Recognition of epileptic seizures from EEG data

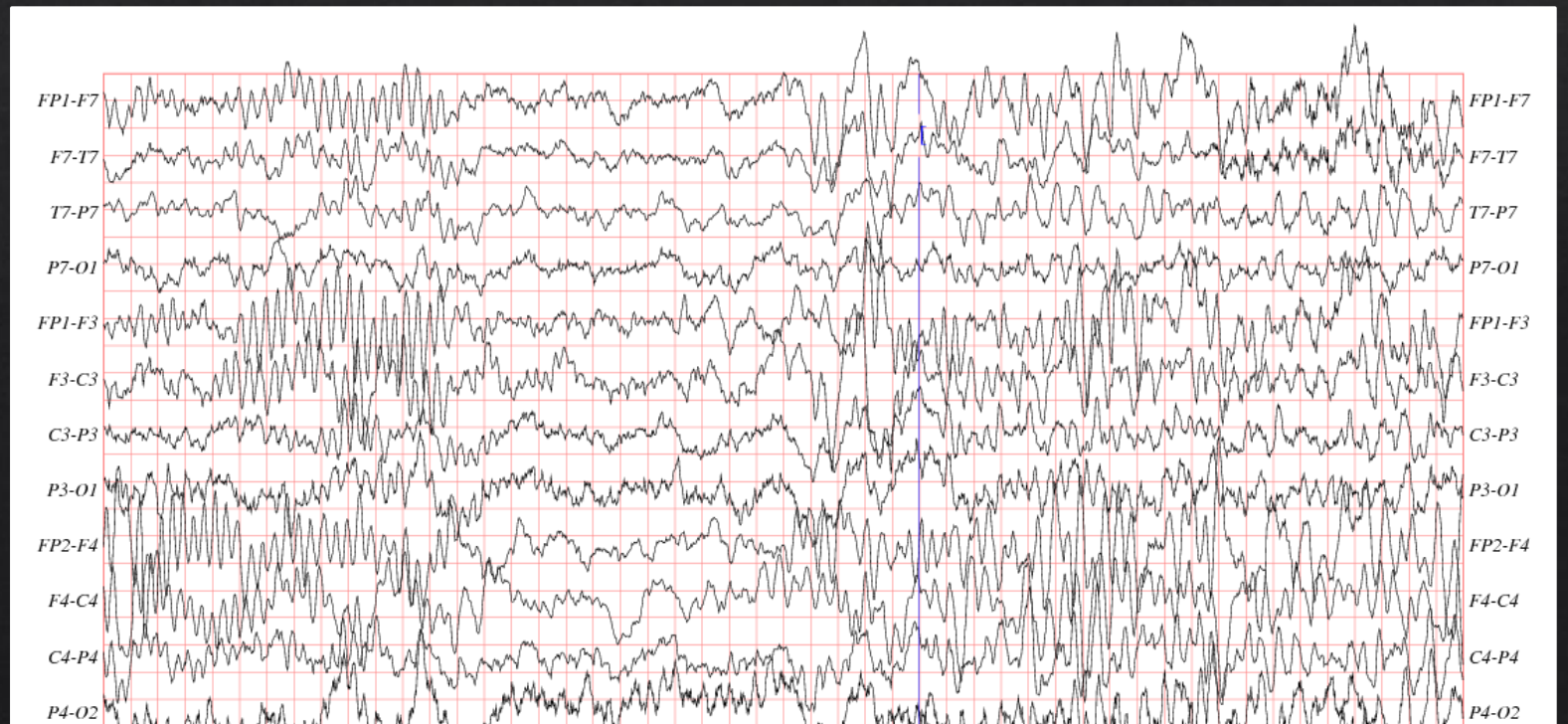
Christian Espinosa

Seizure Recognition

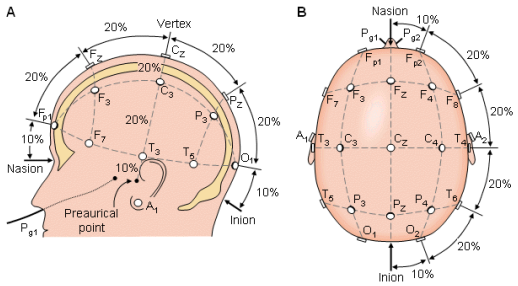
Seizure Recognition

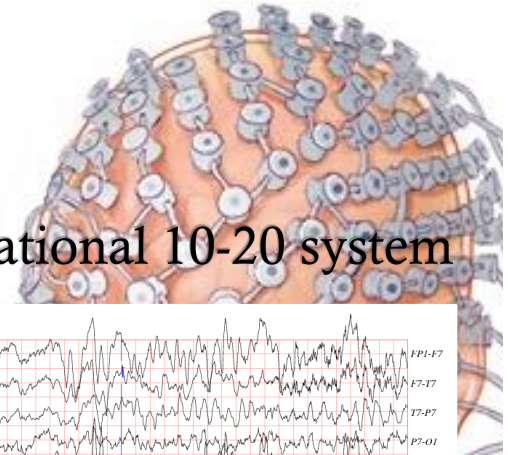
What is a EEG?

