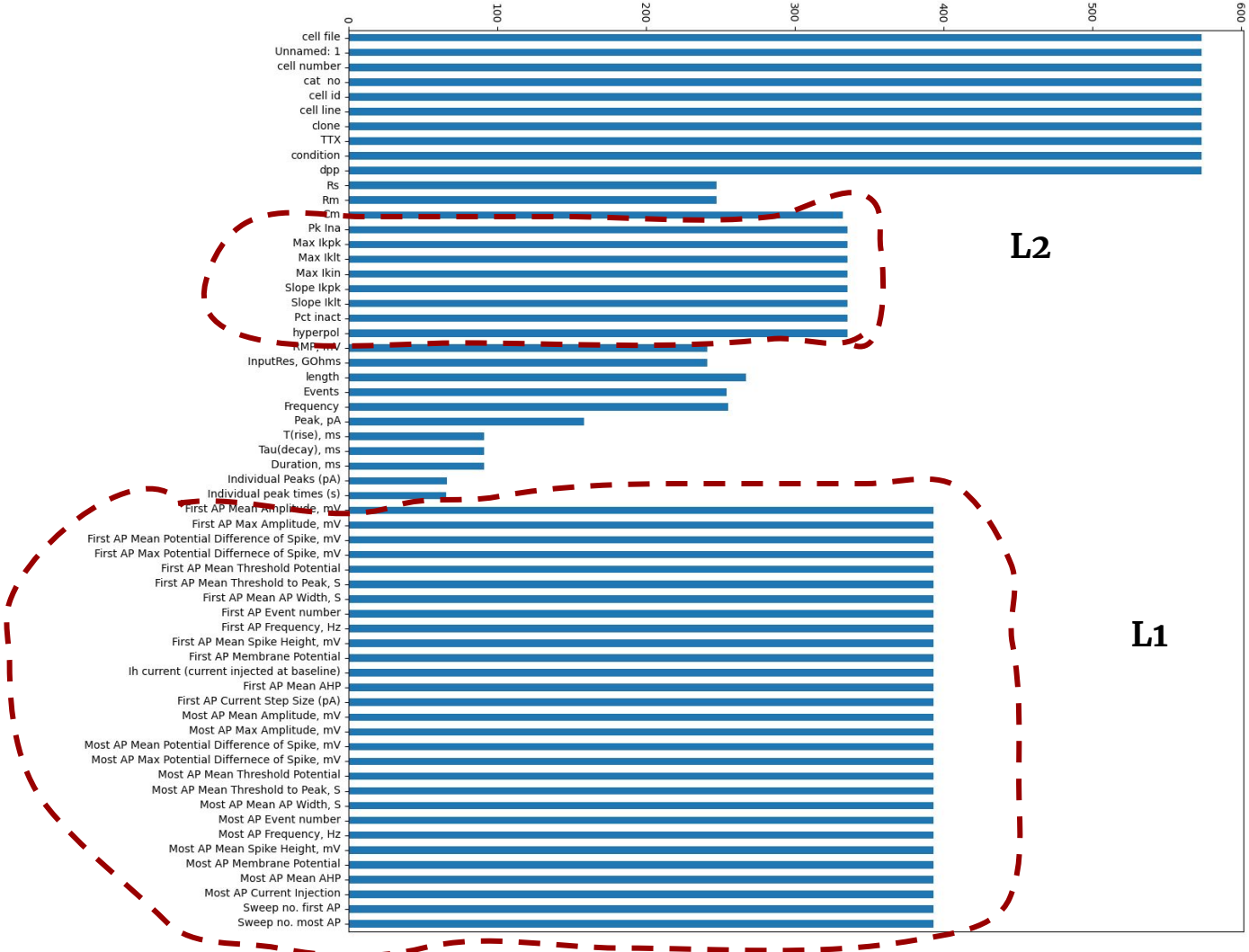
Ephys data: Looking at time ranges

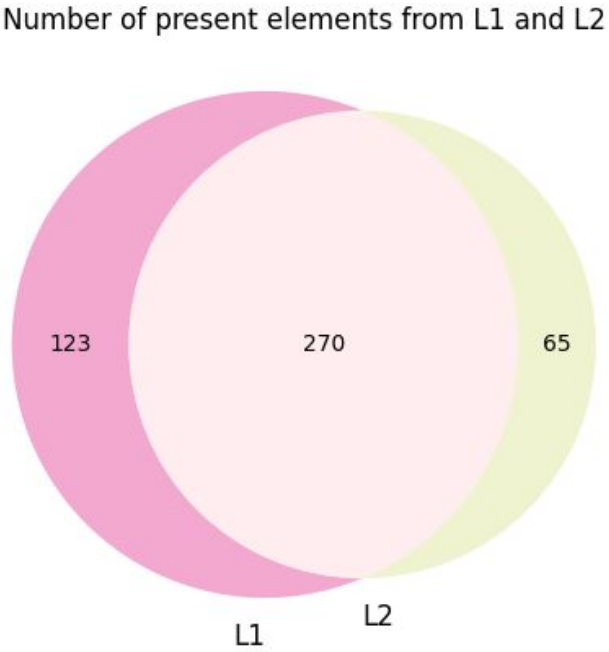
Mohorianu Lab

Liviu Pîrvan
29 September, 2023
Meeting

Recap…

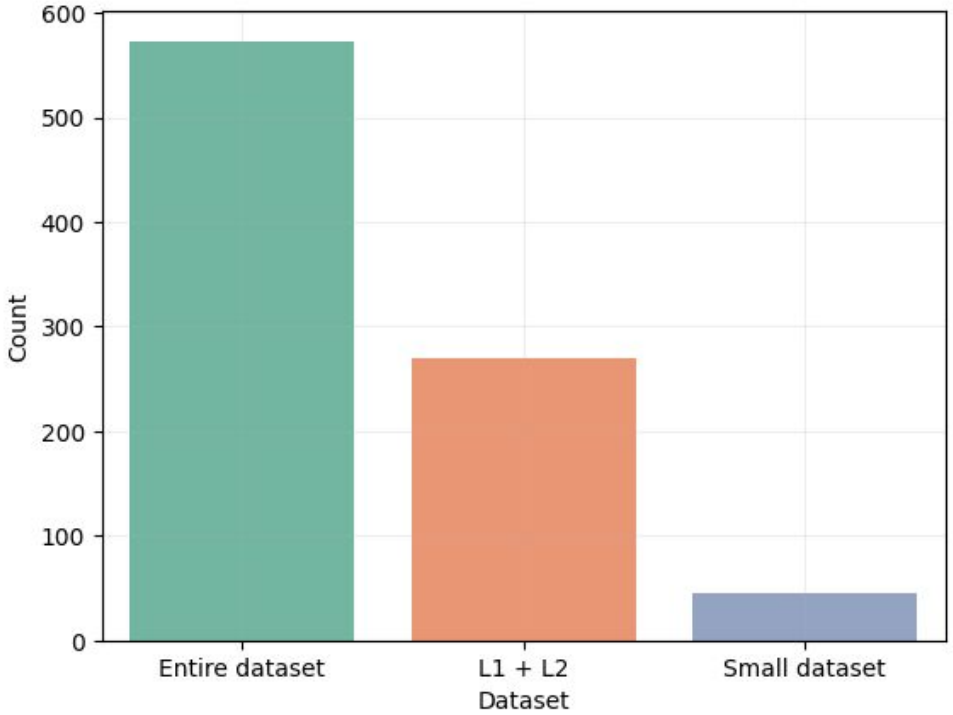

0
100
200
300
400
500
600
cell file
Unnamed: 1
cell number
cat no
cell id
cell line
clone
TTX
condition
dpp
Rs
Rm
Cm
Pk Ina
Max Ikpk
Max Iklt
Max Ikin
Slope Ikpk
Slope Iklt
Pct inact
hyperpol
RMP, mV
InputRes, GOhms
length
Events
Frequency
Peak, pA
T(rise), ms
Tau(decay), ms
Duration, ms
Individual Peaks (pA)
Individual peak times (s)
First AP Mean Amplitude, mV
First AP Max Amplitude, mV
First AP Mean Potential Difference of Spike, mV
First AP Max Potential Differnece of Spike, mV
First AP Mean Threshold Potential
First AP Mean Threshold to Peak, S
First AP Mean AP Width, S
First AP Event number
First AP Frequency, Hz
First AP Mean Spike Height, mV
First AP Membrane Potential
Ih current (current injected at baseline)
First AP Mean AHP
First AP Current Step Size (pA)
Most AP Mean Amplitude, mV
Most AP Max Amplitude, mV
Most AP Mean Potential Difference of Spike, mV
Most AP Max Potential Differnece of Spike, mV
Most AP Mean Threshold Potential
Most AP Mean Threshold to Peak, S
Most AP Mean AP Width, S
Most AP Event number
Most AP Frequency, Hz
Most AP Mean Spike Height, mV
Most AP Membrane Potential
Most AP Mean AHP
Most AP Current Injection
Sweep no. first AP
Sweep no. most AP
L2
L1

