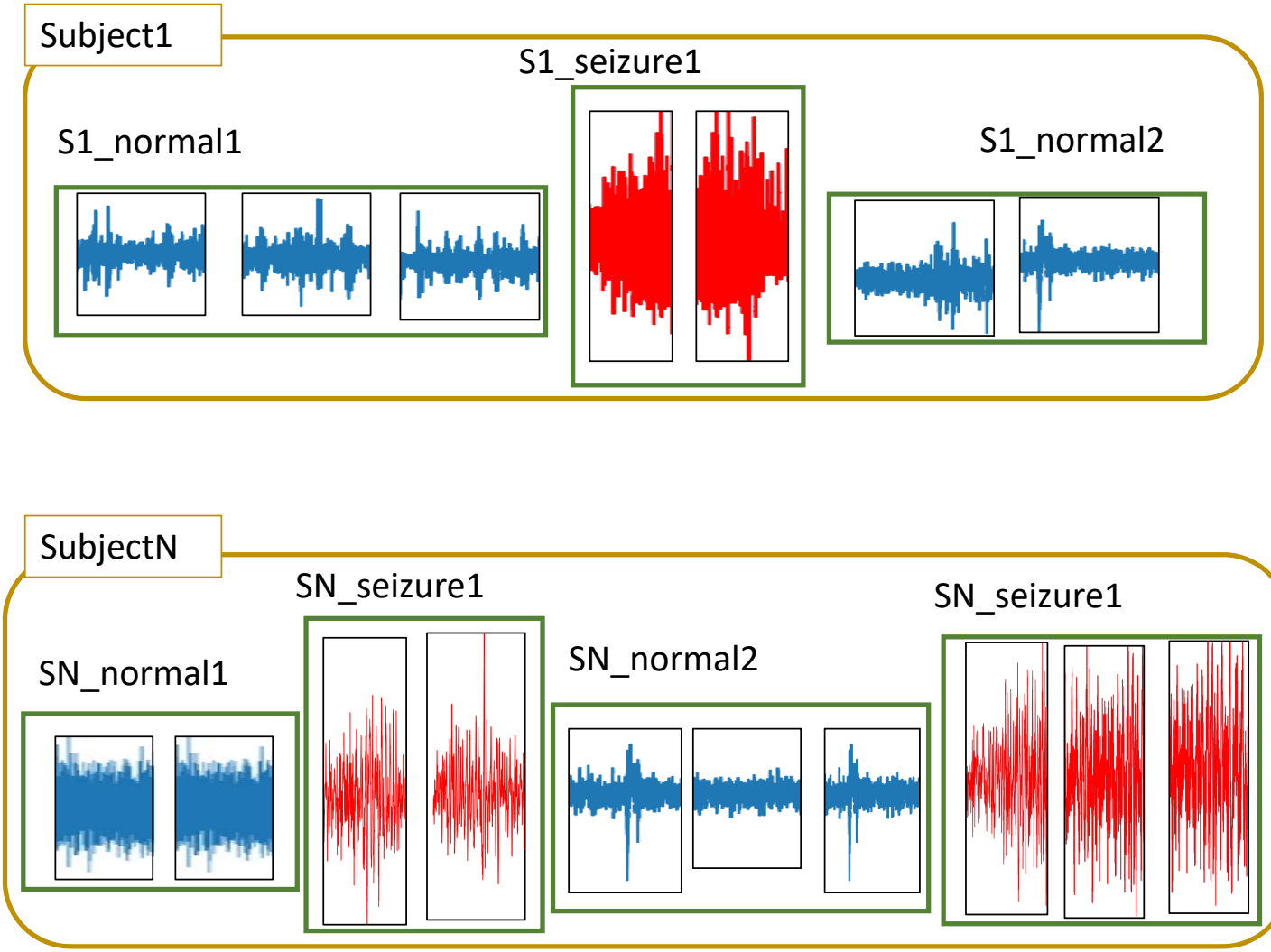
escola d'enginyeria

UAB

Detection of epileptic seizures in EEG signals

Challenge Objectives



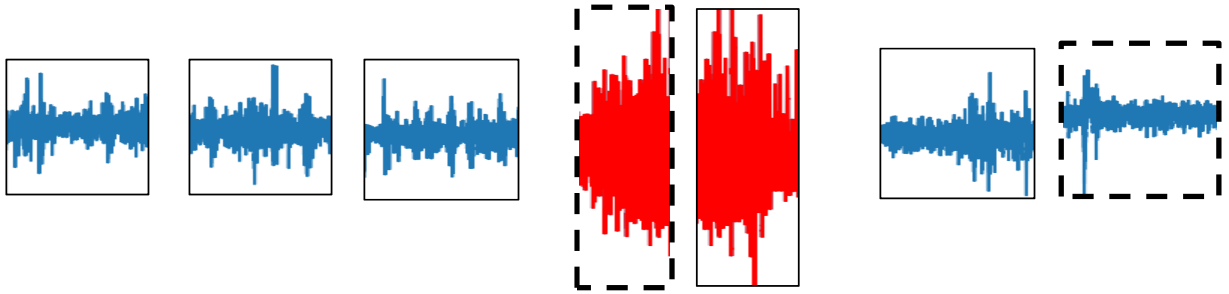
2. Experimental Design

Sampling Levels:

