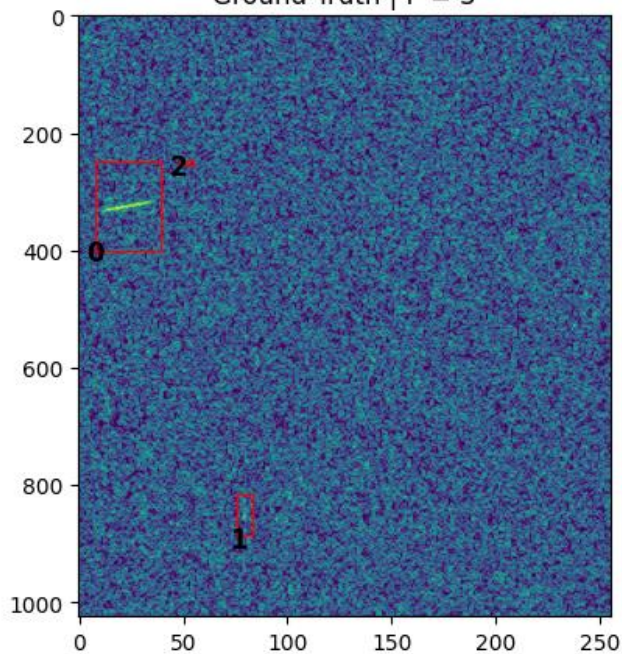
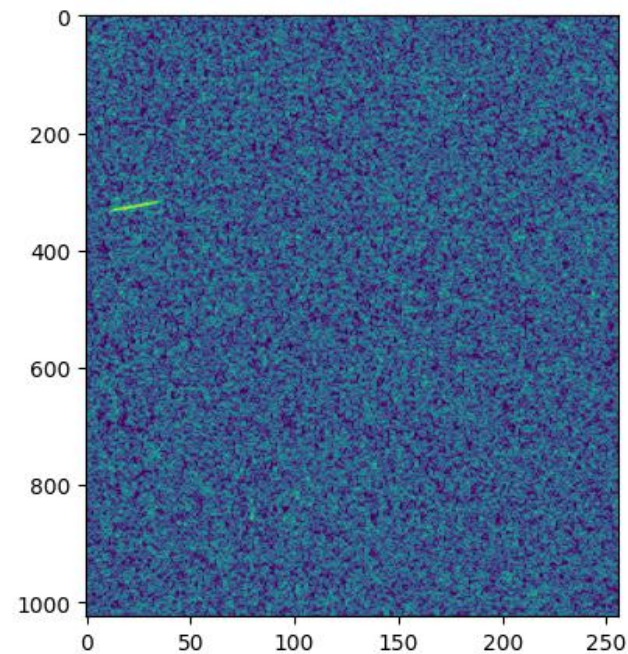