Elements from both L1 and L2

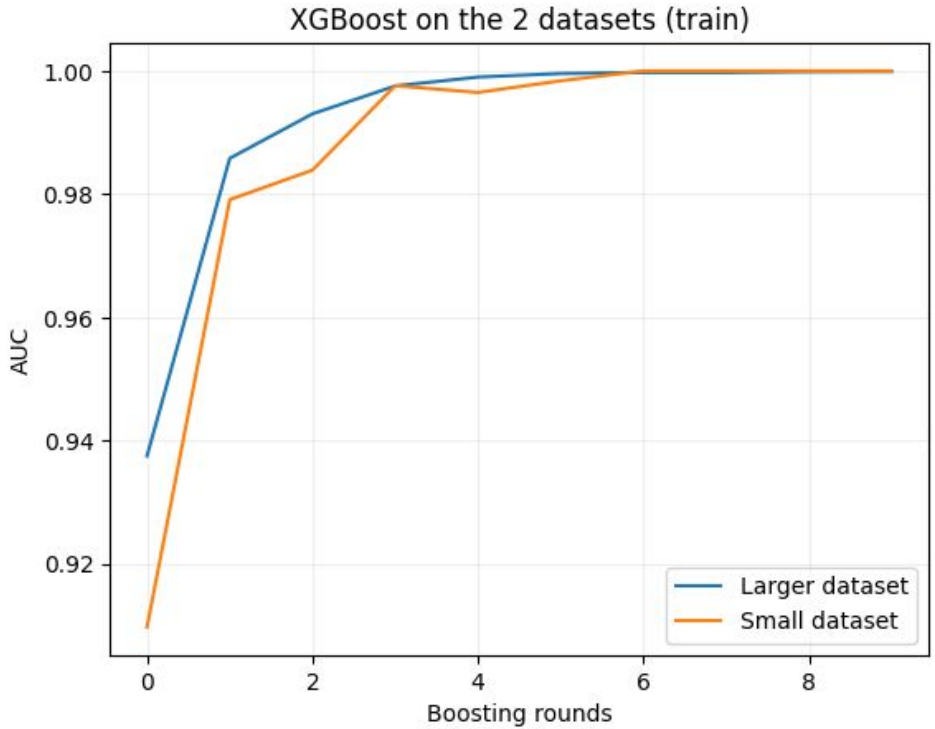


270/573 = 0.47

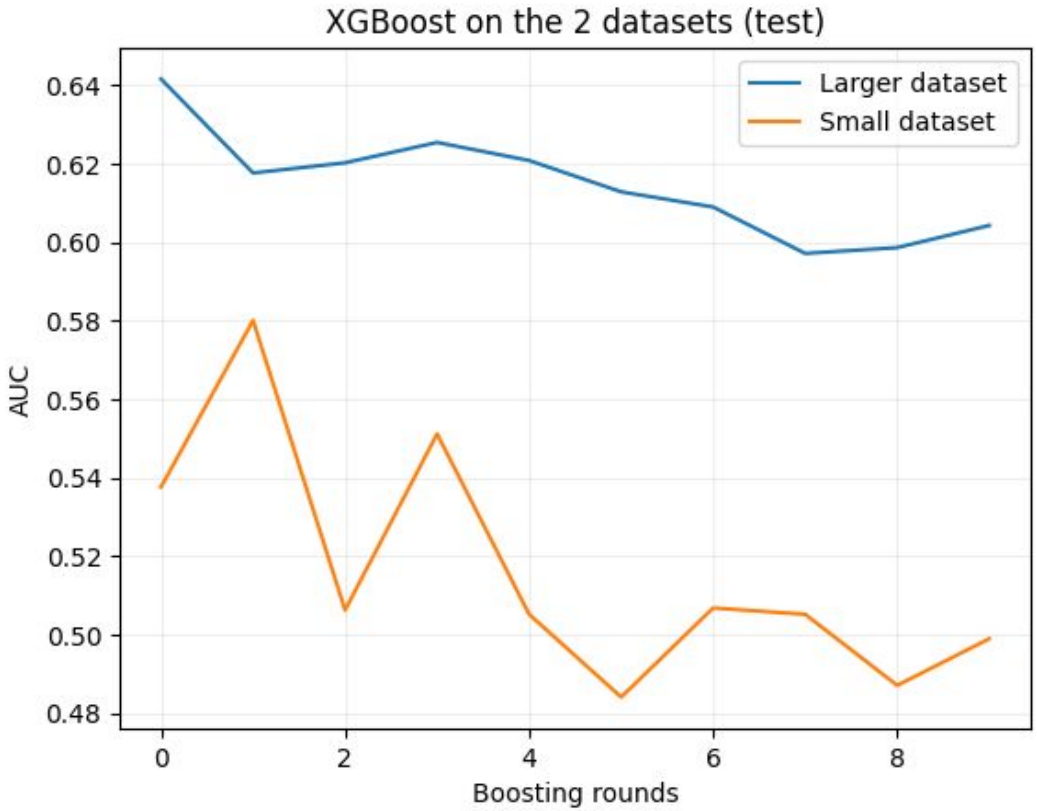
Number of elements for different filtering



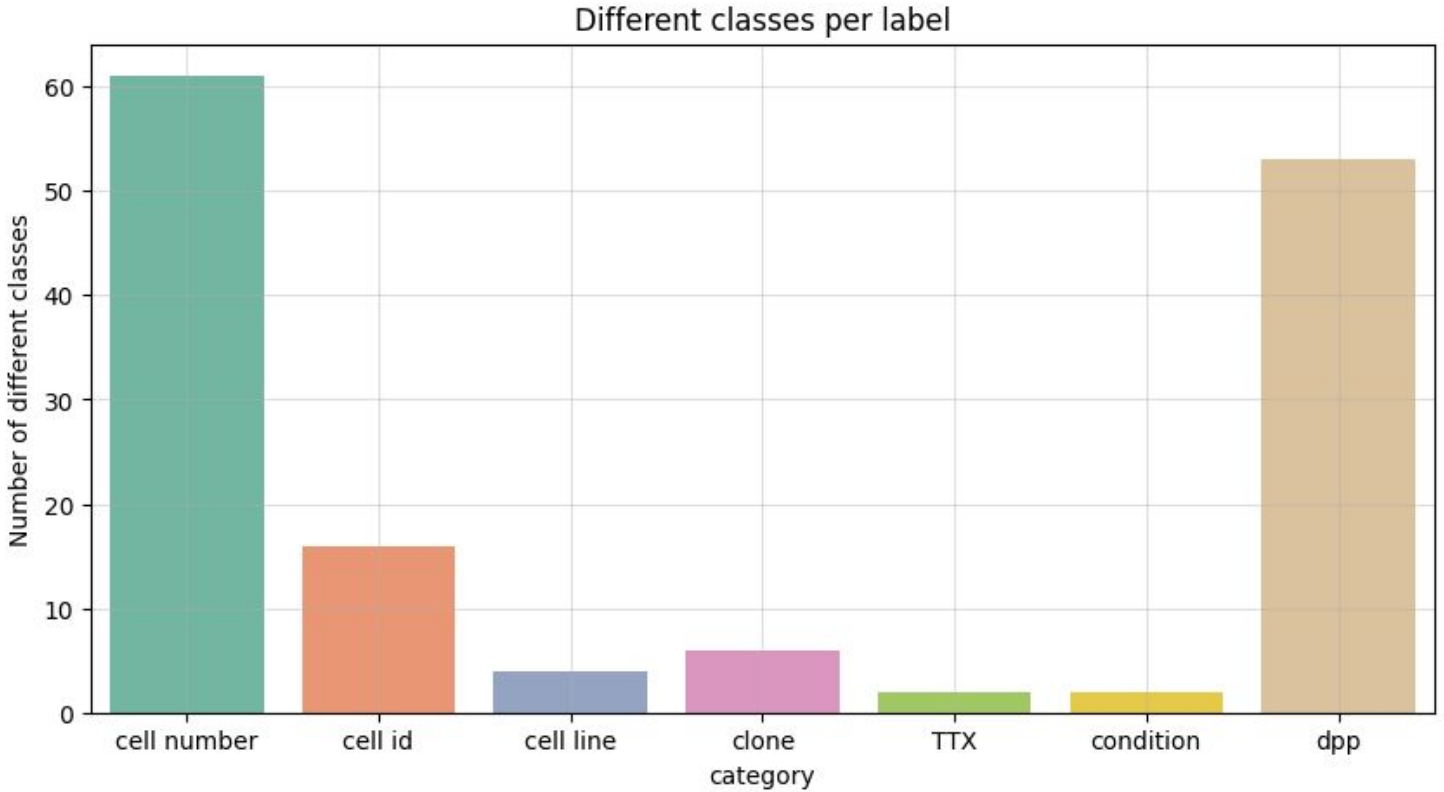
XGBoost performs better on the larger dataset



