

AVANTIX

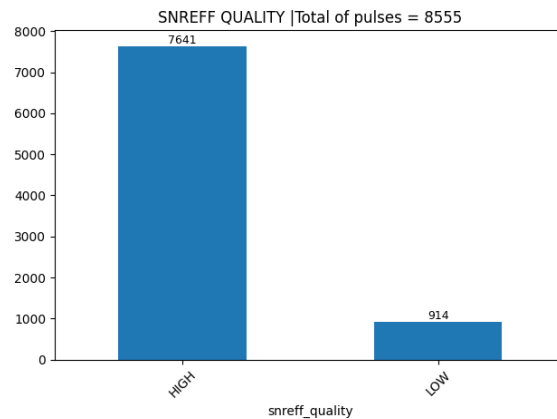
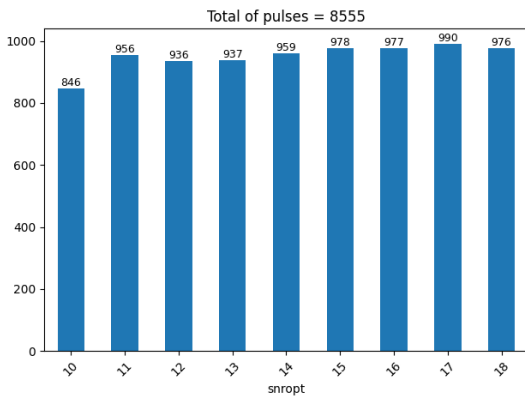
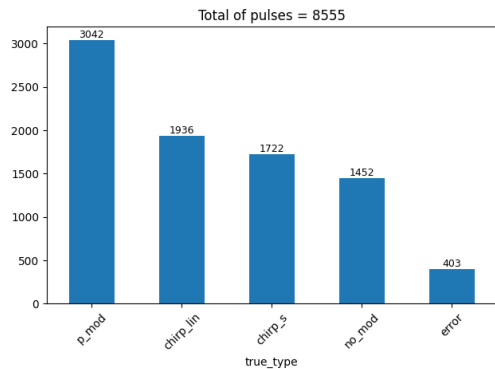
Avancement CBE

AVANTIX

Classification modulation

Jeu de données

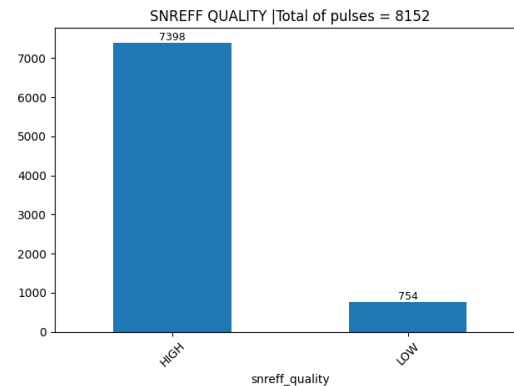
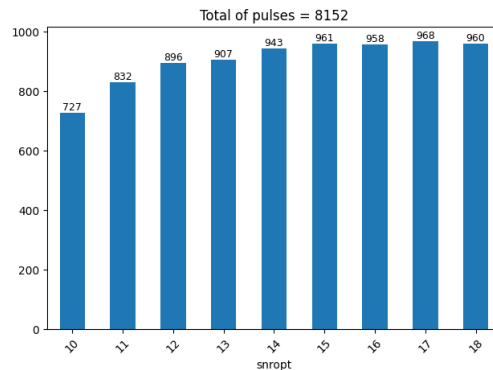
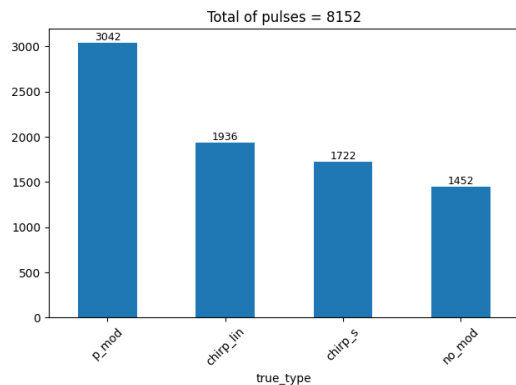
9 fichiers /data/SIGINT/FVE/LEGO_FV/long_LEGO_FV_noP124_snropt_{snropt}.iq.pkl @ 4GSps
snropt = [10, 18] dB



Jeu de données

9 fichiers /data/SIGINT/FVE/LEGO_FV/long_LEGO_FV_noP124_snropt_{snropt}_iq.pkl
snropt = [10, 18] dB

Après suppression des 403 pulses en « error »