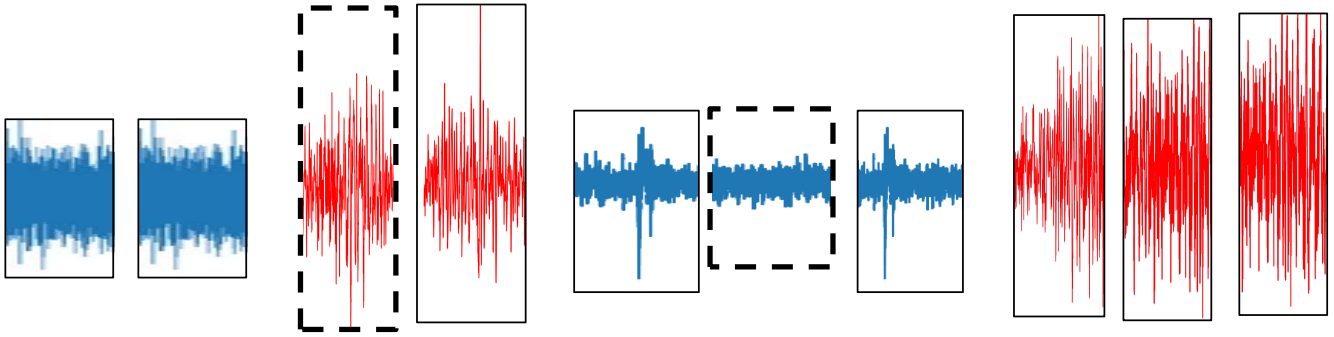
1. **Window**
2. **Seizure**
3. **Subject**

Challenge Objectives

1. **Window Level:** K-fold on windows (experimental sampling unit)

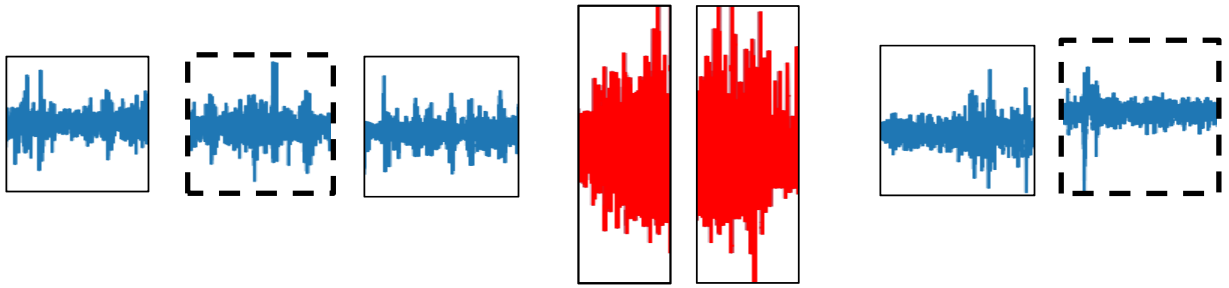


- - test set

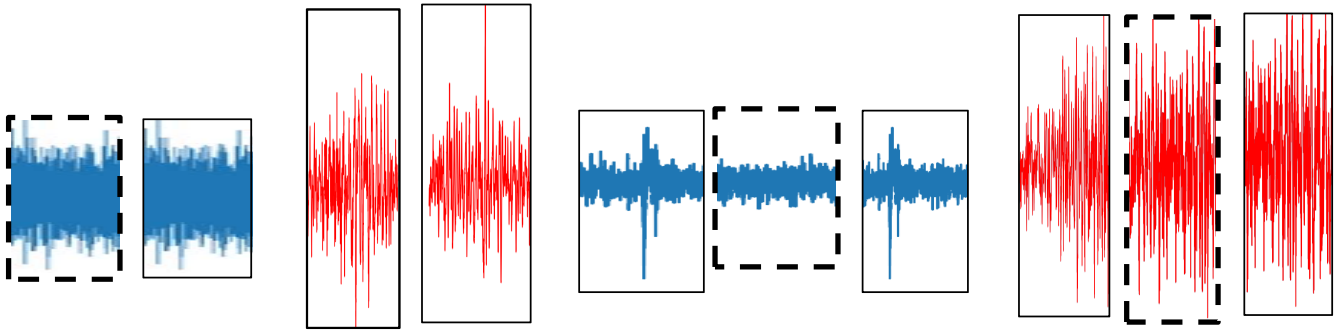


Challenge Objectives

1. **Window Level:** K-fold on windows (experimental sampling unit)