XGBoost performs better on the larger dataset

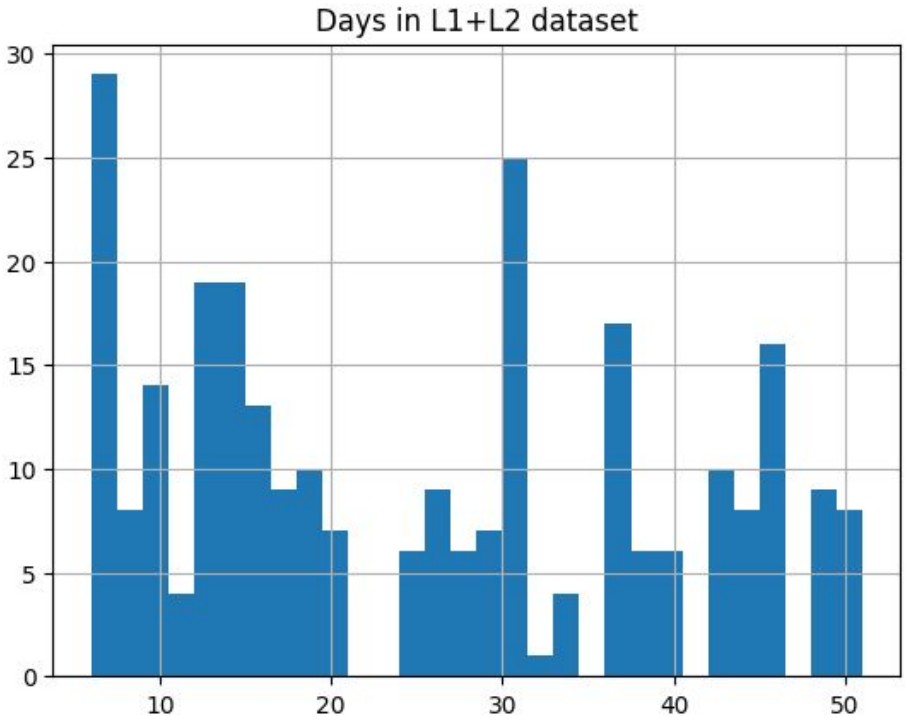


Number of classes per label



Looking at time ranges

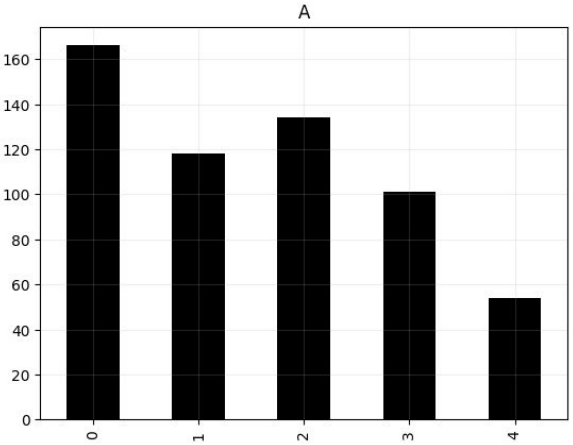
Frequency of days in the L1+L2 dataset

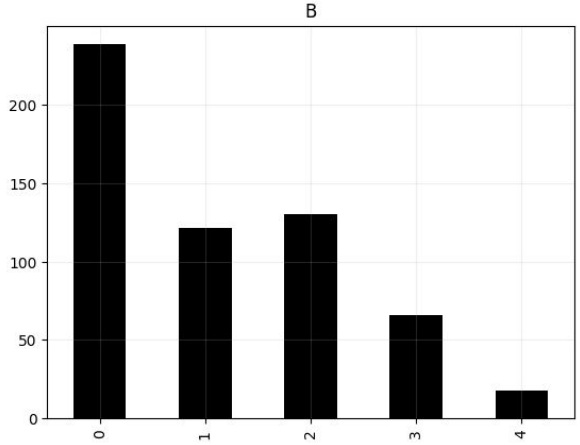


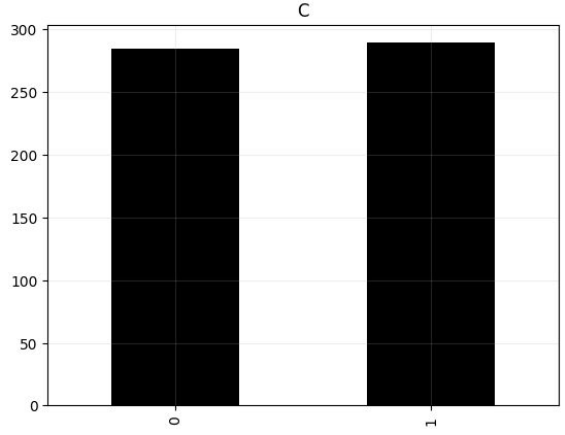
Proposed time ranges

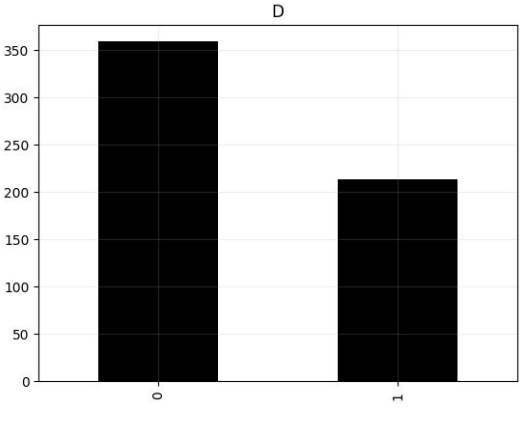
- A:0-14, 15-28, 29-42, 43-56,57+
- B:7-21, 22-35, 36-49, 50-63, 64+ ***(why 7 minimum? I assumed 6-21)***
- C:0-28, 29-56+
- D:0-35, 36-63 ***(nothing above 63? I assumed 63+)***

How many data points in each time range?
(whole dataset)