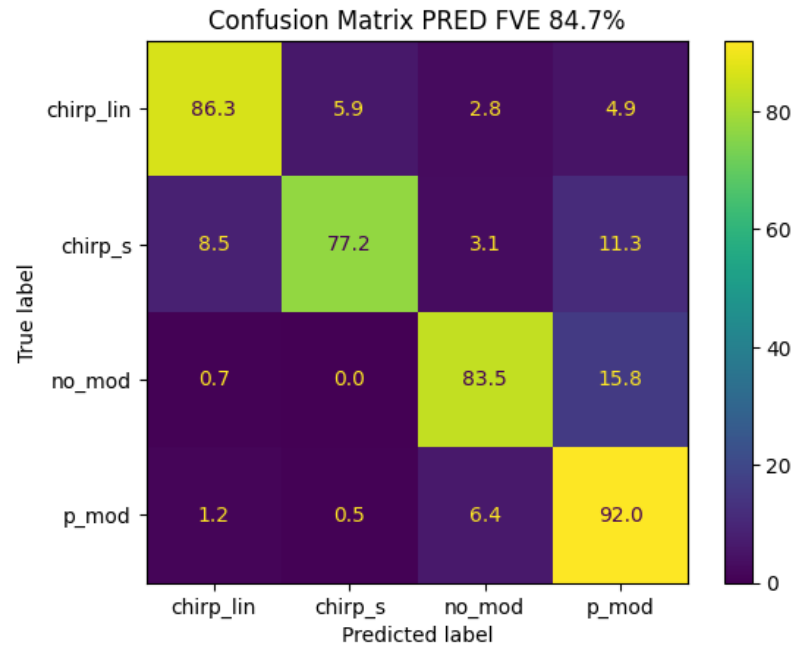
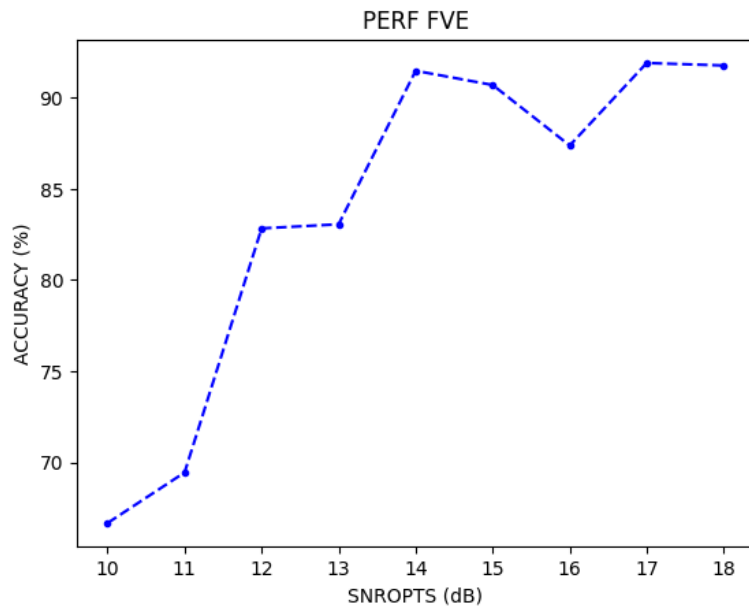
Split Train(80)/Test(20) en fct de snropt et de snreff_quality (via demod vs via tridge)

Train = 6521 pulses | Test = 1631 pulses

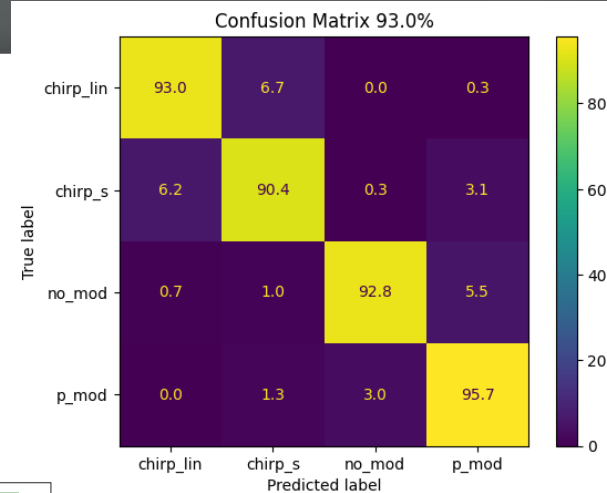
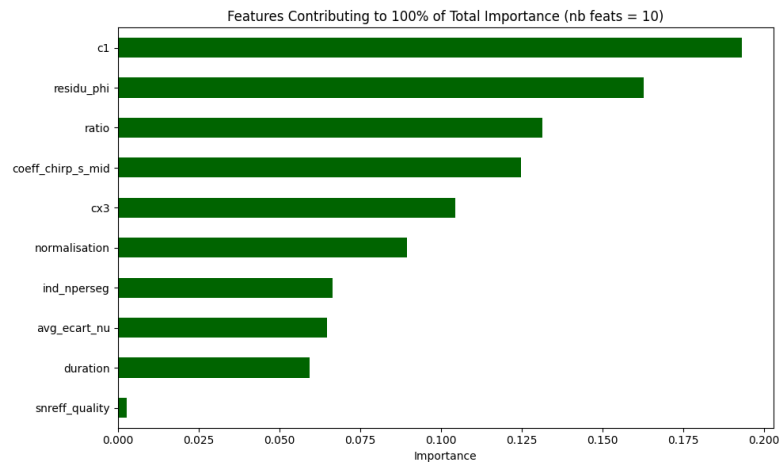
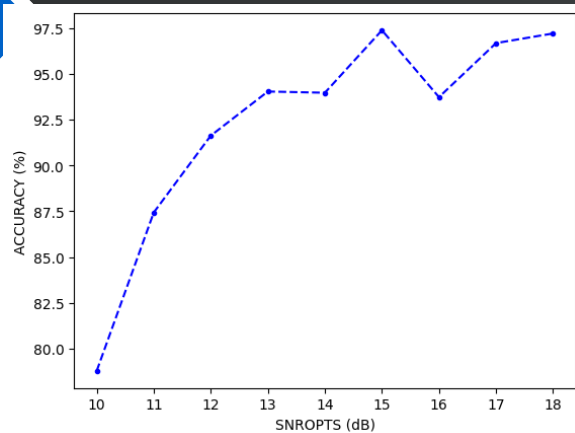
Tableau des performances