- - test set



Challenge Objectives

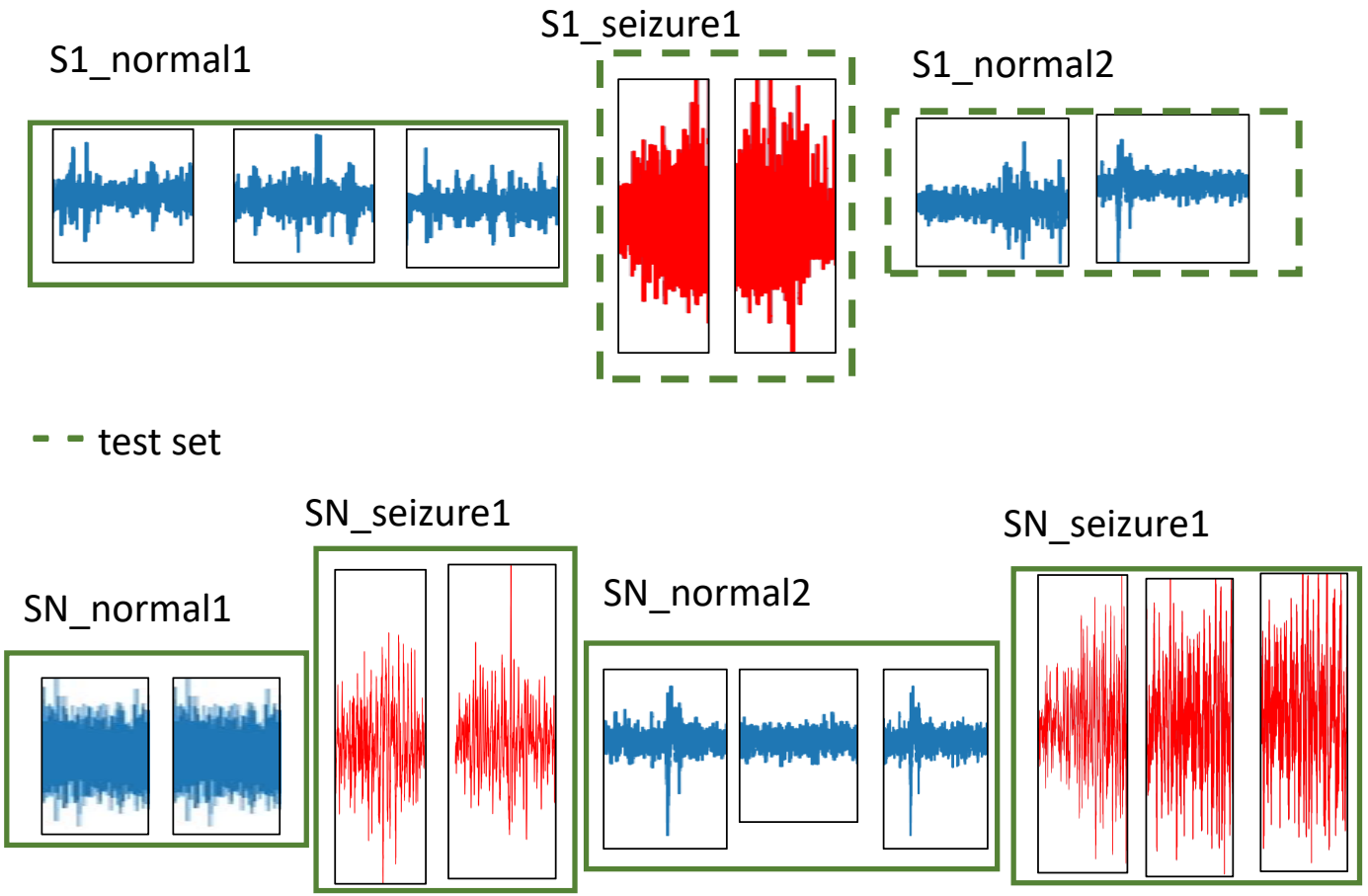
1. **Window Level:** K-fold on windows (experimental sampling unit)