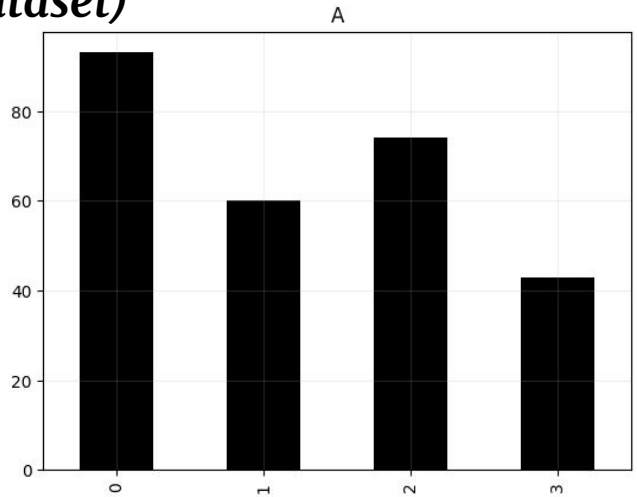


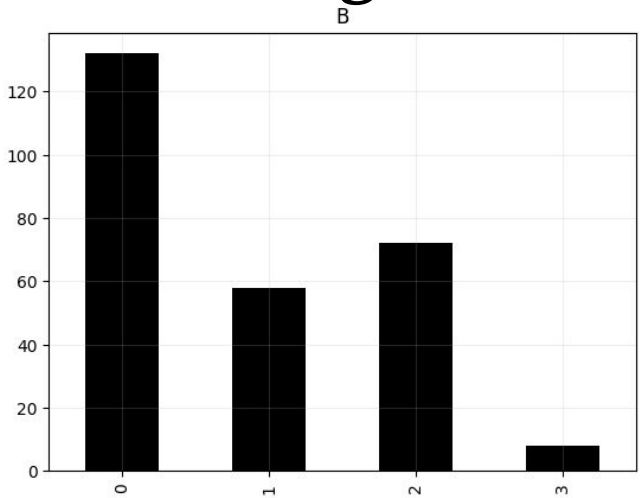


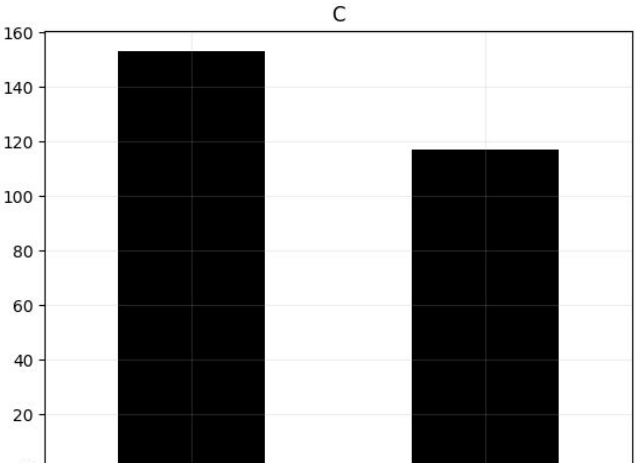


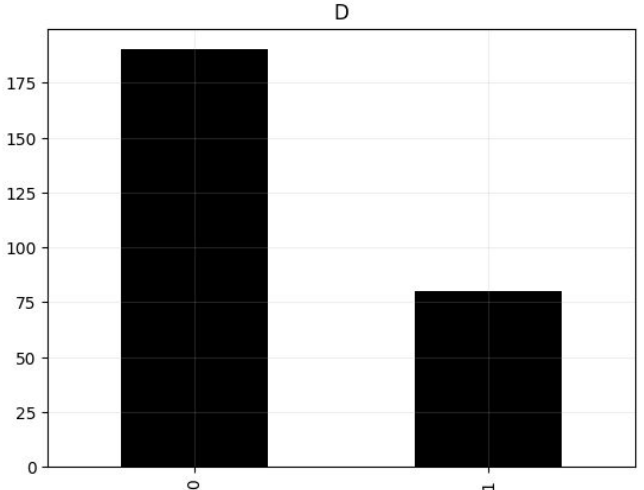
How many data points in each time range?

(L1+L2 dataset)

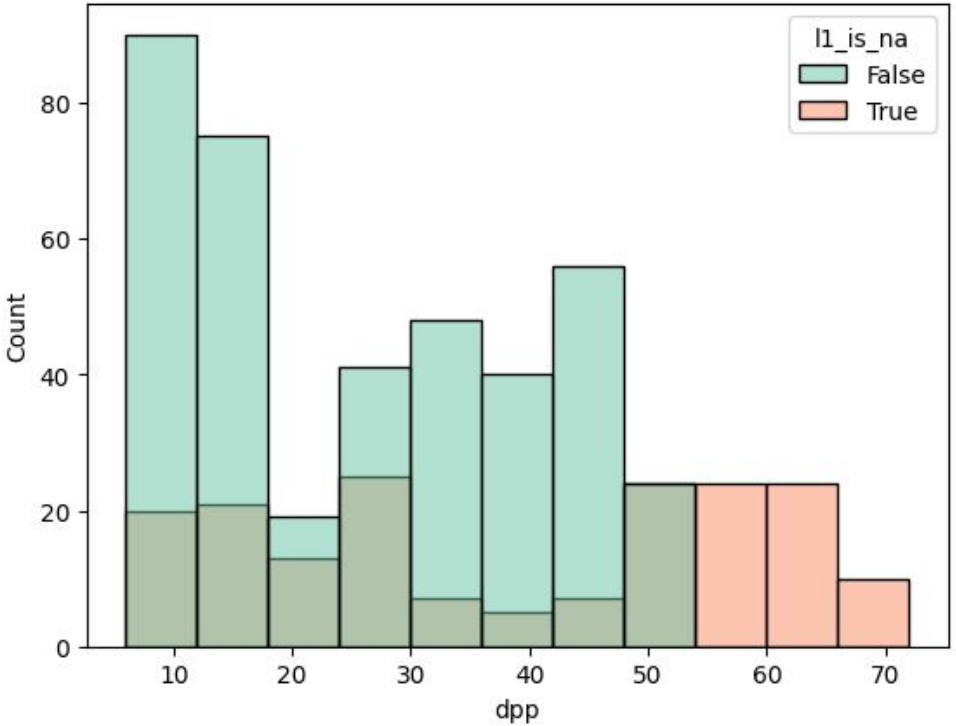


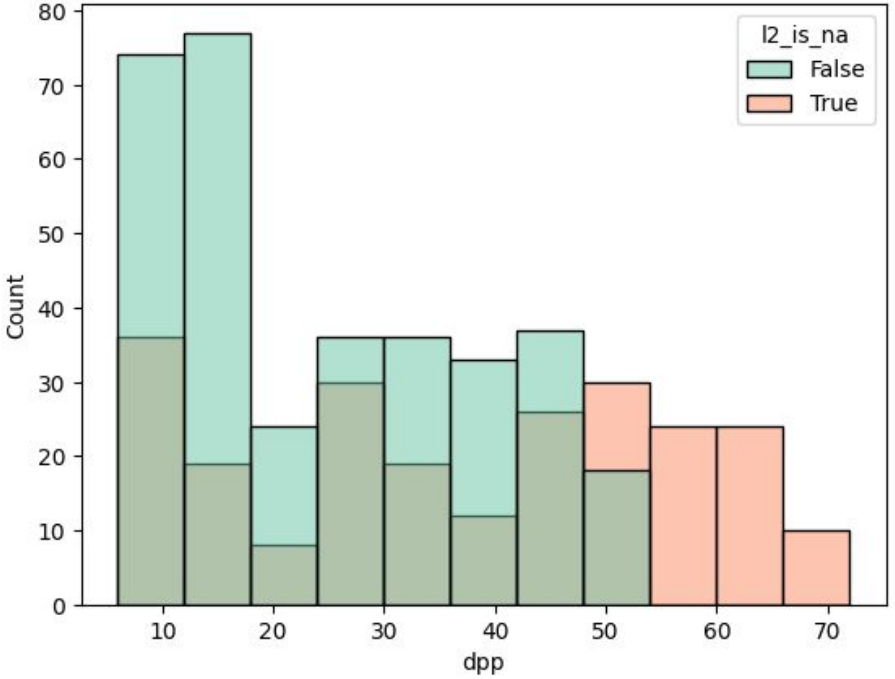






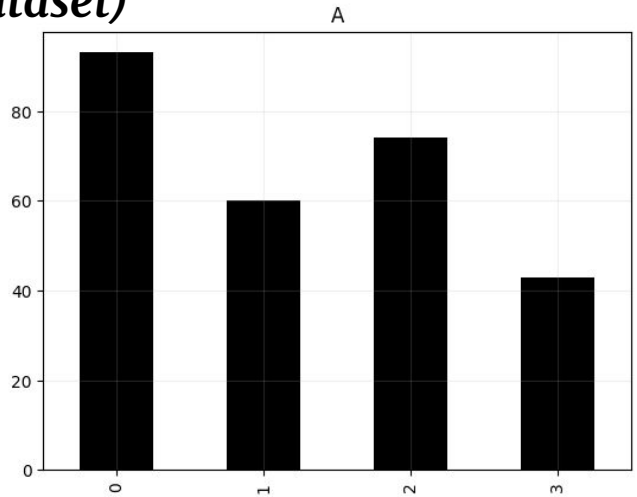
Later timepoints have only NA values for L1 and L2