Inférence sur test

seed:1, rec_24523_fs_1000.0MSps_nperseg_256.txt

Ground Truth | P = 3

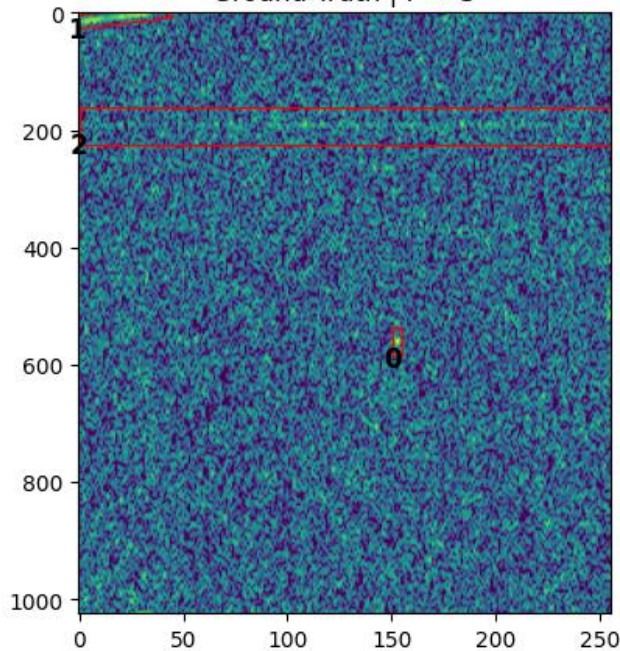
Preds | P = 2



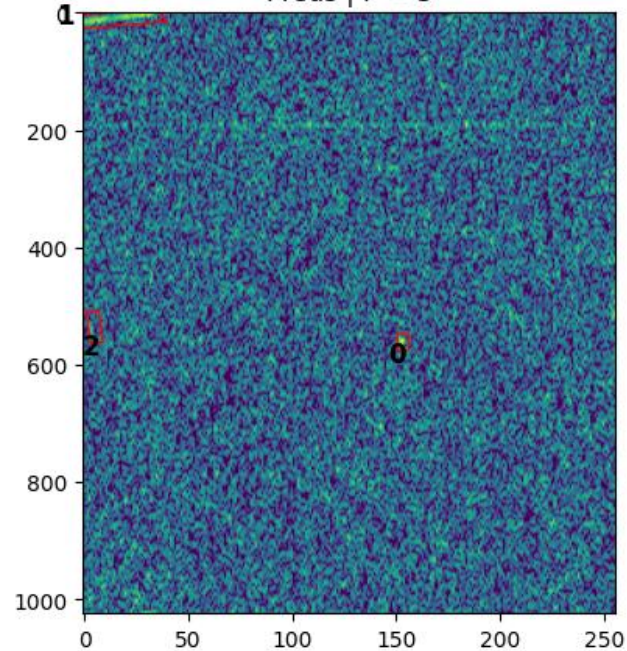
Inférence sur test

seed:2, rec_18267_fs_1000.0MSps_nperseg_128.txt

Ground Truth | $P = 3$



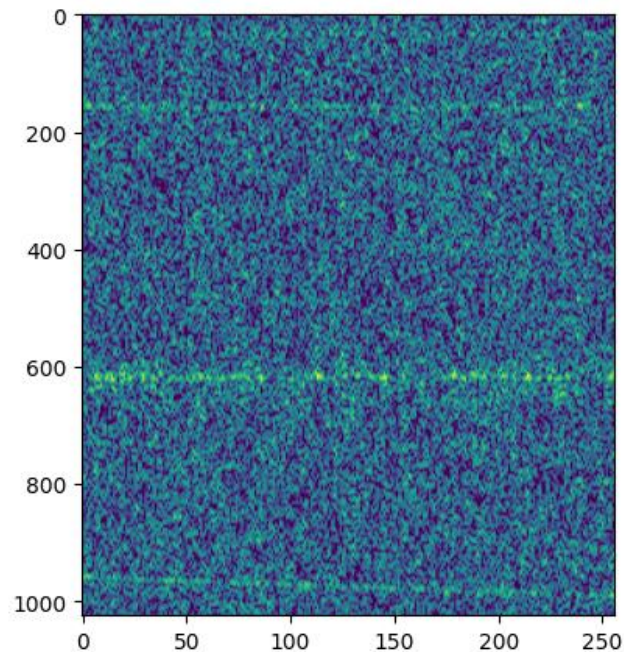
Preds | $P = 3$



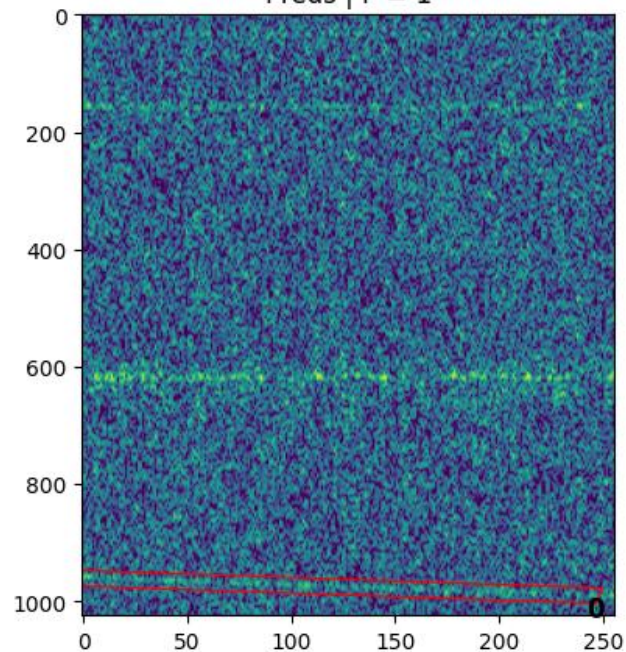
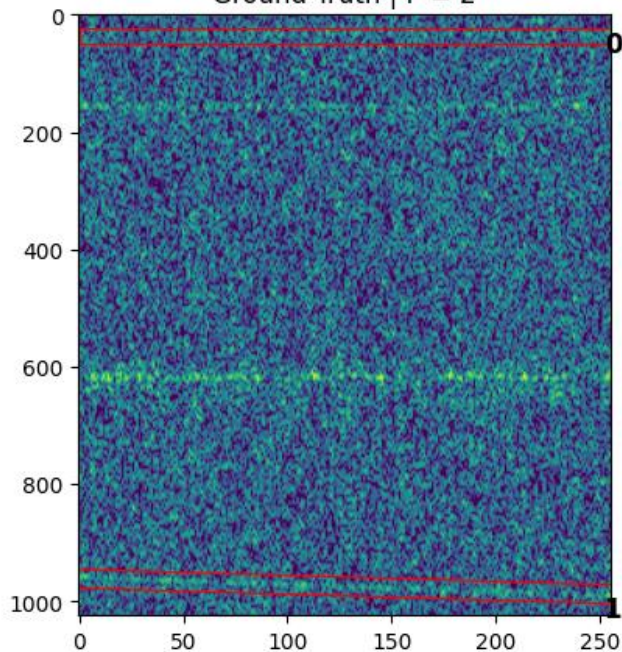
Inférence sur test

seed:3, rec_39103_fs_1000.0MSps_nperseg_128.txt

Ground Truth | $P = 2$



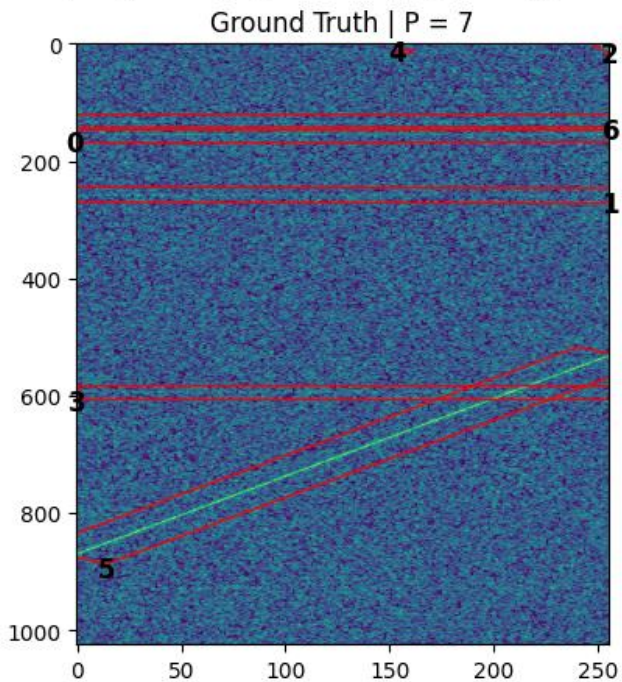
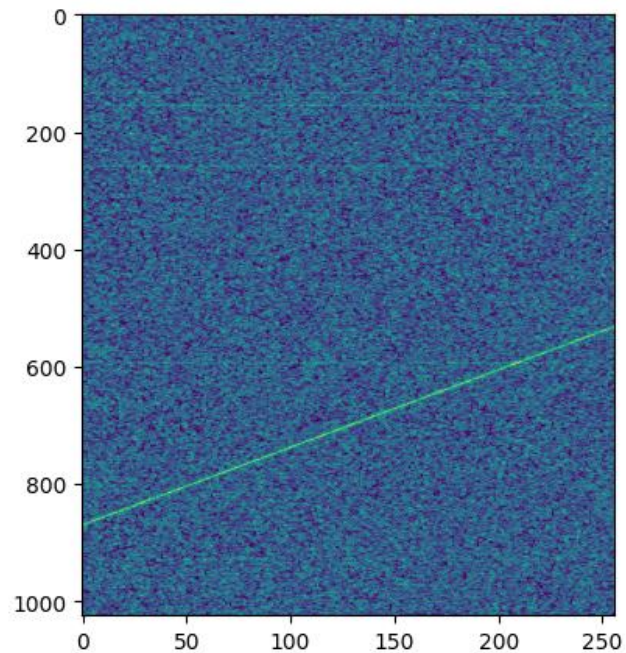
Preds | $P = 1$