62	**Train: summary undersampling Test balanced**							
63	**model**	**recall_0**	**recall_1**	**precision_0**	**precision_1**	**f1_0**	**f1_1**	**accuracy**
72	LSTM	0.9637+/-0.0015	0.9838+/-0.0005	0.9835+/-0.0005	0.9644+/-0.0014	0.9735+/-0.0009	0.974+/-0.0008	0.9737+/-0.0008
73	EpiGao19	0.9643+/-0.0029	0.9473+/-0.003	0.9482+/-0.0027	0.9637+/-0.0027	0.9562+/-0.0012	0.9554+/-0.0012	0.9558+/-0.0012
74	EpiHossain19	0.9338+/-0.0103	0.8604+/-0.012	0.8701+/-0.0087	0.9287+/-0.0091	0.9007+/-0.0014	0.8932+/-0.0026	0.8971+/-0.0017
75								
76	**Train: undersampling Test unbalanced (union res nores)**							
86	LSTM	0.9634+/-0.003	0.9838+/-0.0005	0.9996+/-0.0	0.369+/-0.0191	0.9812+/-0.0016	0.5365+/-0.0202	0.9638+/-0.0029
87	EpiGao19	0.9633+/-0.002	0.9473+/-0.003	0.9988+/-0.0001	0.3594+/-0.0116	0.9808+/-0.001	0.521+/-0.0121	0.963+/-0.0019
88	EpiHossain19	0.9318+/-0.0098	0.8604+/-0.012	0.9968+/-0.0002	0.2166+/-0.0197	0.9632+/-0.0052	0.3456+/-0.0248	0.9303+/-0.0094
89								

kfold cross validation | leave_one_patient_out | L1Seiz | L1Seiz separado | L1Seiz summ