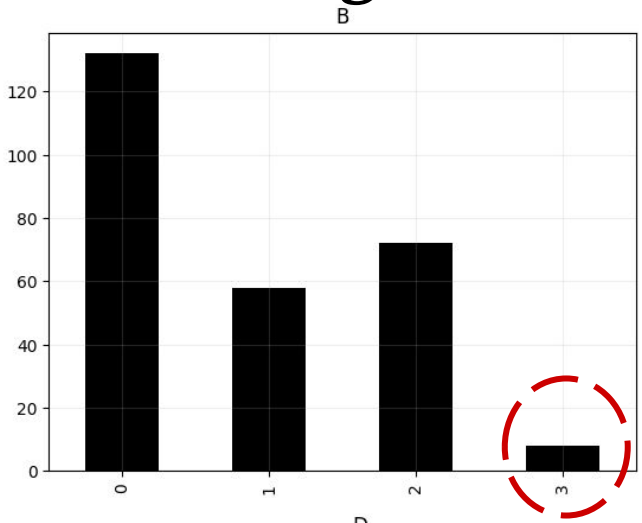


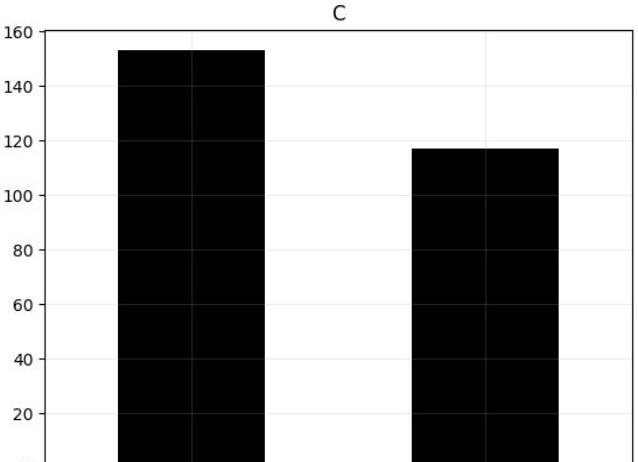


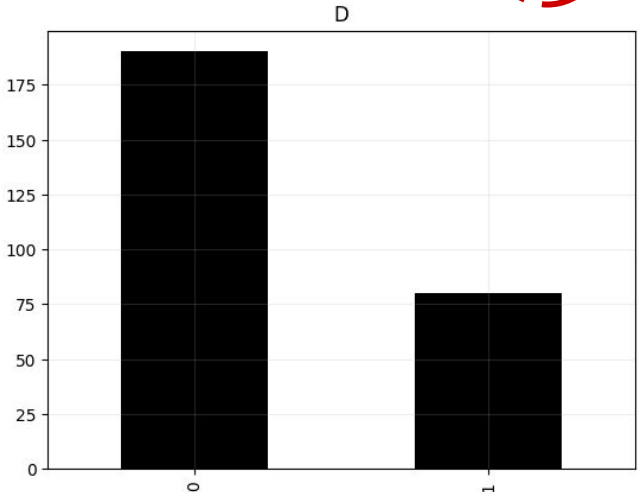
How many data points in each time range?

(L1+L2 dataset)