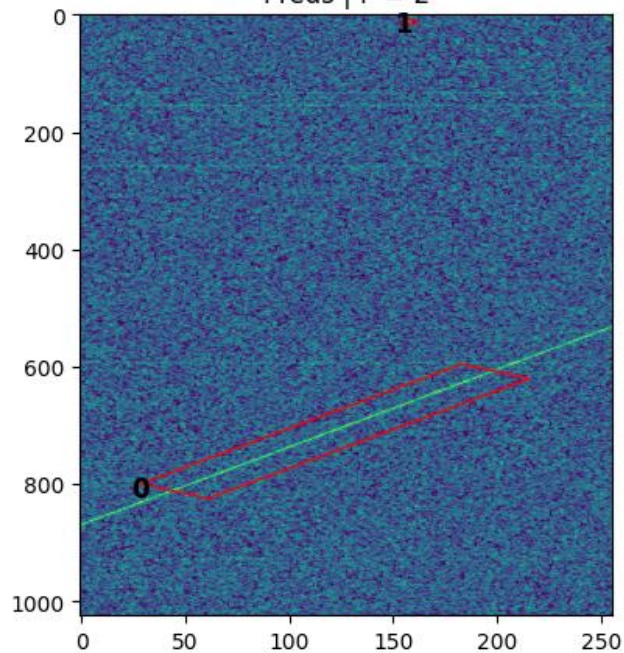
Inférence sur test

seed:4, rec_27514_fs_1000.0MSps_nperseg_512.txt

Ground Truth | $P = 7$



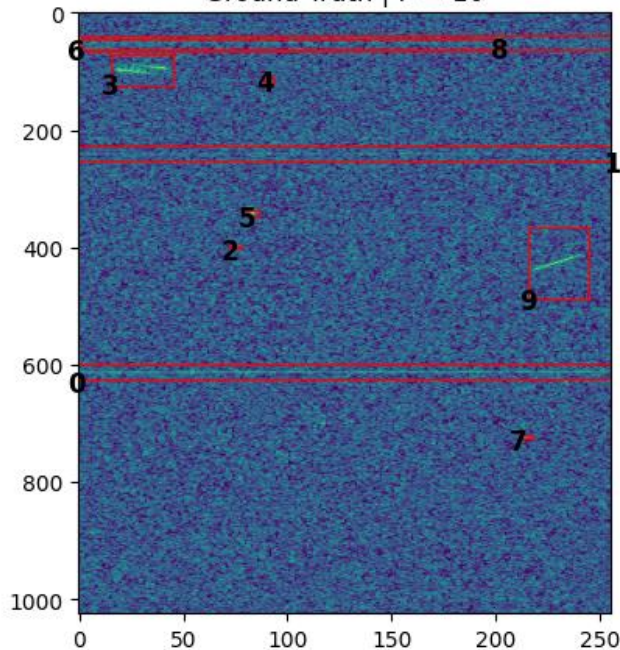
Preds | $P = 2$



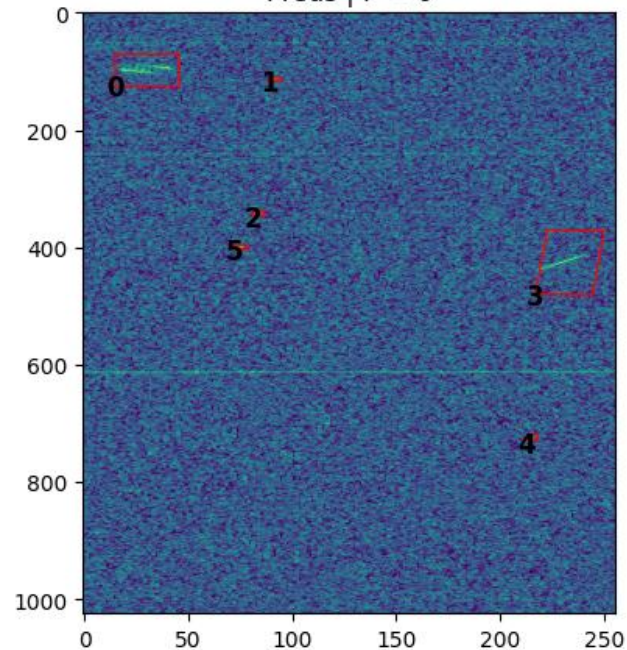
Inférence sur test

seed:5, rec_28724_fs_1000.0MSps_nperseg_512.txt

Ground Truth | P = 10



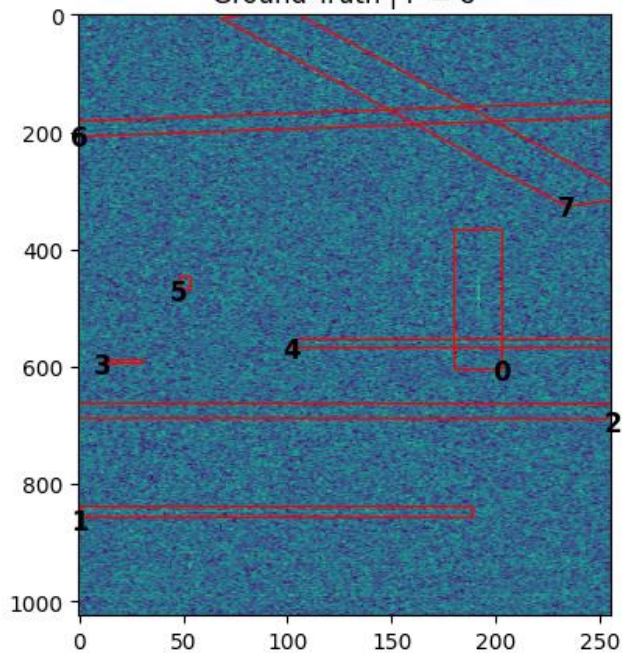
Preds | P = 6



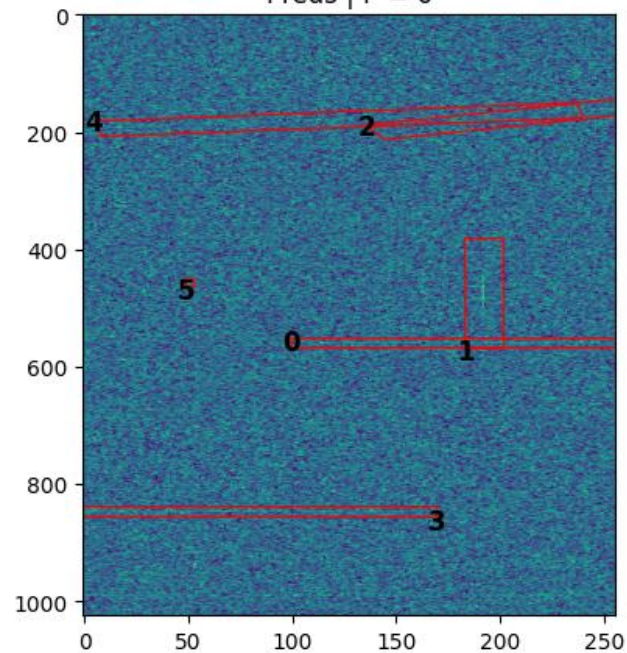
Inférence sur test

seed:6, rec_17637_fs_1000.0MSps_nperseg_1024.txt

Ground Truth | P = 8



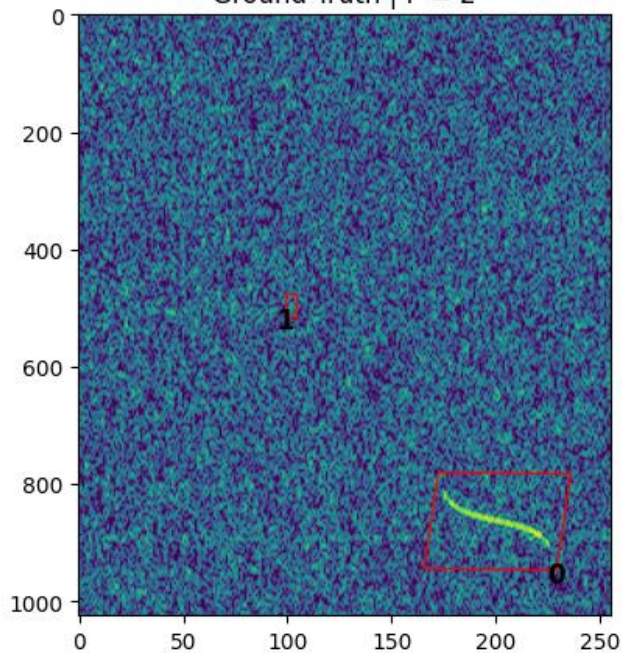
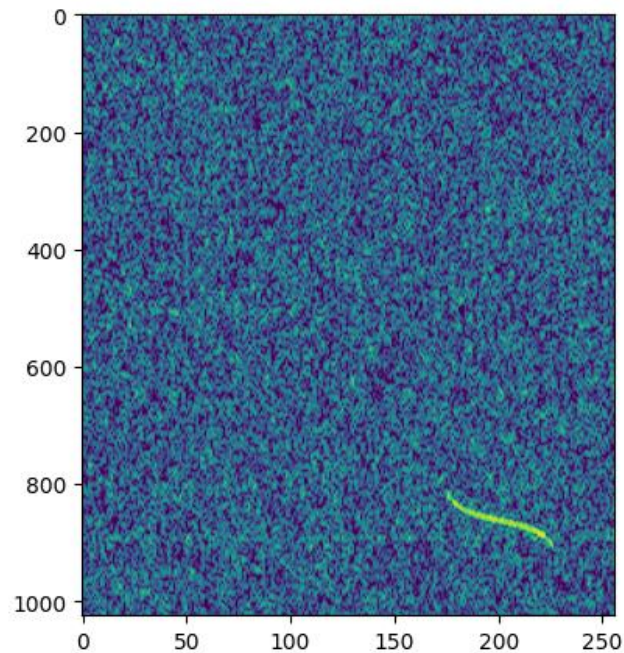
Preds | P = 6