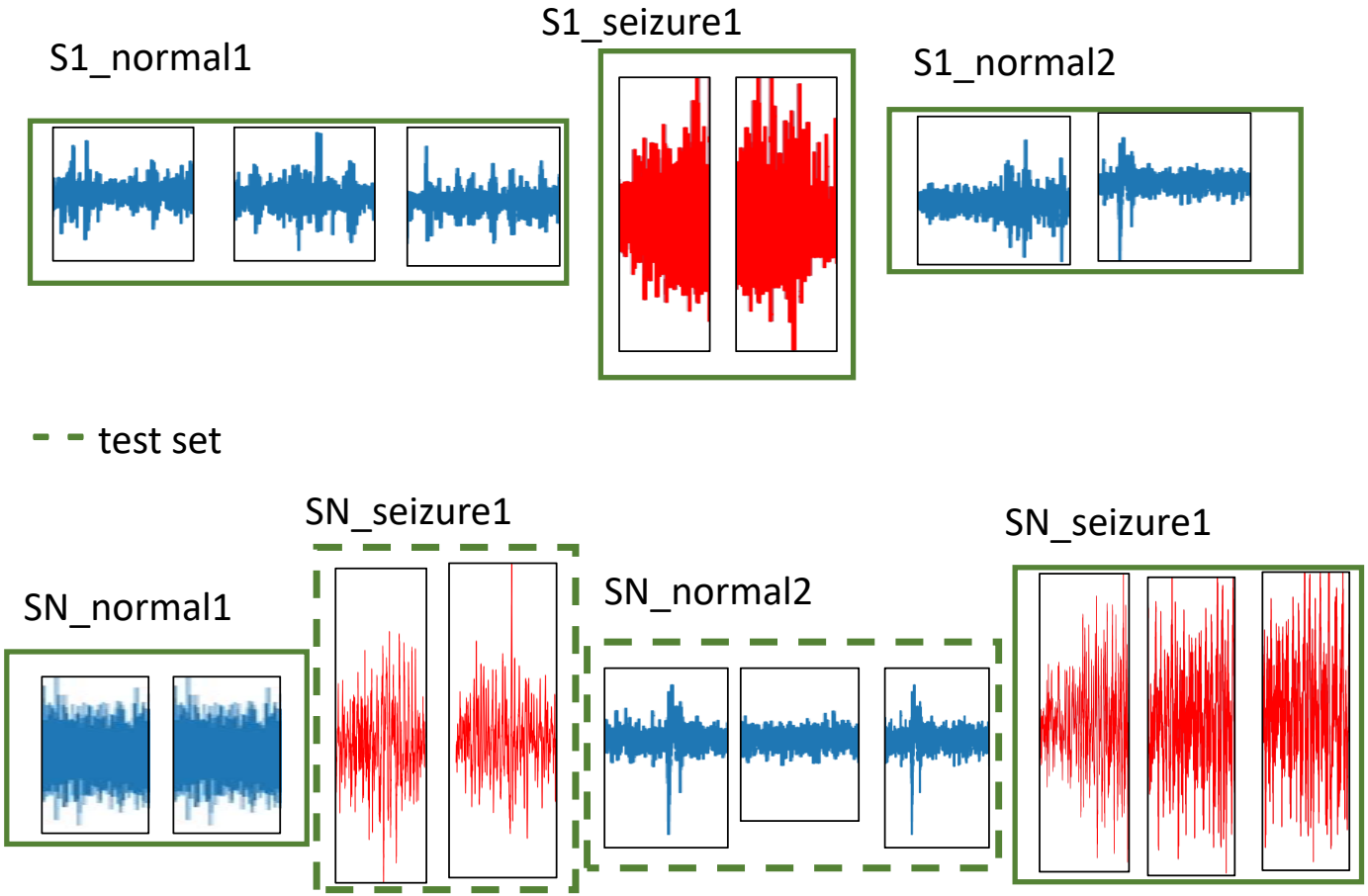
Challenge Objectives

2. Seizure: K-fold on seizure/normal episodes (leave-one-seizure-out)



Challenge Objectives

2. Seizure: K-fold on seizure/normal episodes (leave-one-seizure-out)



Challenge Objectives

2. Seizure: K-fold on seizure/normal episodes (leave-one-seizure-out)

	Early AGV		LSTM	
subject	recall_0	recall_1	recall_0	recall_1
chb01	88,59	92,34	96,35	89,80
chb02	99,59	99,19	94,66	93,43
chb03	95,29	84,51	99,09	91,96
chb04	96,31	84,10	96,87	86,20
chb05	58,85	97,59	79,39	95,35
chb06	20,77	77,04	90,39	58,89
chb07	92,07	93,13	99,77	92,35
chb08	95,19	73,08	80,00	78,27
chb09	79,63	98,00	95,89	98,12
chb10	98,13	91,56	99,80	91,90
chb11	84,68	80,91	95,46	92,88
chb12	91,76	74,49	95,99	73,29
chb13	28,64	43,10	90,44	68,01
chb14	81,83	37,07	98,02	27,87
chb15	98,19	54,09	99,17	87,68
chb16	96,35	73,12	95,63	49,03
chb17	92,32	66,97	85,64	84,46
chb18	95,66	47,11	97,84	78,28
chb19	100,00	82,93	99,14	77,04
chb20	69,12	57,06	94,54	63,65
chb21	94,89	63,85	94,00	65,61
chb22	82,94	97,59	100,00	89,10