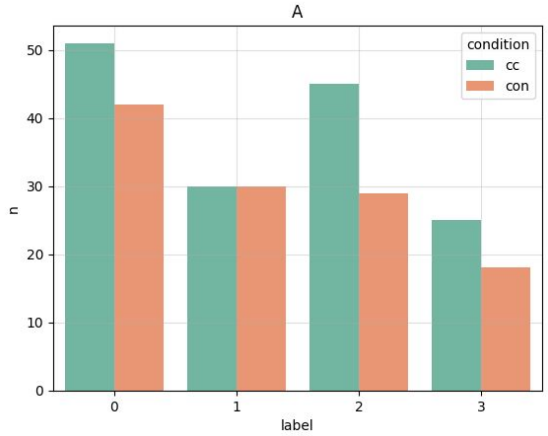


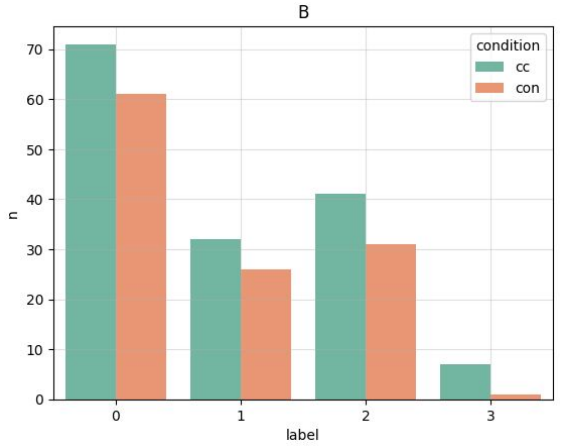


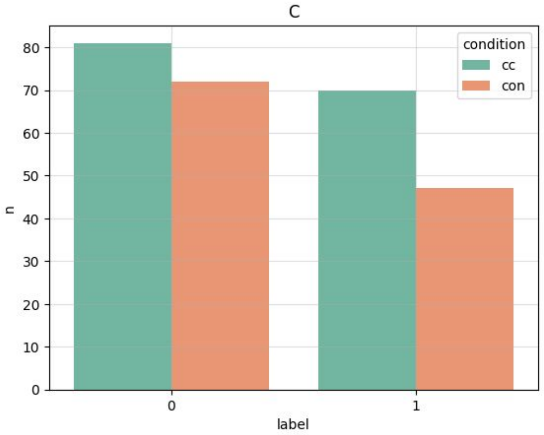


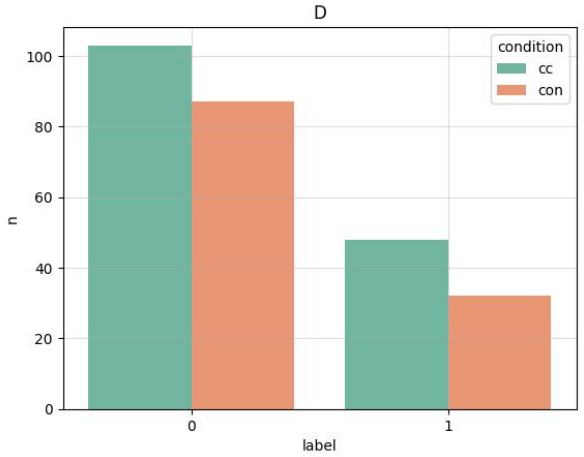


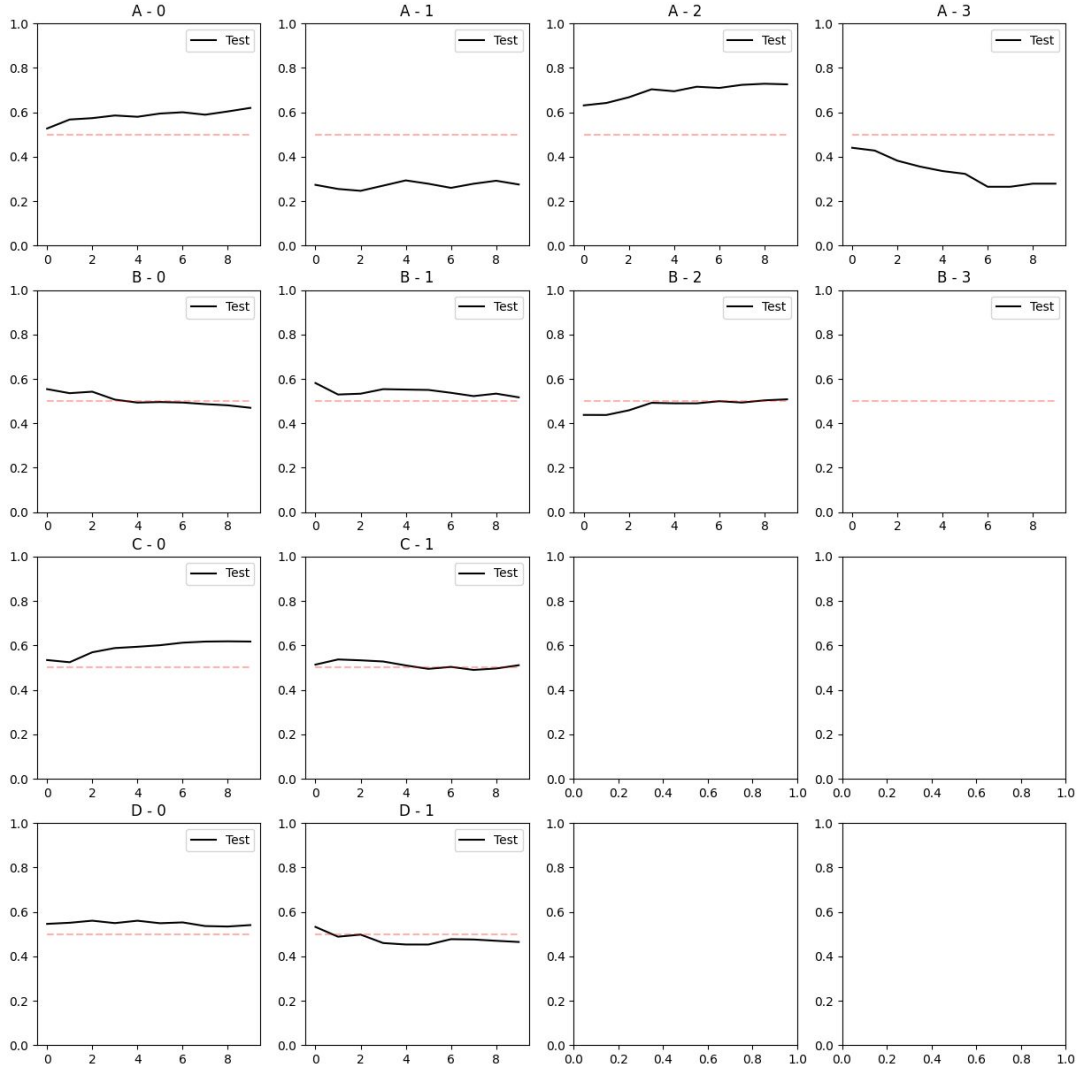
Data points split by conditions in each time range