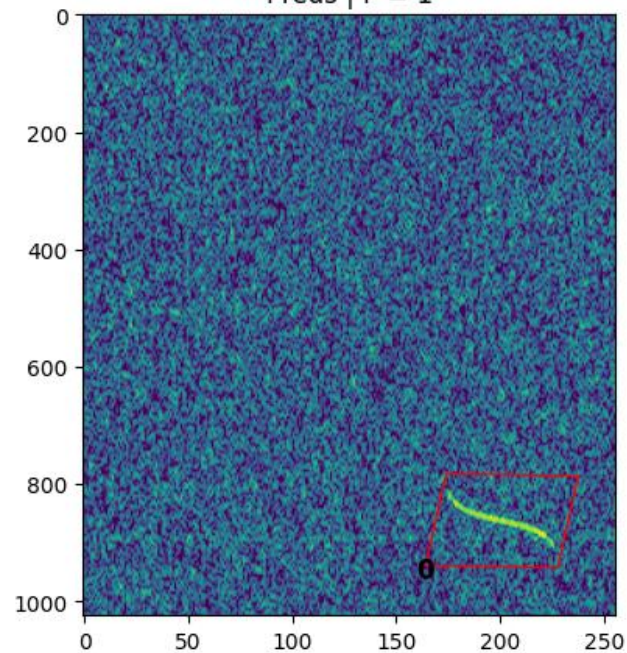
Inférence sur test

seed:7, rec_33922_fs_1000.0MSps_nperseg_128.txt

Ground Truth | $P = 2$



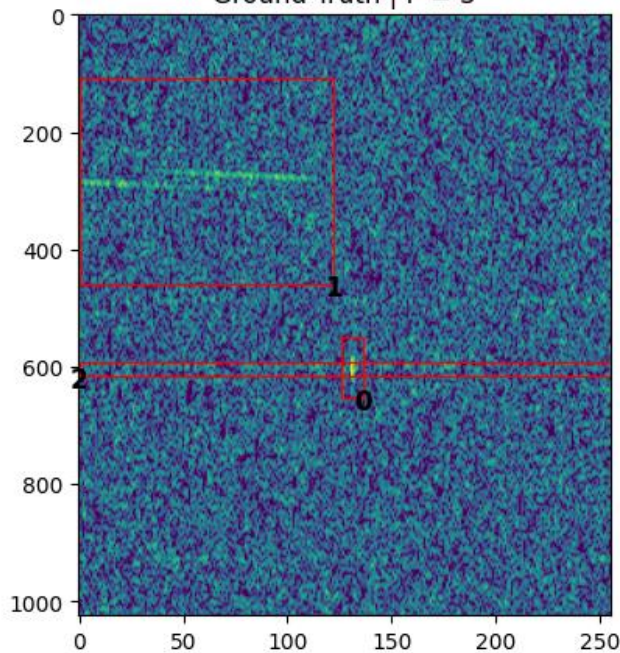
Preds | $P = 1$



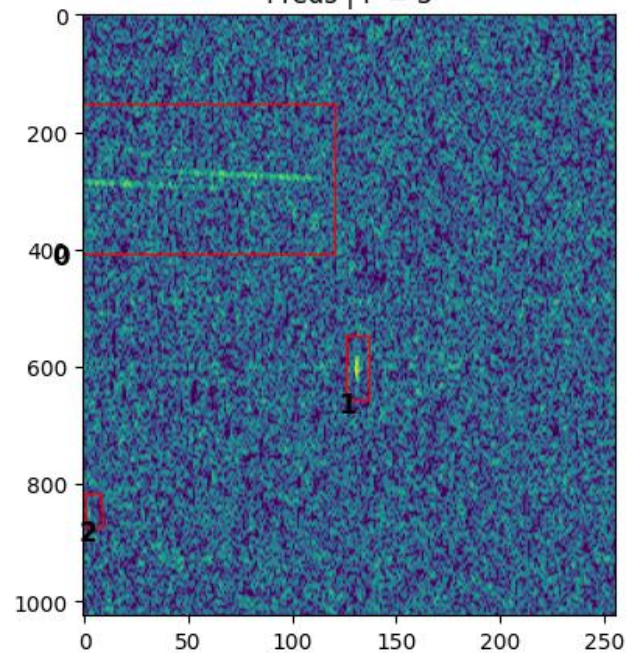
Inférence sur test

seed:8, rec_16706_fs_1000.0MSps_nperseg_128.txt

Ground Truth | P = 3



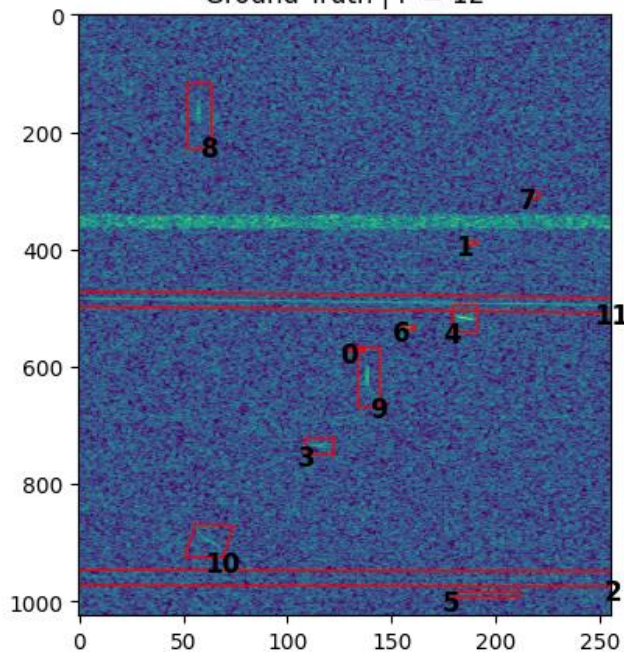
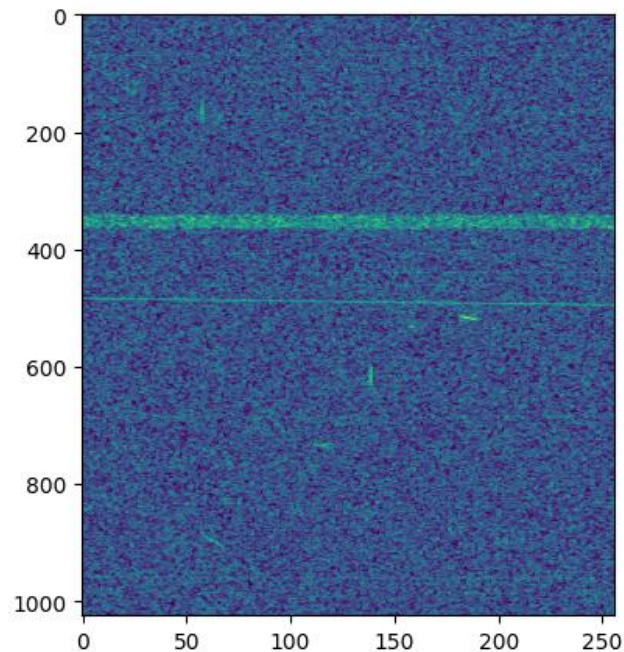
Preds | P = 3