Features	Modèle	Acc % on test	Commentaires
FVE ratio = res_lin/res_s residu_phi = res_no_mod / duration coeff_chirp_s_mid normalisation avg_ecart_nu c1 duration ind_nperseg cx3 = c1 + c2 snreff_quality : demod vs tridge	DecisionTree FVE max-depth = 5 min_impurity_decrease=0.012	84,7	Deux DecisionTree entraînés par FVE : 1 pour les low et un pour les high snr
	RF	93,0	Borne supérieure
	DecisionTree max-depth = 8	91,3	DecisionTree entraîné via grid-search
FVE + Custom features 'std', 'skewness', 'kurtosis', 'max_value', 'argmax_index', 'zero_crossings', 'mean_value', 'diff_std', 'symmetry_error', 'duration', 'peak_width_half_max', 'slope_asymmetry', 'derivative_energy', 'quad_fit_error', 'second_deriv_mean', 'cusum_slope_change', 'signal_entropy', 'normalized_auc', 'median_position', 'fft_energy_ratio', 'autocorr_lag1', 'dominant_frequency', 'spectral_centroid'	RF	94,6	Borne supérieure
	DecisionTree max-depth = 60 (49 feats)	91,3	
	DecisionTree max-depth = 11 TOP 10	91,6	0,3 point de % d'amélioration → on abandonne

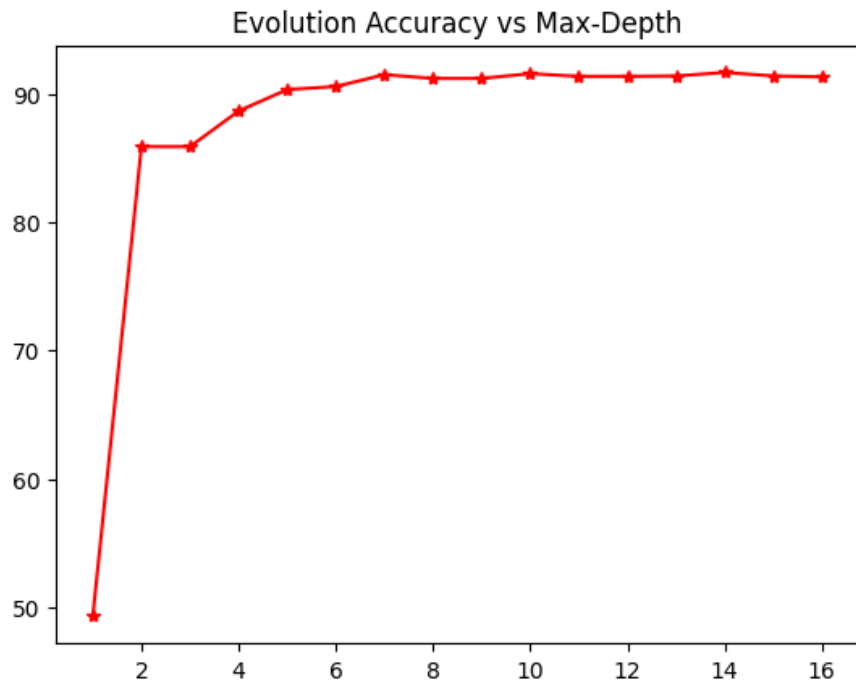
Perf FVE - Baseline



Perf FVE + RF

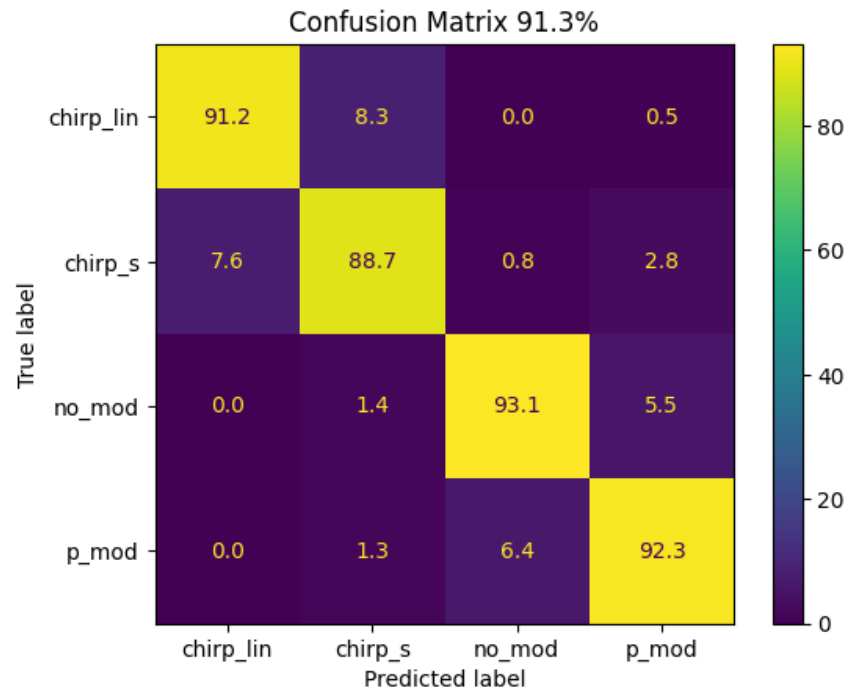
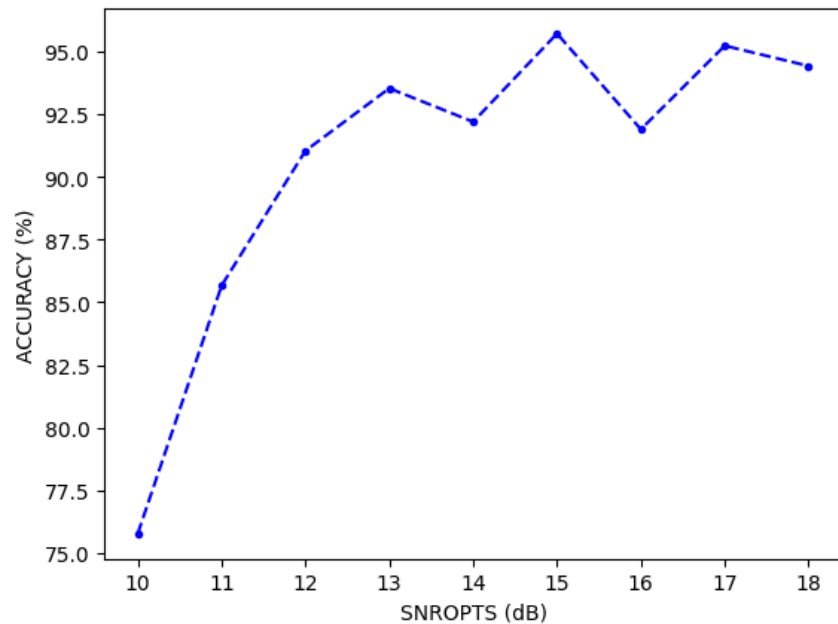