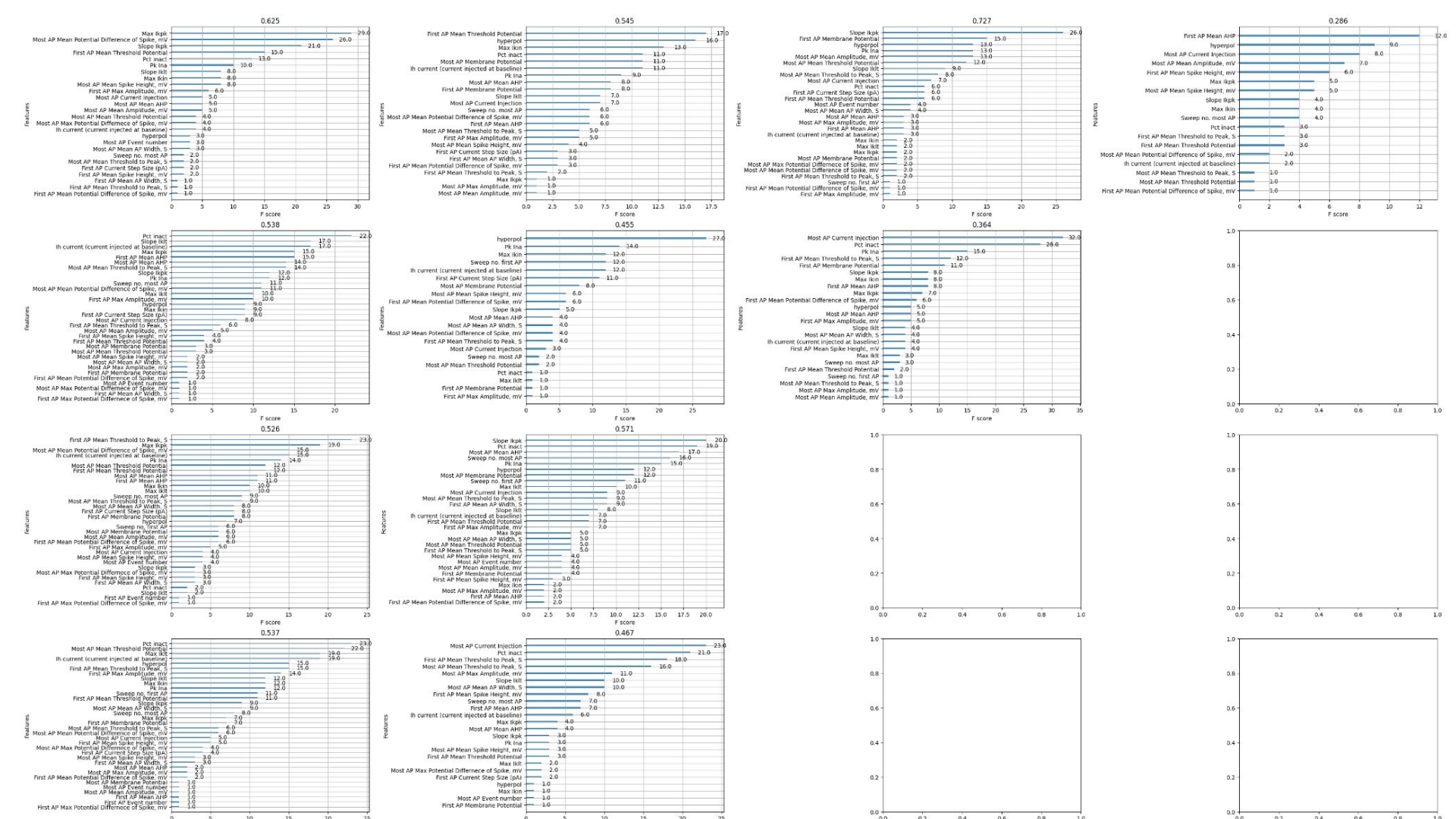




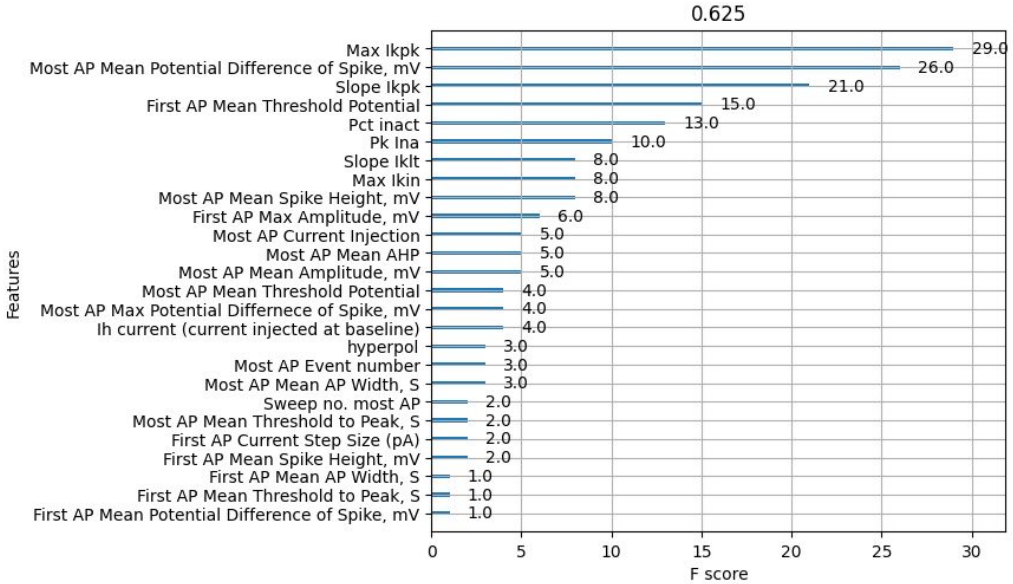


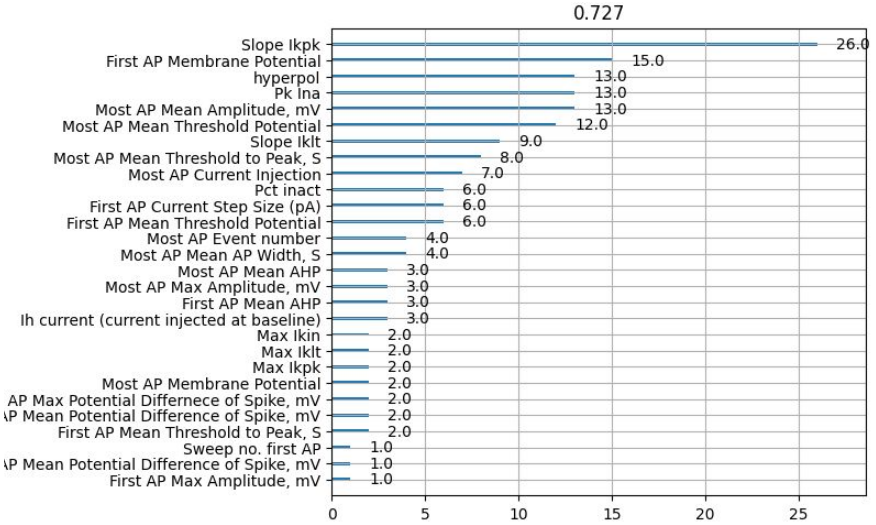



A - 0
A - 1
A - 2
A - 3
B - 0
B - 1
B - 2
B - 3
C - 0
C - 1
D - 0
D - 1
Test


0.625
Max ikpk 29.0
Most AP Mean Potential Difference of Spike, mV 26.0
Slope ikpk 21.0
First AP Mean Threshold Potential 15.0
Pct inact 13.0
Pk ina 10.0
Slope ikit 8.0
Max ikin 8.0
Most AP Mean Spike Height, mV 8.0
First AP Max Amplitude, mV 6.0
Most AP Current injection 5.0
Most AP Mean AHP 5.0
Most AP Mean Amplitude, mV 5.0
Most AP Mean Threshold Potential 4.0
Most AP Max Potential Difference of Spike, mV 4.0
Ih current (current injected at baseline) 4.0
hyperpol 3.0
Most AP Event number 3.0
Most AP Mean AP Width, S 3.0
Sweep no. most AP 2.0
Most AP Mean Threshold to Peak, S 2.0
First AP Current Step Size (pA) 2.0
First AP Mean Spike Height, mV 2.0
First AP Mean AP Width, S 1.0
First AP Mean Threshold to Peak, S 1.0
First AP Mean Potential Difference of Spike, mV 1.0
Features
F score
0.545
First AP Mean Threshold Potential 17.0
hyperpol 16.0
Max ikin 13.0
Pct inact 11.0
Most AP Membrane Potential 11.0
Ih current (current injected at baseline) 11.0
Pk ina 9.0
Most AP Mean AHP 8.0
First AP Membrane Potential 8.0
Slope ikit 7.0
Most AP Current Injection 7.0
Sweep no. most AP 6.0
Most AP Mean Potential Difference of Spike, mV 6.0
First AP Mean AHP 6.0
Most AP Mean Threshold to Peak, S 5.0
First AP Max Amplitude, mV 5.0
Most AP Mean Spike Height, mV 4.0
First AP Current Step Size (pA) 3.0
First AP Mean AP Width, S 3.0
First AP Mean Potential Difference of Spike, mV 3.0
First AP Mean Threshold to Peak, S 2.0
Max ikpk 1.0
Most AP Max Amplitude, mV 1.0
Most AP Mean Amplitude, mV 1.0
Features
F score
0.727
Slope ikpk 26.0
First AP Membrane Potential 15.0
hyperpol 13.0
Pk ina 13.0
Most AP Mean Amplitude, mV 13.0
Most AP Mean Threshold Potential 12.0
Slope ikit 9.0
Most AP Mean Threshold to Peak, S 8.0
Most AP Current Injection 7.0
Pct inact 6.0
First AP Current Step Size (pA) 6.0
First AP Mean Threshold Potential 6.0
Most AP Event number 4.0
Most AP Mean AP Width, S 4.0
Most AP Mean AHP 3.0
Most AP Max Amplitude, mV 3.0
First AP Mean AHP 3.0
Ih current (current injected at baseline) 3.0
Max ikin 2.0
Max ikit 2.0
Max ikpk 2.0
Most AP Membrane Potential 2.0
Most AP Max Potential Difference of Spike, mV 2.0
Most AP Mean Potential Difference of Spike, mV 2.0
First AP Mean Threshold to Peak, S 2.0
Sweep no. first AP 1.0
First AP Mean Potential Difference of Spike, mV 1.0
First AP Max Amplitude, mV 1.0
Features
F score
0.286
First AP Mean AHP 12.0
hyperpol 9.0
Most AP Current Injection 8.0
Most AP Mean Amplitude, mV 7.0
First AP Mean Spike Height, mV 6.0
Max ikpk 5.0
Most AP Mean Spike Height, mV 5.0
Slope ikpk 4.0
Max ikin 4.0
Sweep no. most AP 4.0
Pct inact 3.0
First AP Mean Threshold to Peak, S 3.0
First AP Mean Threshold Potential 3.0
Most AP Mean Potential Difference of Spike, mV 2.0
Ih current (current injected at baseline) 2.0
Most AP Mean Threshold to Peak, S 1.0
Most AP Mean Threshold Potential 1.0
First AP Mean Potential Difference of Spike, mV 1.0
Features
F score
0.538
Pct inact 22.0
Slope ikit 17.0
Ih current (current injected at baseline) 17.0
Max ikpk 15.0
First AP Mean AHP 15.0
Most AP Mean AHP 14.0
Most AP Mean Threshold to Peak, S 14.0
Slope ikpk 12.0
Pk ina 12.0
Sweep no. most AP 11.0
Most AP Mean Potential Difference of Spike, mV 11.0
Max ikit 10.0
First AP Max Amplitude, mV 10.0
hyperpol 9.0
Max ikin 9.0
First AP Current Step Size (pA) 8.0
Most AP Current Injection 8.0
First AP Mean Threshold to Peak, S 6.0
Most AP Mean Amplitude, mV 5.0
First AP Mean Spike Height, mV 4.0
First AP Mean Threshold Potential 4.0
Most AP Membrane Potential 3.0
Most AP Mean Threshold Potential 3.0
Most AP Mean Spike Height, mV 2.0
Most AP Mean AP Width, S 2.0
Most AP Max Amplitude, mV 2.0
First AP Membrane Potential 2.0
First AP Mean Potential Difference of Spike, mV 2.0
Most AP Event number 1.0
Most AP Max Potential Difference of Spike, mV 1.0
First AP Mean AP Width, S 1.0
First AP Max Potential Difference of Spike, mV 1.0
Features
F score
0.455
hyperpol 27.0
Pk ina 14.0
Max ikin 12.0
Sweep no. first AP 12.0
Ih current (current injected at baseline) 12.0
First AP Current Step Size (pA) 11.0
Most AP Membrane Potential 8.0
Most AP Mean Spike Height, mV 6.0
First AP Mean Potential Difference of Spike, mV 6.0
Slope ikpk 5.0
Most AP Mean AHP 4.0
Most AP Mean AP Width, S 4.0
Most AP Mean Potential Difference of Spike, mV 4.0
First AP Mean Threshold to Peak, S 4.0
Most AP Current Injection 3.0
Sweep no. most AP 2.0
Most AP Mean Threshold Potential 2.0
Pct inact 1.0
Max ikit 1.0
First AP Membrane Potential 1.0
First AP Max Amplitude, mV 1.0
Features
F score
0.364
Most AP Current injection 32.0
Pct inact 28.0
Pk ina 15.0
First AP Mean Threshold to Peak, S 12.0
First AP Membrane Potential 11.0
Slope ikpk 8.0
Max ikin 8.0
First AP Mean AHP 8.0
Max ikpk 7.0
First AP Mean Potential Difference of Spike, mV 6.0
hyperpol 5.0
Most AP Mean AHP 5.0
First AP Max Amplitude, mV 5.0
Slope ikit 4.0
Most AP Mean AP Width, S 4.0
Ih current (current injected at baseline) 4.0
First AP Mean Spike Height, mV 4.0
Max ikit 3.0
Sweep no. most AP 3.0
First AP Mean Threshold Potential 2.0
Sweep no. first AP 1.0
Most AP Mean Threshold to Peak, S 1.0
Most AP Max Amplitude, mV 1.0
Most AP Mean Amplitude, mV 1.0
Features
F score
0.526
First AP Mean Threshold to Peak, S 23.0
Max ikpk 19.0
Most AP Mean Potential Difference of Spike, mV 15.0
Ih current (current injected at baseline) 15.0
Pk ina 14.0
Most AP Mean Threshold Potential 12.0
First AP Mean Threshold Potential 12.0
Most AP Membrane Potential 11.0
First AP Mean AHP 11.0
Max ikin 10.0
Max ikit 10.0
Sweep no. most AP 9.0
Most AP Mean Threshold to Peak, S 9.0
Most AP Mean AP Width, S 8.0
First AP Current Step Size (pA) 8.0
First AP Membrane Potential 8.0
hyperpol 7.0
Sweep no. first AP 6.0
Most AP Membrane Potential 6.0
Most AP Mean Amplitude, mV 6.0
First AP Mean Potential Difference of Spike, mV 6.0
First AP Max Amplitude, mV 5.0
Most AP Current injection 4.0
Most AP Mean Spike Height, mV 4.0
Most AP Event number 4.0
Slope ikpk 3.0
Most AP Max Potential Difference of Spike, mV 3.0
First AP Mean Spike Height, mV 3.0
First AP Mean AP Width, S 3.0
Pct inact 2.0
Slope ikit 2.0
First AP Event number 1.0
First AP Max Potential Difference of Spike, mV 1.0
Features
F score
0.571
Slope ikpk 20.0
Pct inact 19.0
Most AP Mean AHP 17.0
Sweep no. most AP 16.0
Pk ina 15.0
hyperpol 12.0
Most AP Membrane Potential 12.0
Sweep no. first AP 11.0
Max ikit 10.0
Most AP Current Injection 9.0
Most AP Mean Threshold to Peak, S 9.0
First AP Mean AP Width, S 9.0
Slope ikit 8.0
Ih current (current injected at baseline) 7.0
First AP Mean Threshold Potential 7.0
First AP Max Amplitude, mV 7.0
Max ikpk 5.0
Most AP Mean AP Width, S 5.0
Most AP Mean Threshold Potential 5.0
First AP Mean Threshold to Peak, S 5.0
Most AP Mean Spike Height, mV 4.0
Most AP Event number 4.0
Most AP Mean Amplitude, mV 4.0
First AP Membrane Potential 4.0
First AP Mean Spike Height, mV 3.0
Max ikin 2.0
Most AP Max Amplitude, mV 2.0
First AP Mean AHP 2.0
First AP Mean Potential Difference of Spike, mV 2.0
Features
F score
0.537
Pct inact 23.0
Most AP Mean Threshold Potential 22.0
Max ikit 19.0
Ih current (current injected at baseline) 19.0
hyperpol 15.0
First AP Mean Threshold Potential 15.0
First AP Max Amplitude, mV 14.0
Slope ikit 12.0
Max ikin 12.0
Pk ina 12.0
Sweep no. first AP 11.0
First AP Mean Threshold Potential 11.0
Slope ikpk 9.0
Most AP Mean AP Width, S 9.0
Sweep no. most AP 8.0
Max ikpk 7.0
First AP Membrane Potential 7.0
Most AP Mean Threshold to Peak, S 6.0
Most AP Mean Potential Difference of Spike, mV 6.0
First AP Mean Spike Height, mV 5.0
First AP Current Injection 5.0
Most AP Max Potential Difference of Spike, mV 4.0
First AP Current Step Size (pA) 4.0
Most AP Mean Spike Height, mV 3.0
First AP Mean AP Width, S 3.0
Most AP Mean AHP 2.0
Most AP Max Amplitude, mV 2.0
First AP Mean Potential Difference of Spike, mV 2.0
Most AP Membrane Potential 1.0
Most AP Event number 1.0
Most AP Mean Amplitude, mV 1.0
First AP Mean AHP 1.0
First AP Event number 1.0
First AP Max Potential Difference of Spike, mV 1.0
Features
F score
0.467
Most AP Current Injection 23.0
Pct inact 21.0
First AP Mean Threshold to Peak, S 18.0
Most AP Mean Threshold to Peak, S 16.0
Most AP Max Amplitude, mV 11.0
Slope ikit 10.0
Most AP Mean AP Width, S 10.0
First AP Mean Spike Height, mV 8.0
Sweep no. most AP 7.0
First AP Mean AHP 7.0
Ih current (current injected at baseline) 6.0
Max ikpk 4.0
Most AP Mean AHP 4.0
Slope ikpk 3.0
Pk ina 3.0
Most AP Mean Spike Height, mV 3.0
First AP Mean Threshold Potential 3.0
Max ikit 2.0
Most AP Max Potential Difference of Spike, mV 2.0
First AP Current Step Size (pA) 2.0
hyperpol 1.0
Max ikin 1.0
Most AP Event number 1.0
First AP Membrane Potential 1.0