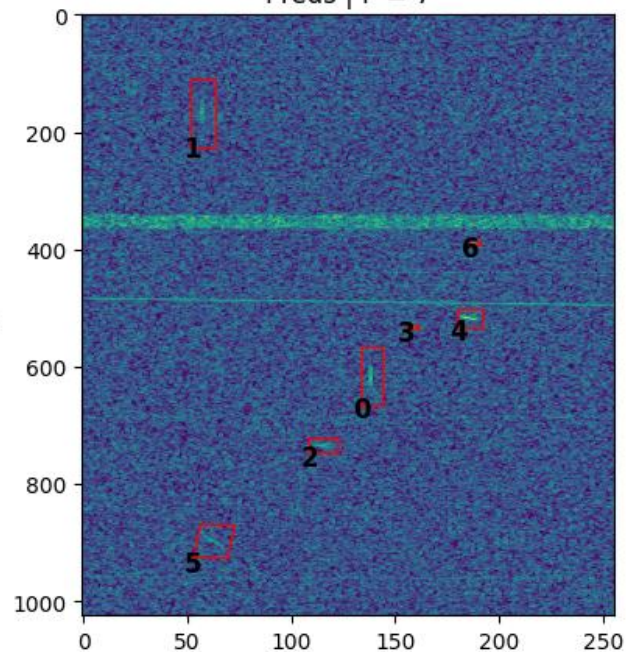
Inférence sur test

seed:9, rec_31696_fs_1000.0MSps_nperseg_512.txt

Ground Truth | $P = 12$



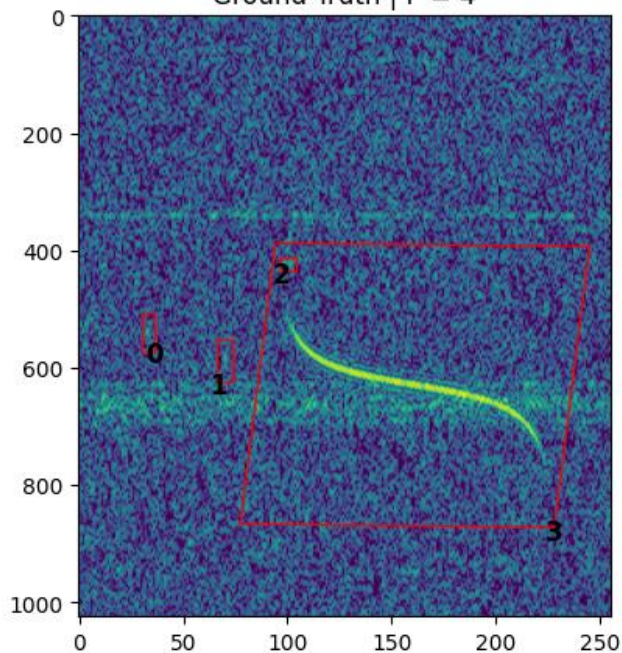
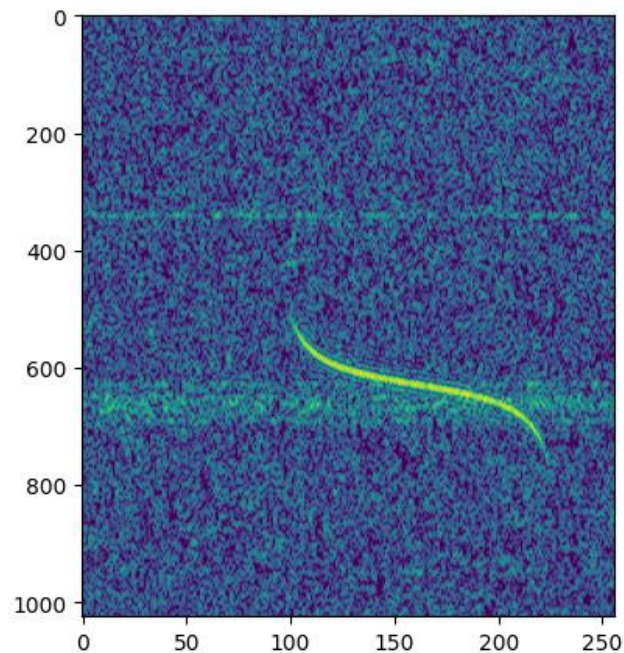
Preds | $P = 7$