Perf DecisionTree en fct de max-depth



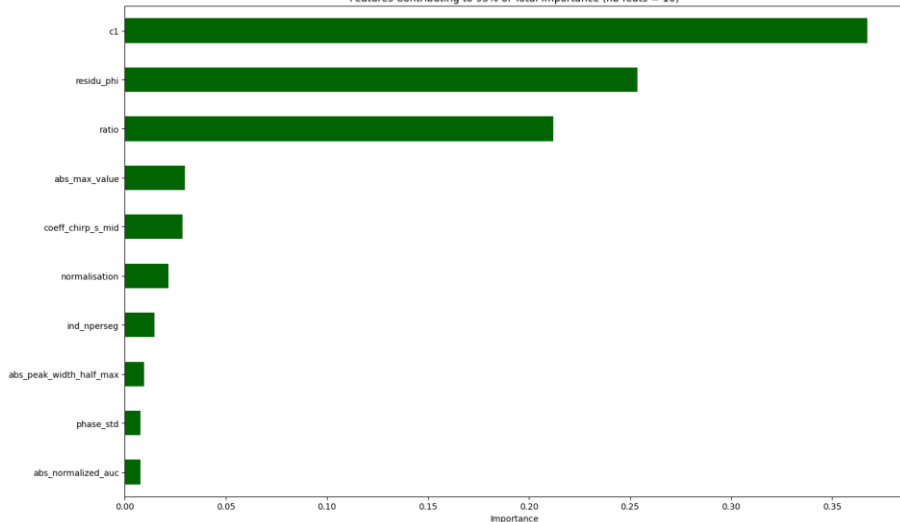
On fixe max-depth à 8

Perf DecisionTree – max_depth=8

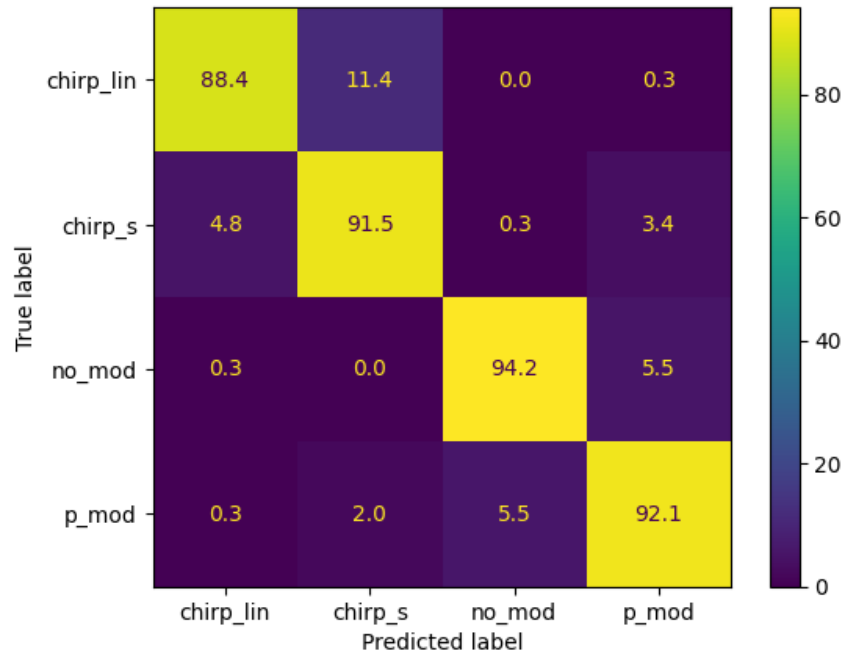


Perf FVE + CBE + RF

Features Contributing to 95% of Total Importance (nb feats = 10)