kfold cross validation | leave_one_patient_out | **L1Seiz**

Analysis aggregated per patient to discard outliers

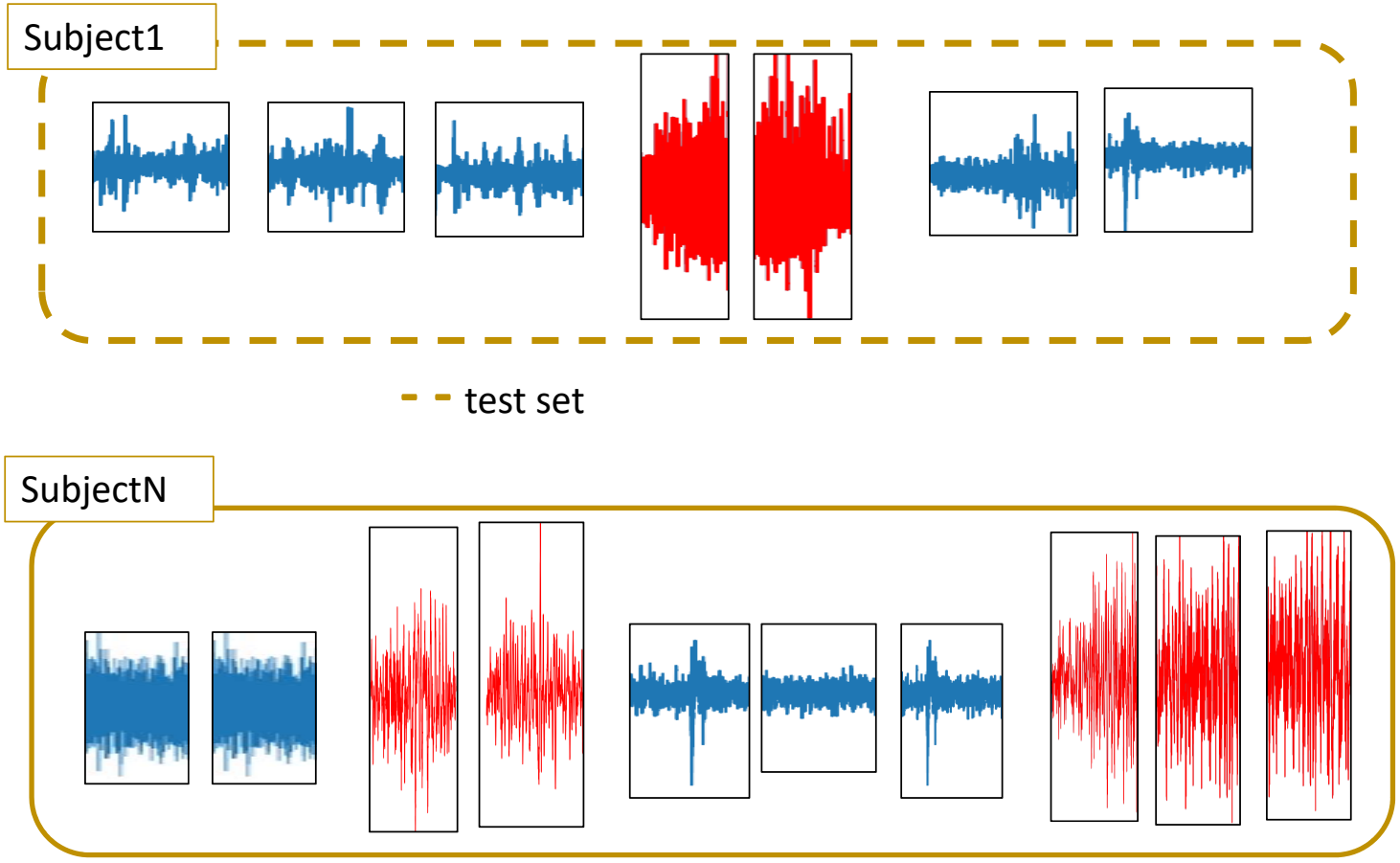
Global analysis aggregated for all patients

TEST BALANCED							
	Ceros muestreados en la mitad del archivo normal						
model	recall_0	recall_1	precision_0	precision_1	f1_0	f1_1	accuracy
EpiC2dEarlyAvg	0.8755+/-0.2702	0.7831+/-0.2669	0.7894+/-0.2552	0.886+/-0.2341	0.8158+/-0.2513	0.804+/-0.2364	0.8293+/-0.1868
EpiC2dEarlyCat	0.9594+/-0.0726	0.8585+/-0.2063	0.8959+/-0.1238	0.9397+/-0.1549	0.919+/-0.0773	0.8863+/-0.1729	0.9089+/-0.1014
LSTM	0.9585+/-0.0865	0.828+/-0.2499	0.8789+/-0.1444	0.918+/-0.2121	0.9079+/-0.0991	0.8581+/-0.2241	0.8933+/-0.1293
EpiGao19	0.9158+/-0.1464	0.8181+/-0.1994	0.8537+/-0.12	0.9169+/-0.1243	0.8719+/-0.1189	0.8463+/-0.1666	0.8669+/-0.1132
EpiHossain19	0.8985+/-0.1526	0.7474+/-0.2357	0.8026+/-0.1433	0.8757+/-0.1796	0.8368+/-0.1296	0.7874+/-0.2117	0.8229+/-0.1398

TEST UNBALANCED							
	Ceros muestreados en la mitad del archivo normal						
model	recall_0	recall_1	precision_0	precision_1	f1_0	f1_1	accuracy
EpiC2dEarlyAvg	0.8826+/-0.2654	0.7873+/-0.2652	0.9249+/-0.1538	0.8124+/-0.2963	0.8809+/-0.2396	0.7584+/-0.2668	0.8635+/-0.2219
EpiC2dEarlyCat	0.98+/-0.0362	0.8587+/-0.2188	0.968+/-0.0462	0.9073+/-0.1847	0.9729+/-0.0288	0.8684+/-0.1896	0.9558+/-0.0481
LSTM	0.9822+/-0.0377	0.8317+/-0.2555	0.9624+/-0.0533	0.891+/-0.2327	0.9709+/-0.0336	0.847+/-0.2328	0.9521+/-0.0564
EpiGao19	0.9257+/-0.1147	0.8181+/-0.1994	0.9556+/-0.0436	0.7866+/-0.2033	0.9352+/-0.0794	0.7801+/-0.1814	0.9042+/-0.094
EpiHossain19	0.9066+/-0.1186	0.7474+/-0.2357	0.937+/-0.0545	0.7258+/-0.259	0.9169+/-0.0782	0.7123+/-0.2291	0.8747+/-0.1072