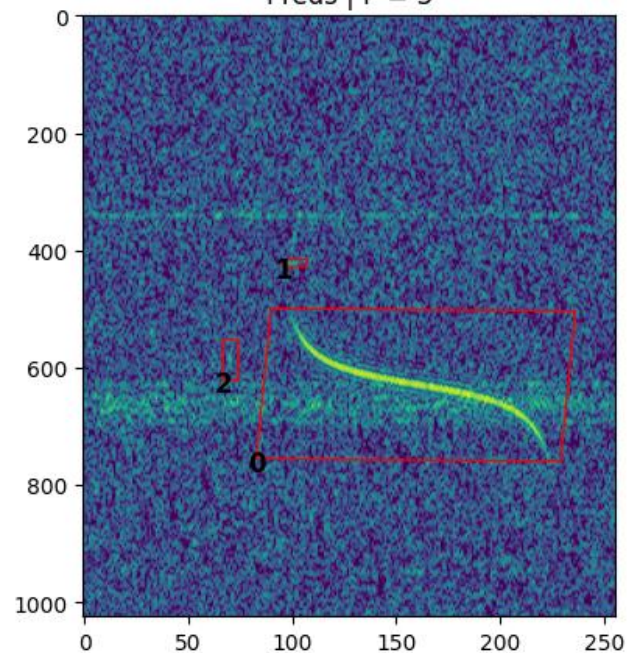
Inférence sur test

seed:10, rec_8505_fs_1000.0MSps_nperseg_128.txt

Ground Truth | P = 4



Preds | P = 3

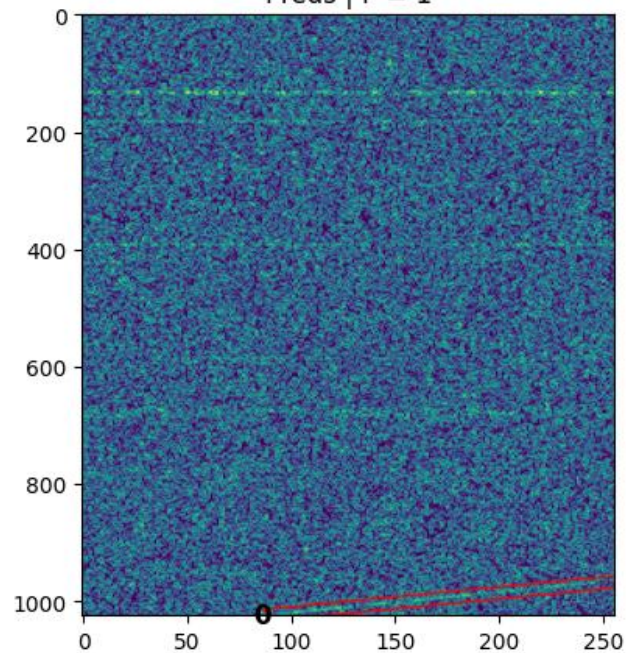
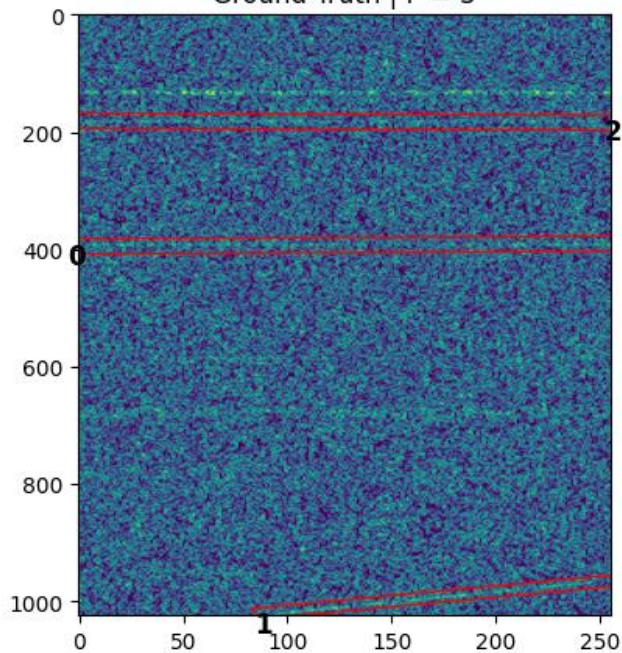
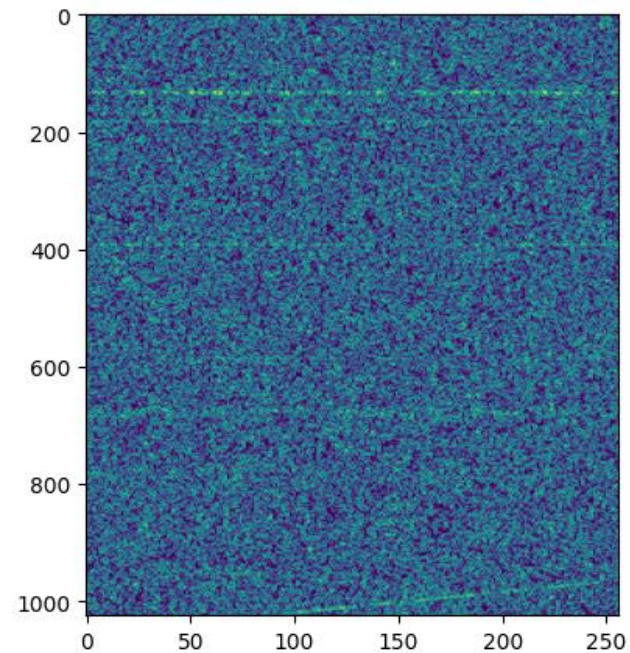


Inférence sur test

seed:11, rec_15308_fs_1000.0MSps_nperseg_256.txt

Ground Truth | $P = 3$

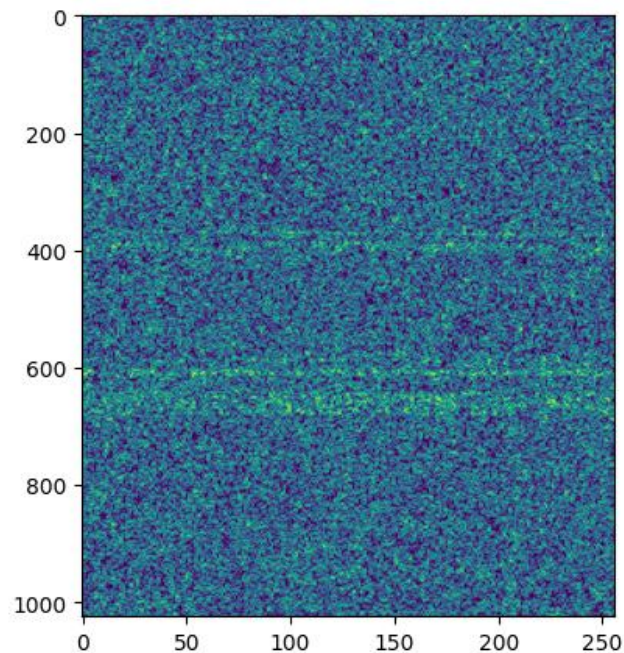
Preds | $P = 1$



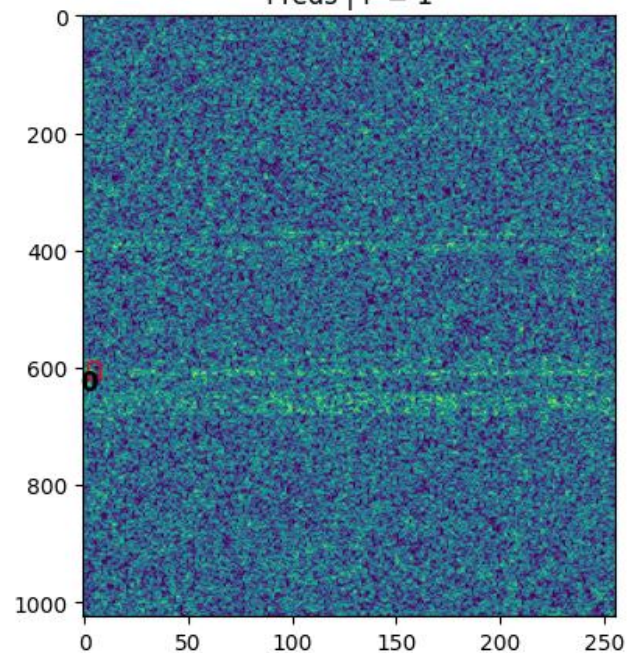
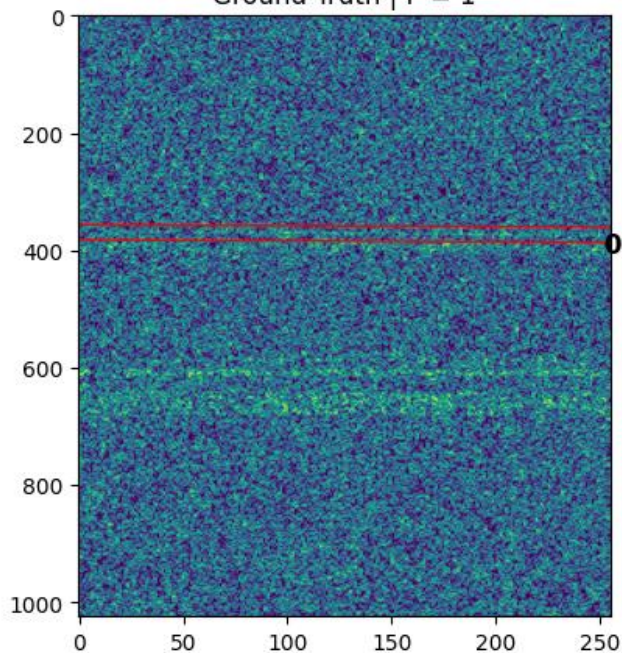
Inférence sur test