Confusion Matrix 91.6%

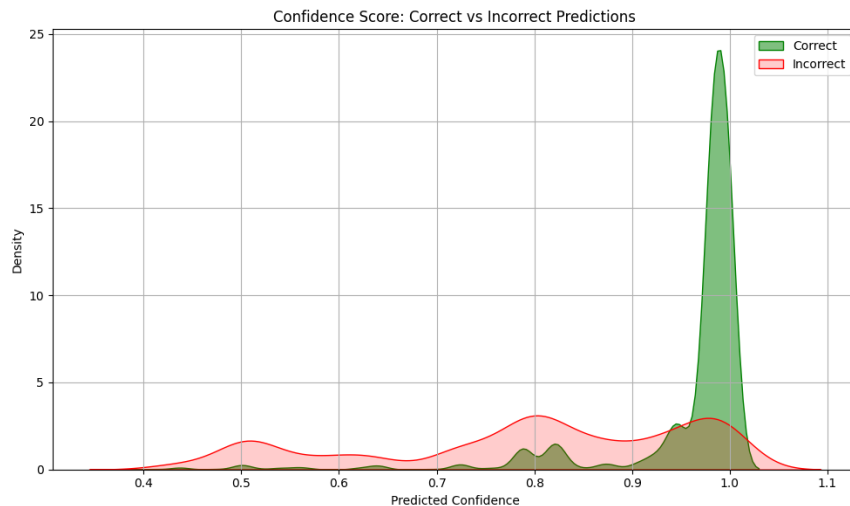


Analyse des erreurs : exemples

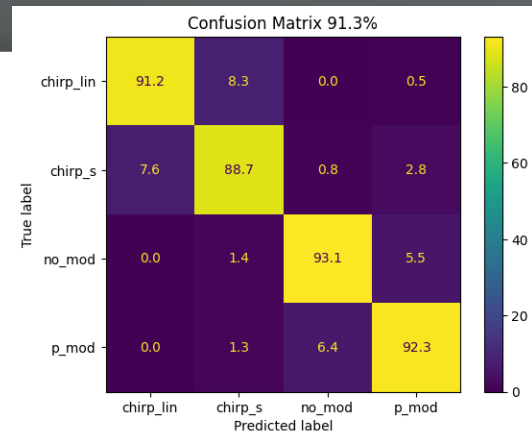
FVE features + SNREFF_QUALITY à max-depth = 8