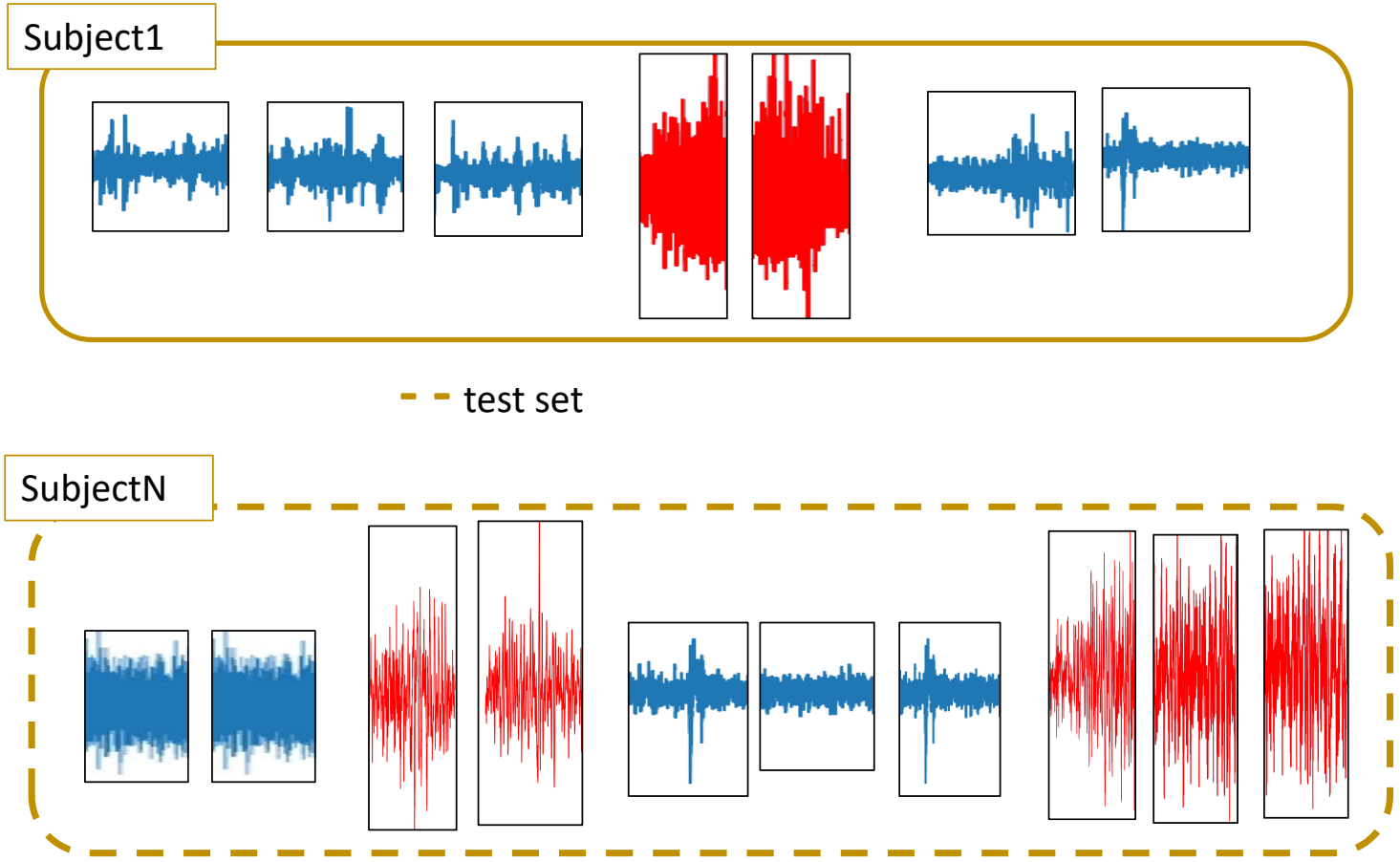
Challenge Objectives

3. Subject: Leave-one-patient out



Challenge Objectives

3. Subject: Leave-one-patient out



Challenge Objectives

2. Experimental Design

3. Subject: Leave-one-patient out

Train: Balanced (1s proportional by patients)
Test: Unbalanced
100% de pacientes *