seed:12, rec_32521_fs_1000.0MSps_nperseg_256.txt

Ground Truth | $P = 1$



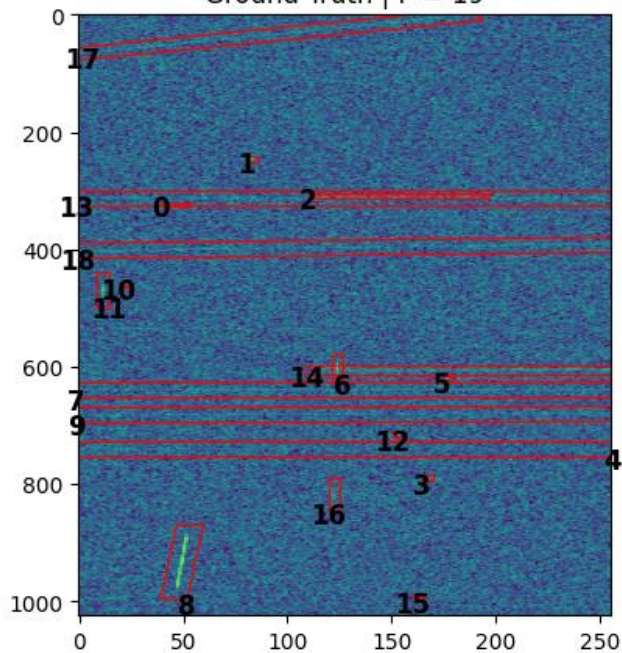
Preds | $P = 1$



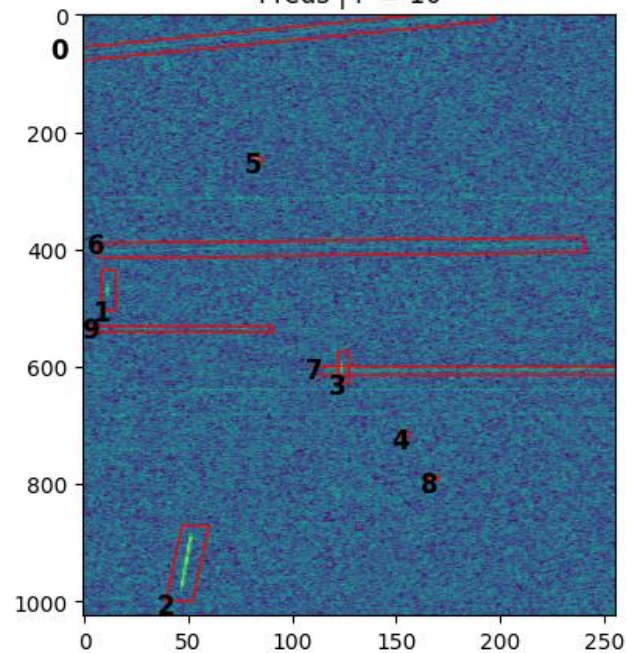
Inférence sur test

seed:13, rec_31925_fs_1000.0MSps_nperseg_1024.txt

Ground Truth | $P = 19$



Preds | $P = 10$

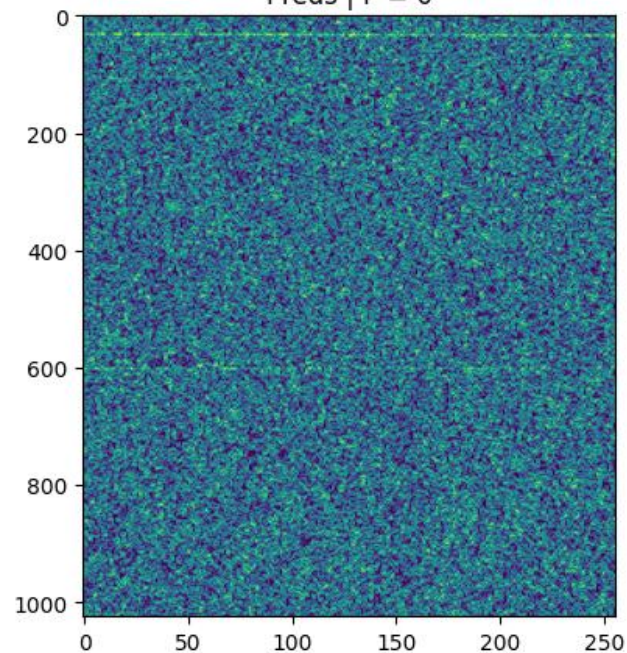
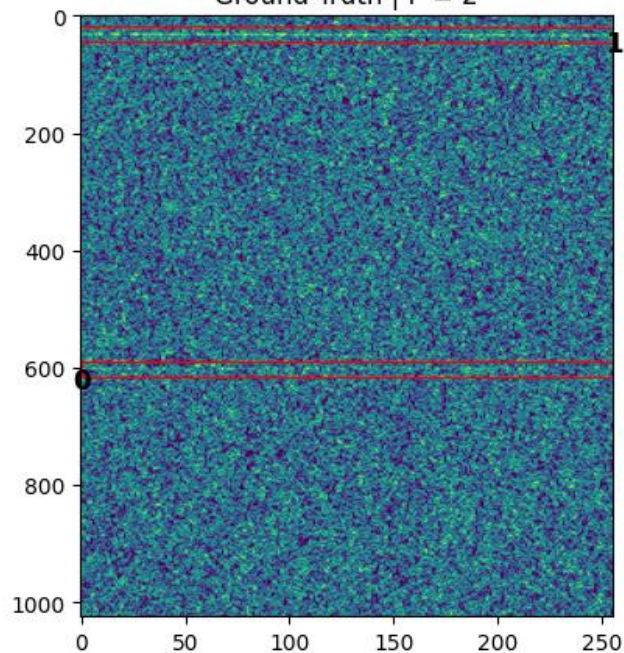
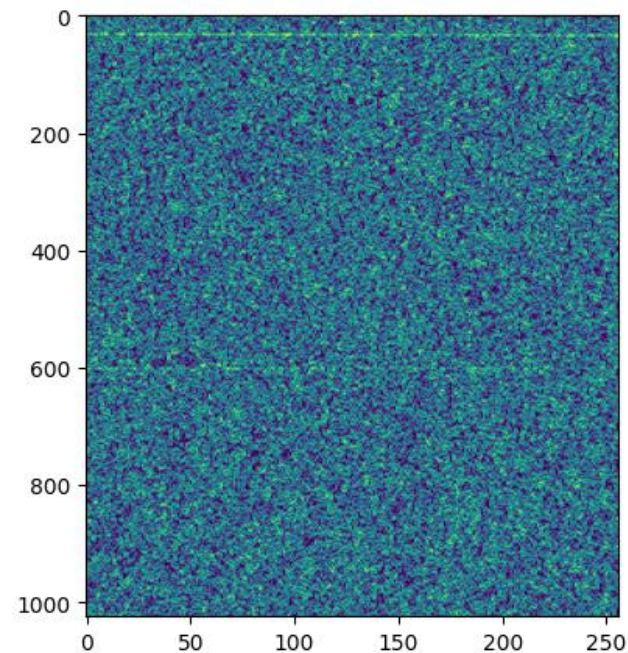


Inférence sur test

seed:14, rec_31624_fs_1000.0MSps_nperseg_256.txt

Ground Truth | $P = 2$

Preds | $P = 0$



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Passage temps contraint

Export TensorRT

- Export to [ONNX](#) or [OpenVINO](#) for up to 3x CPU speedup.
- Export to [TensorRT](#) for up to 5x GPU speedup.