Accuracy = 91,3%

140 impulsions mal classées / 1631

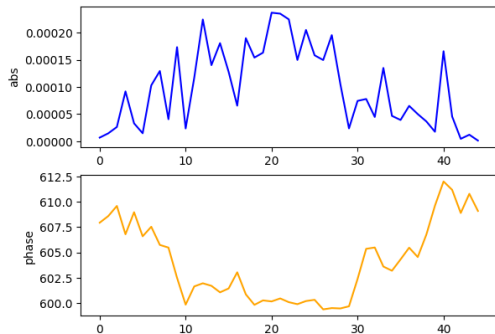


Pas de possibilité de détecter les erreurs de classification

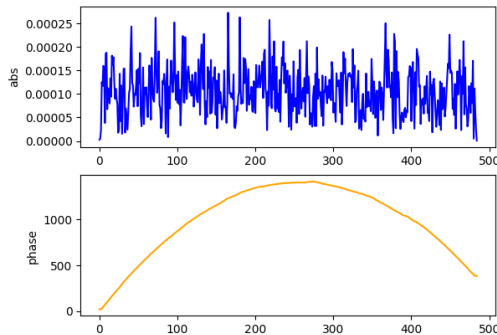


Analyse des erreurs : exemples

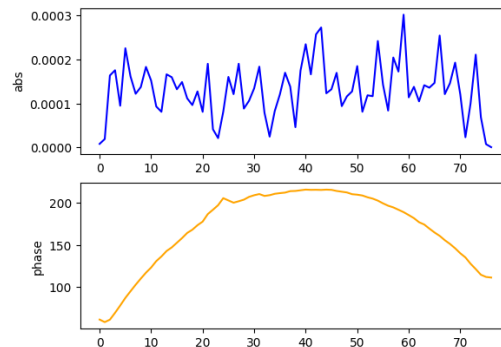
GT = no_mod | PRED = p_mod



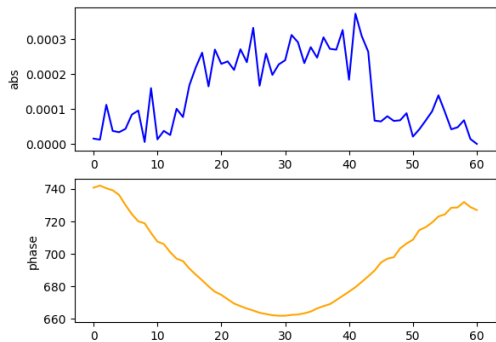
GT = chirp_lin | PRED = chirp_s



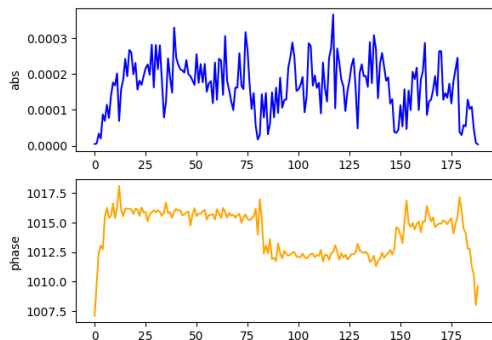
GT = chirp_s | PRED = chirp_lin



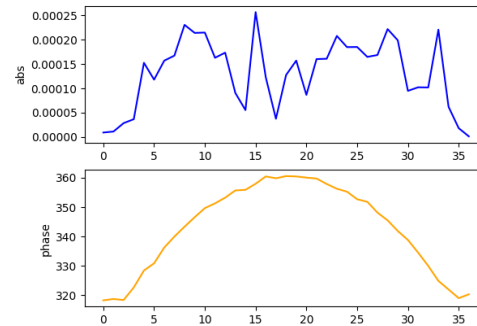
GT = chirp_lin | PRED = chirp_s



GT = p_mod | PRED = no_mod

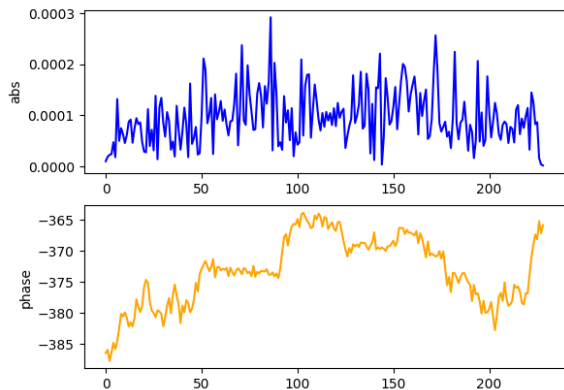


GT = chirp_lin | PRED = chirp_s

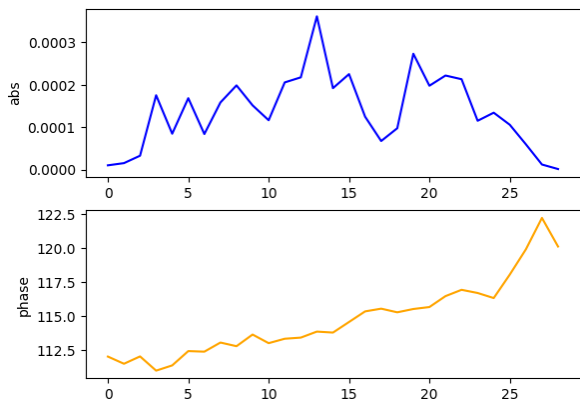


Analyse des erreurs : exemples

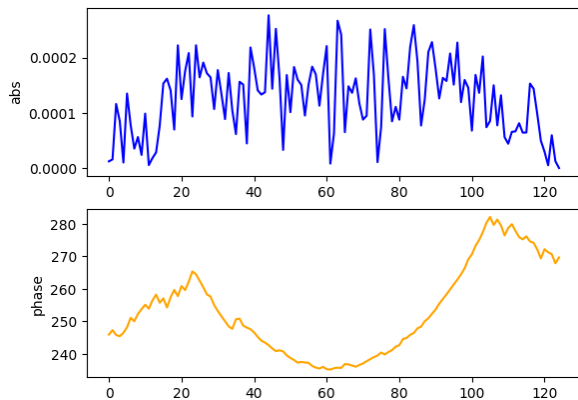
GT = p_mod | PRED = chirp_s



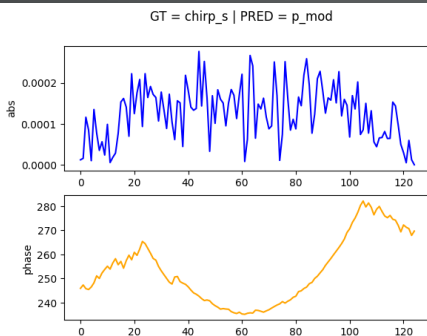
GT = no_mod | PRED = chirp_s



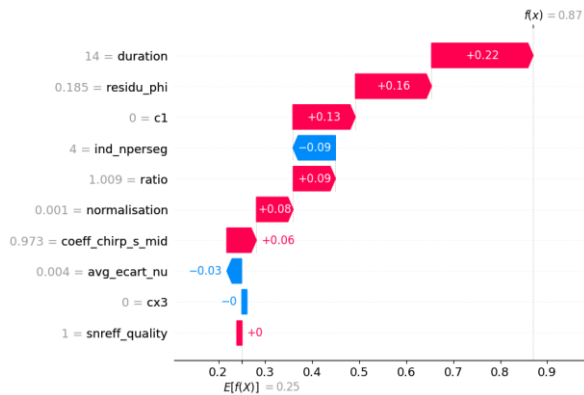
GT = chirp_s | PRED = p_mod



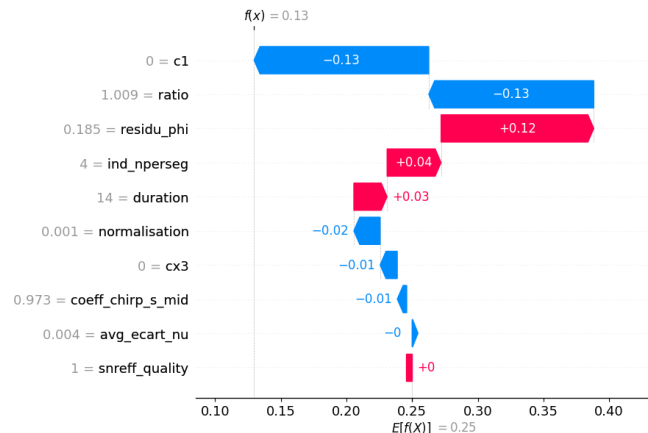
Analyse des erreurs : exemples



Explanation on pred_type choosed by model



Explanation on true_type not choosed by model



AVANTIX

IQ2PDW CPU plugin PHX2

List des NPERSEGS

```
def get_NPERSEGS(fs):
    NPERSEGS_4GS = [64, 128, 256, 512, 1024, 4096, 16384, 131072]
    nperseg_min = 8
    def nearest_power_of_2(x):
        | return 2 ** round(torch.math.log2(x)) if x > 0 else 0

    NPERSEGS = [nearest_power_of_2(int(nperseg * fs / 4e9)) for nperseg in NPERSEGS_4GS]
    NPERSEGS = [x for x in NPERSEGS if x >= nperseg_min]

    return NPERSEGS
```