model	recall_0	recall_1	precision_	precision_	f1_0	f1_1	accuracy
EpiC2dEarlyAvg	0.85+/-0.23	0.77+/-0.22	0.99+/-0.01	0.33+/-0.27	0.9+/-0.2	0.39+/-0.26	0.85+/-0.23
EpiC2dEarlyCat	0.9+/-0.17	0.67+/-0.32	0.99+/-0.01	0.43+/-0.36	0.93+/-0.13	0.41+/-0.31	0.9+/-0.17
EpiC2dEarlyConv1	0.83+/-0.25	0.7+/-0.34	0.99+/-0.01	0.3+/-0.3	0.88+/-0.19	0.33+/-0.29	0.83+/-0.24
EpiC2dEarlyTodo	0.83+/-0.25	0.7+/-0.35	0.99+/-0.01	0.3+/-0.27	0.88+/-0.2	0.33+/-0.28	0.83+/-0.24
EpiC2dFeatAvg	0.89+/-0.21	0.69+/-0.33	0.99+/-0.01	0.44+/-0.33	0.92+/-0.16	0.43+/-0.33	0.88+/-0.2
EpiC2dFeatCat	0.91+/-0.17	0.68+/-0.31	0.99+/-0.01	0.45+/-0.36	0.94+/-0.13	0.42+/-0.31	0.9+/-0.17
EpiC2dFeatConv1	0.89+/-0.21	0.7+/-0.34	0.99+/-0.01	0.46+/-0.35	0.92+/-0.17	0.42+/-0.32	0.88+/-0.2
EpiC2dFeatTodo	0.89+/-0.21	0.7+/-0.32	0.99+/-0.01	0.41+/-0.34	0.92+/-0.16	0.41+/-0.32	0.89+/-0.2
LSTM	0.94+/-0.13	0.6+/-0.37	0.99+/-0.01	0.49+/-0.38	0.96+/-0.08	0.44+/-0.35	0.94+/-0.12
EpiGao19	0.83+/-0.2	0.69+/-0.26	0.99+/-0.01	0.18+/-0.18	0.89+/-0.15	0.24+/-0.2	0.83+/-0.19
EpiHossain19	0.87+/-0.15	0.69+/-0.26	0.99+/-0.01	0.19+/-0.15	0.92+/-0.1	0.27+/-0.19	0.87+/-0.15

80% pacientes (19 pac) **

model	recall_0	recall_1	precision_	precision_	f1_0	f1_1	accuracy
EpiC2dEarlyAvg	0.85+/-0.24	0.84+/-0.17	1.0+/-0.0	0.3+/-0.23	0.89+/-0.21	0.39+/-0.25	0.84+/-0.24
EpiC2dEarlyCat	0.88+/-0.19	0.81+/-0.16	0.99+/-0.01	0.41+/-0.34	0.92+/-0.14	0.46+/-0.31	0.88+/-0.19
EpiC2dEarlyConv1	0.8+/-0.27	0.83+/-0.22	1.0+/-0.01	0.28+/-0.27	0.86+/-0.21	0.35+/-0.29	0.8+/-0.26
EpiC2dEarlyTodo	0.8+/-0.27	0.84+/-0.22	1.0+/-0.01	0.29+/-0.27	0.86+/-0.22	0.36+/-0.29	0.8+/-0.26
EpiC2dFeatAvg	0.87+/-0.23	0.83+/-0.16	1.0+/-0.01	0.45+/-0.33	0.91+/-0.18	0.5+/-0.31	0.86+/-0.22
EpiC2dFeatCat	0.89+/-0.19	0.81+/-0.16	1.0+/-0.01	0.42+/-0.33	0.92+/-0.15	0.47+/-0.31	0.88+/-0.19
EpiC2dFeatConv1	0.87+/-0.23	0.83+/-0.23	1.0+/-0.01	0.44+/-0.32	0.91+/-0.18	0.48+/-0.32	0.87+/-0.22
EpiC2dFeatTodo	0.87+/-0.23	0.83+/-0.17	1.0+/-0.01	0.41+/-0.31	0.91+/-0.18	0.47+/-0.31	0.87+/-0.22
LSTM	0.93+/-0.14	0.73+/-0.28	0.99+/-0.01	0.51+/-0.35	0.95+/-0.09	0.52+/-0.33	0.92+/-0.14
EpiGao19	0.82+/-0.21	0.79+/-0.16	0.99+/-0.01	0.2+/-0.19	0.88+/-0.16	0.28+/-0.2	0.82+/-0.21
EpiHossain19	0.86+/-0.16	0.77+/-0.21	0.99+/-0.01	0.2+/-0.15	0.92+/-0.11	0.29+/-0.2	0.86+/-0.15

* Resultados provenientes del balanceo mediante muestreo proporcional a 1s en el conjunto de training
** Sujetos retirados para 80%, 5, 'chb14', 'chb15', 'chb16', 'chb20', 'chb21'

kfold cross validation | **leave_one_patient_out** | L1Seiz