A1 and A3


0.625
Max Ikpk
Most AP Mean Potential Difference of Spike, mV
Slope Ikpk
First AP Mean Threshold Potential
Pct inact
Pk Ina
Slope Iklt
Max Ikin
Most AP Mean Spike Height, mV
First AP Max Amplitude, mV
Most AP Current Injection
Most AP Mean AHP
Most AP Mean Amplitude, mV
Most AP Mean Threshold Potential
Most AP Max Potential Differnece of Spike, mV
Ih current (current injected at baseline)
hyperpol
Most AP Event number
Most AP Mean AP Width, S
Sweep no. most AP
Most AP Mean Threshold to Peak, S
First AP Current Step Size (pA)
First AP Mean Spike Height, mV
First AP Mean AP Width, S
First AP Mean Threshold to Peak, S
First AP Mean Potential Difference of Spike, mV
29.0
26.0
21.0
15.0
13.0
10.0
8.0
8.0
8.0
6.0
5.0
5.0
5.0
4.0
4.0
4.0
3.0
3.0
3.0
2.0
2.0
2.0
2.0
1.0
1.0
1.0
Features
0
5
10
15
20
25
30
F score


0.727
Slope Ikpk
First AP Membrane Potential
hyperpol
Pk Ina
Most AP Mean Amplitude, mV
Most AP Mean Threshold Potential
Slope Iklt
Most AP Mean Threshold to Peak, S
Most AP Current Injection
Pct inact
First AP Current Step Size (pA)
First AP Mean Threshold Potential
Most AP Event number
Most AP Mean AP Width, S
Most AP Mean AHP
Most AP Max Amplitude, mV
First AP Mean AHP
Ih current (current injected at baseline)
Max Ikin
Max Iklt
Max Ikpk
Most AP Membrane Potential
AP Max Potential Differnece of Spike, mV
AP Mean Potential Difference of Spike, mV
First AP Mean Threshold to Peak, S
Sweep no. first AP
AP Mean Potential Difference of Spike, mV
First AP Max Amplitude, mV
26.0
15.0
13.0
13.0
13.0
12.0
9.0
8.0
7.0
6.0
6.0
6.0
4.0
4.0
3.0
3.0
3.0
3.0
2.0
2.0
2.0
2.0
2.0
2.0
2.0
1.0
1.0
1.0
0
5
10
15
20
25