J'ai commencé à évaluer l'apport mais bug quand nombre de batch > 1

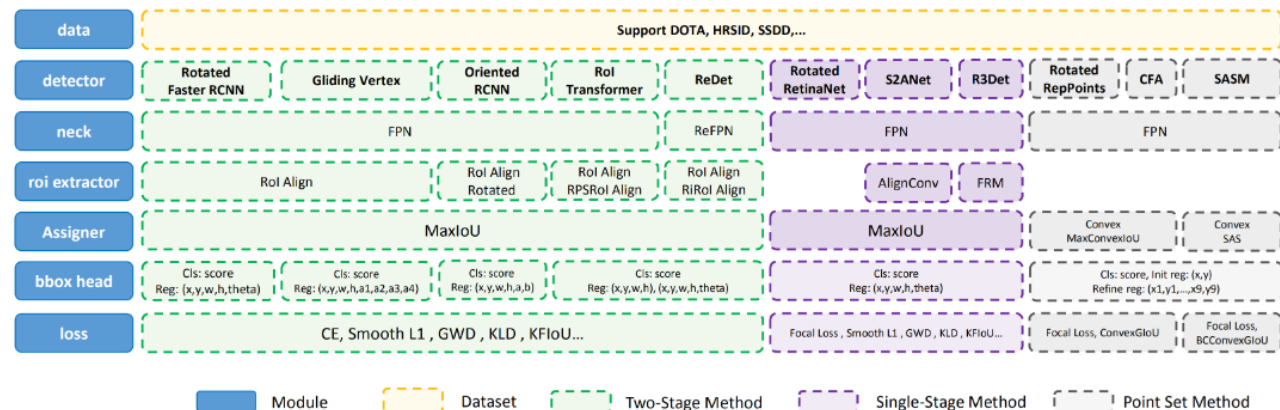
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openMMLab - openMMrotate

MMRotate

<https://github.com/open-mmlab/mmrrotate>

The module design of MMRotate is as follows:



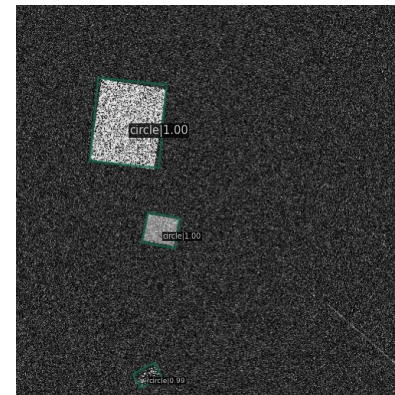
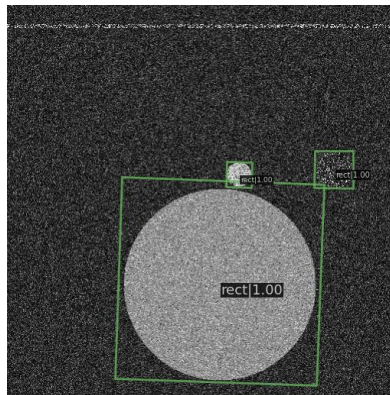
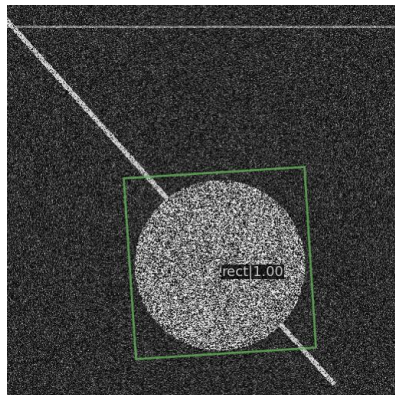
BENCHMARK AND MODEL ZOO

- [Rotated RetinaNet-OBb/HBB](#) (ICCV'2017)
- [Rotated FasterRCNN-OBb](#) (TPAMI'2017)
- [Rotated RepPoints-OBb](#) (ICCV'2019)
- [Rotated FCOS](#) (ICCV'2019)
- [RoI Transformer](#) (CVPR'2019)
- [Gliding Vertex](#) (TPAMI'2020)
- [Rotated ATSS-OBb](#) (CVPR'2020)
- [CSL](#) (ECCV'2020)
- [R³Det](#) (AAAI'2021)
- [S²A-Net](#) (TGRS'2021)
- [ReDet](#) (CVPR'2021)
- [Beyond Bounding-Box](#) (CVPR'2021)
- [Oriented R-CNN](#) (ICCV'2021)
- [GWD](#) (ICML'2021)
- [KLD](#) (NeurIPS'2021)
- [SASM](#) (AAAI'2022)
- [Oriented RepPoints](#) (CVPR'2022)
- [KFIoU](#) (arXiv)
- [G-Rep](#) (stay tuned)

MMRotate sur simple shapes

Backbone	mAP	Angle	lr schd	Mem (GB)	Inf Time (fps)	Aug	Batch Size	Configs	Download
Swin-tiny (1024,1024,20 0)	77.51	le90	1x		10.9	-	2	roi_trans_swin_tiny_fpn_1x_dota_le90	model log

Installation + apprentissage en récupérant fichier de config existant



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Revue

Etude datasets publics

[DOTA](#) : AR_max = 6

[Retail50k](#) : AR_median = 20 et AR_max = 50

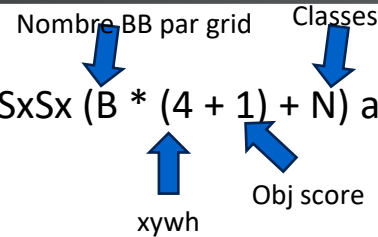
[SSDD](#) : AR_q3 = 6, AR_max = 8

[HRSC](#) : AR_max = 8

[HRSID](#) : AR_max > 3

Notre dataset : AR_max >> 100

YOLO



Yolov1 : Prédiction d'une BB sur chaque grid et output $S \times S \times (B * (4 + 1) + N)$ avec $S = 7$ et $B = 2$

Yolo9000 (v2) : Ajout regul (BN, fine tuning sur last epoch, $S=13$, skip connection), **ajout anchor boxes** et $S \times S \times (B * (4 + 1 + N)) \rightarrow$ prédiction des classes pour chaque box

Yolov3 : Ajout de 3 heads pour détecter différentes échelles, multi-label

Yolov4 : Gros gain par rapport à v3 grâce au Neck (entrelacement des différentes échelles de feature maps), utilisation SPP+PAN, head similaire à v3

YOLOv5 : Amélioration du 4

YOLOX - YOLOv6 – v7 – v8 : Abandon des anchors box

Anchor boxes

Total Loss

$$\begin{aligned}
 L = & \lambda_{coord} \times \sum_{i=1}^{S^2} 1_i^{obj} \times \left((\Delta x_i^* - \Delta \hat{x}_i)^2 + (\Delta y_i^* - \Delta \hat{y}_i)^2 + \right. \\
 & \left. + (\sqrt{\Delta w_i^*} - \sqrt{\Delta \hat{w}_i})^2 + (\sqrt{\Delta h_i^*} - \sqrt{\Delta \hat{h}_i})^2 \right) \\
 & + \sum_{i=1}^{S^2} 1_i^{obj} \times (c_i^* - \hat{c}_i)^2 + \sum_{i=1}^{S^2} 1_i^{obj} \times \sum_{c=1}^{20} (p_{i,c} - \hat{p}_{i,c})^2 \\
 & + \lambda_{no_obj} \sum_{i=1}^{S^2} 1_i^{no_obj} \times \sum_{j=1}^B (c_{i,j} - \hat{c}_{i,j})^2
 \end{aligned}$$

yolov1

Total Loss Function

$$\begin{aligned}
 loss_t = & \sum_{i=0}^W \sum_{j=0}^H \sum_{k=0}^A \\
 & \text{Loss for Anchor box alignment} + 1_{Max\ IOU < Thresh} \lambda_{noobj} * (-b_{ijk}^o)^2 \quad \text{Loss for cells with No Objects} \\
 & + 1_{t < 12800} \lambda_{prior} * \sum_{r \in (x,y,w,h)} (prior_k^r - b_{ijk}^r)^2 \\
 & + 1_k^{truth} (\lambda_{coord} * \sum_{r \in (x,y,w,h)} (truth_k^r - b_{ijk}^r)^2 \\
 & \quad + \lambda_{obj} * (IOU_{truth}^k - b_{ijk}^o)^2 \\
 & \quad + \lambda_{class} * (\sum_{c=1}^C (truth_k^c - b_{ijk}^c)^2) \quad \text{Loss for cells with objects}
 \end{aligned}$$

yolov2

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TODO

TODO

- Nouvelle BT avec modif simulateur et labelizer
- Apprentissage sur nouvelle BT

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MERCI