fs	NPERSEGS
100 MSps	[8, 16, 32, 128, 512, 4096]
500 MSps	[8, 16, 32, 64, 128, 512, 2048, 16384]
1 GSps	[16, 32, 64, 128, 256, 1024, 4096, 32768]
2 GSps	[32, 64, 128, 256, 512, 2048, 8192, 65536]
4 GSps	[64, 128, 256, 512, 1024, 4096, 16384, 131072]
244 MSps	[8, 16, 32, 64, 256, 1024, 8192]
4 MSps	[16, 128]

Tc_iq2pdw : Plugin PHX

```
PROBLEMS  PORTS 3  GITLENS  OUTPUT  DEBUG CONSOLE  TERMINAL  JUPYTER

[2025-06-27 13:25:12.914] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:13.917] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:14.919] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:15.921] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:16.923] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:17.925] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:18.927] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:19.929] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:20.932] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:21.934] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:22.936] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:23.938] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:24.940] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:25.941] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:26.943] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:27.945] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:28.947] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:29.949] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-INIT avancement=0 0/0
[2025-06-27 13:25:30.950] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-DONE avancement=100 0/0
[2025-06-27 13:25:31.952] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-DONE avancement=100 0/0
[2025-06-27 13:25:32.954] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-DONE avancement=100 0/0
[2025-06-27 13:25:33.956] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-DONE avancement=100 0/0
[2025-06-27 13:25:34.958] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-DONE avancement=100 0/0
[2025-06-27 13:25:35.960] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid=w plug
inGuiD= etattraitement-DONE avancement=100 0/0
```

Test Démarrage OK

Tc_iq2pdw : Plugin PHX

```
inGuid-p: etattraitemnt-DONE avancement-100 0/0
p

Actions for w / p
0: >>> main menu
1: Start
2: Stop
3: Cancel
4: Pause
5: Resume
6: Config
7: Shutdown
[2025-06-27 13:31:34.655] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid-w plug
inGuid-p: etattraitemnt-DONE avancement-100 0/0
[2025-06-27 13:31:35.657] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid-w plug
inGuid-p: etattraitemnt-DONE avancement-100 0/0
[2025-06-27 13:31:36.659] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid-w plug
inGuid-p: etattraitemnt-DONE avancement-100 0/0
[2025-06-27 13:31:37.661] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid-w plug
inGuid-p: etattraitemnt-DONE avancement-100 0/0

Sent action to the subscriber with this work GUID

Actions for w / p
0: >>> main menu
1: Start
2: Stop
3: Cancel
4: Pause
5: Resume
6: Config
7: Shutdown
[2025-06-27 13:31:37.997] [MockCServer] [info] [ServiceImpl.cpp:96] Remove writer 0x7f4884001b50
[2025-06-27 13:31:38.663] [MockCServer] [info] [ServiceImpl.cpp:233] Status received: workGuid-w plug
inGuid-p: etattraitemnt-STOPPED avancement-100 0/0
[]

[root@53a7c47b502a bin]# cd /pkg/tc_iq2pdw/data/
[root@53a7c47b502a data]# ls
data_for_FE
[root@53a7c47b502a data]#
exit
(sigint) (base)
/data/SIGINT/CBE/phenix_plugin 15:21:08
$ docker run --rm -it --entrypoint /bin/bash -v ./vol_cfg:/srv/plugin/cfg:ro -v ./vol_data:/data --n
etwork=phenix phx2/iq2pdw-plugin:latest
[root@60c7c1ba5b1e bin]#
exit
(sigint) (base)
/data/SIGINT/CBE/phenix_plugin 15:21:40
$ docker run --rm -it -v ./vol_cfg:/srv/plugin/cfg:ro -v ./vol_data:/data --network=phenix phx2/iq2p
dw-plugin:latest -c "/srv/plugin/cfg/traitemnt.json"
JSON config file loaded
pdw2H5 started
pushFileMetaData done.
Init mc output file: 0
/pkg/tc_iq2pdw/iq2pdw/demod.py:70: UserWarning: ComplexHalf support is experimental and many operators
don't support it yet. (Triggered internally at /pytorch/aten/src/ATen/EmptyTensor.cpp:56.)
  v_exp = torch.exp(-1j*torch.linspace(0, 2*torch.pi, 2**16)).to(device).to(torch_complex)
/pkg/tc_iq2pdw/iq2pdw/merging.py:685: UserWarning: Sparse CSR tensor support is in beta state. If you
miss a functionality in the sparse tensor support, please submit a feature request to https://github.c
om/pytorch/pytorch/issues. (Triggered internally at /pytorch/aten/src/ATen/SparseCSRTensorImpl.cpp:53.)
  intersections = torch.sparse.mm(intersections, intersections)
/pkg/tc_iq2pdw/iq2pdw/demod.py:137: UserWarning: To copy construct from a tensor, it is recommended to
use sourceTensor.detach().clone() or sourceTensor.detach().clone().requires_grad_(True), rather than
torch.tensor(sourceTensor).
  points = torch.hstack((virtual_sampling_ridge, torch.tensor(sum_durations, device=device).view(-1)))
sensor ELIT & voie V1 processed. Progress = 100%
Received 1 action. Stopping the process.
(sigint) (base)
/data/SIGINT/CBE/phenix_plugin 15:31:39
$ !
```

Test Arrêt OK

Input / Output OK

```

Capteurs -> <class 'h5spy_hl.dataset.Dataset'>
ELIT -> <class 'h5spy_hl.group.Group'>
  VI -> <class 'h5spy_hl.group.Group'>
    Configurations -> <class 'h5spy_hl.dataset.Dataset'>
    IQ -> <class 'h5spy_hl.dataset.Dataset'>
    SignauxAcquisOuEmis -> <class 'h5spy_hl.dataset.Dataset'>
    SignauxIQ -> <class 'h5spy_hl.dataset.Dataset'>
    VoiesAcquisitions -> <class 'h5spy_hl.dataset.Dataset'>
  -----
Capteurs -> <class 'h5spy_hl.dataset.Dataset'>
ELIT -> <class 'h5spy_hl.group.Group'>
  VI -> <class 'h5spy_hl.group.Group'>
    Configurations -> <class 'h5spy_hl.dataset.Dataset'>
    IQ -> <class 'h5spy_hl.dataset.Dataset'>
    ProduitsInterceptionsRadar -> <class 'h5spy_hl.group.Group'>
      DescripteursIntrapulses -> <class 'h5spy_hl.dataset.Dataset'>
      Intrapulses -> <class 'h5spy_hl.dataset.Dataset'>
      PDW -> <class 'h5spy_hl.dataset.Dataset'>
      SynthesePDW -> <class 'h5spy_hl.dataset.Dataset'>
    SignauxAcquisOuEmis -> <class 'h5spy_hl.dataset.Dataset'>
    SignauxIQ -> <class 'h5spy_hl.dataset.Dataset'>
    VoiesAcquisitions -> <class 'h5spy_hl.dataset.Dataset'>
  OutilsAT -> <class 'h5spy_hl.group.Group'>
  Liens -> <class 'h5spy_hl.group.Group'>
    DescriptionsLiens -> <class 'h5spy_hl.dataset.Dataset'>
    Liens_0 -> <class 'h5spy_hl.dataset.Dataset'>

```

df	G0s																			Open Of in Data Wrangler																			Python
...	#	idConfigurat...	#	idSig...	#	TOA	#	DI	#	frequency	#	niveau	#	niveauAnt	#	RSB	#	DTOA	#	typeImpulsion	#	precisionFreq	#	precisionTemporelle	#	idIntrapsule	#	idPWGonio	#	idPWLoc									
0	0	0	0	499968	0.256		53836665	0.002749929	0.0	33.15427	0.0	0	0	0	0	113.80963	3200.0	2	0	0	0	0	0	0	0	0	0	0	0	0									
1	0	0	499966	0.184		42023375	0.01068463	0.0	118.80963	8000.0	2	0	0	0	0	50.6766	1752000.0	2	0	0	0	0	0	0	0	0	0	0	0	0									
2	0	0	499960	0.16		26424040	0.019026279	0.0	118.80203	8000.0	2	0	0	0	0	50.6766	1752000.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0								
3	0	0	500008	0.068		62773210	0.007078943	0.0	18730419	998392000.0	2	0	0	0	0	50.6766	1752000.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0								
4	0	0	501759	57.34425		75473505	0.0013609382	0.0	18730419	998392000.0	2	0	0	0	0	50.6766	1752000.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0								
5	0	0	100152	0.216		47487560	0.006464142	0.0	21.80007	24000.0	2	0	0	0	0	50.6766	1752000.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0								
6	0	0	100176	0.048		61861025	0.010690002	0.0	102.52295	8000.0	2	0	0	0	0	50.6766	1752000.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0								
7	0	0	100184	0.432		63487193	0.032035916	0.0	5.32083	480000.0	2	0	0	0	0	50.6766	1752000.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0								
8	0	0	1500872	7.168		4054802.0	0.006548193	0.0	43.362434	1536000.0	2	0	0	0	0	50.6766	1752000.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0								
9	0	0	1502208	44.54425		3868796.2	inf	0.0	inf	4608000.0	2	0	0	0	0	50.6766	1752000.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0								
10	0	0	1548288	57.344		7529358.0	0.0	0.0	0.0	950272000.0	2	0	0	0	0	50.6766	1752000.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0								
11	0	0	2498560	121.184		49276250	0.0014742018	0.0	21972213	1664000.0	2	0	0	0	0	50.6766	1752000.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0								
12	0	0	2503224	0.064		6037007.0	0.01564073	0.0	241.39145	184000.0	2	0	0	0	0	50.6766	1752000.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0								
13	0	0	2506068	0.224		4504931.0	0.012463499	0.0	157.09076	409600.0	2	0	0	0	0	50.6766	1752000.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0								
14	0	0	2504704	61.44025		7238959.0	0.0024202287	0.0	5.923569	44032000.0	2	0	0	0	0	50.6766	1752000.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0								
15	0	0	2548736	5.12		4005286.8	0.003943397	0.0	15.725762	4315200																													

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