Electroencephalogram

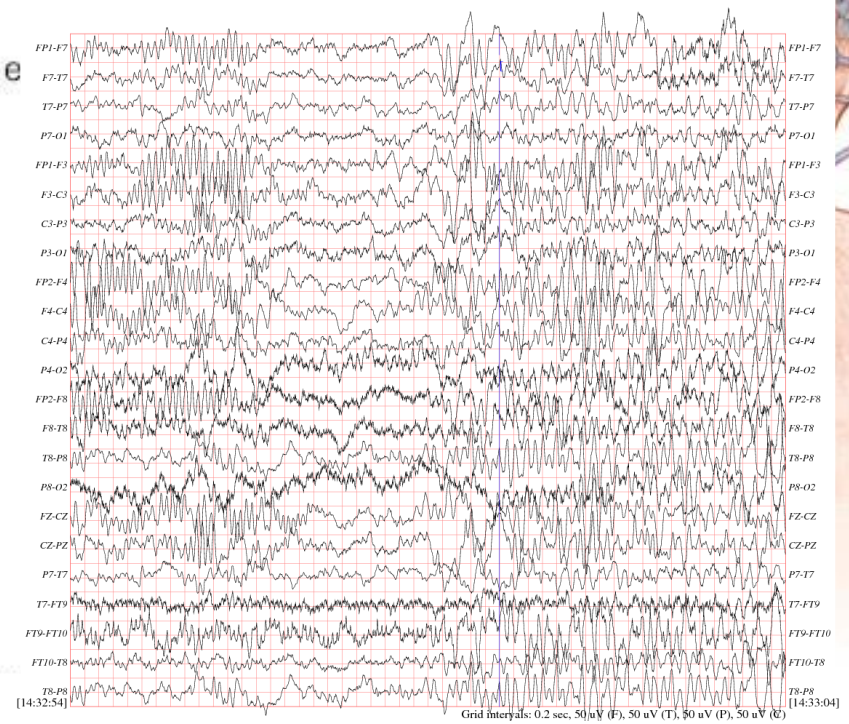


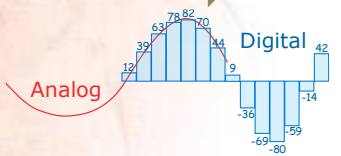
International 10-20 system





EEG e





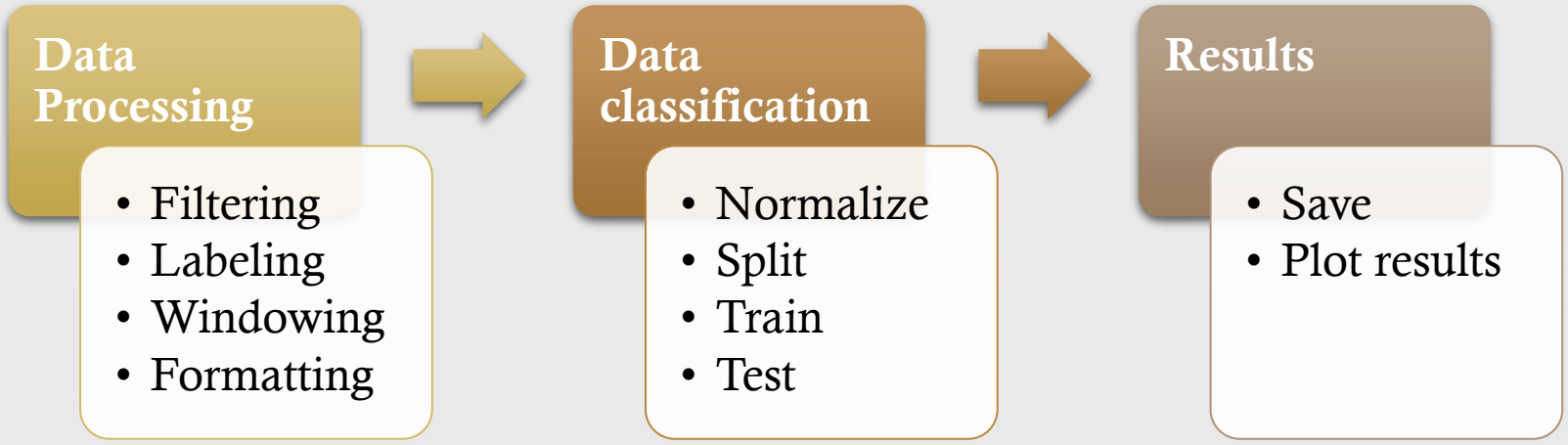
Fp1-F7 data . . .
Fp1-T7 data . . .
Fp1-P7 data . . .
Fp1-O1 data . . .
Fp1-F3 data . . .

.
.
.

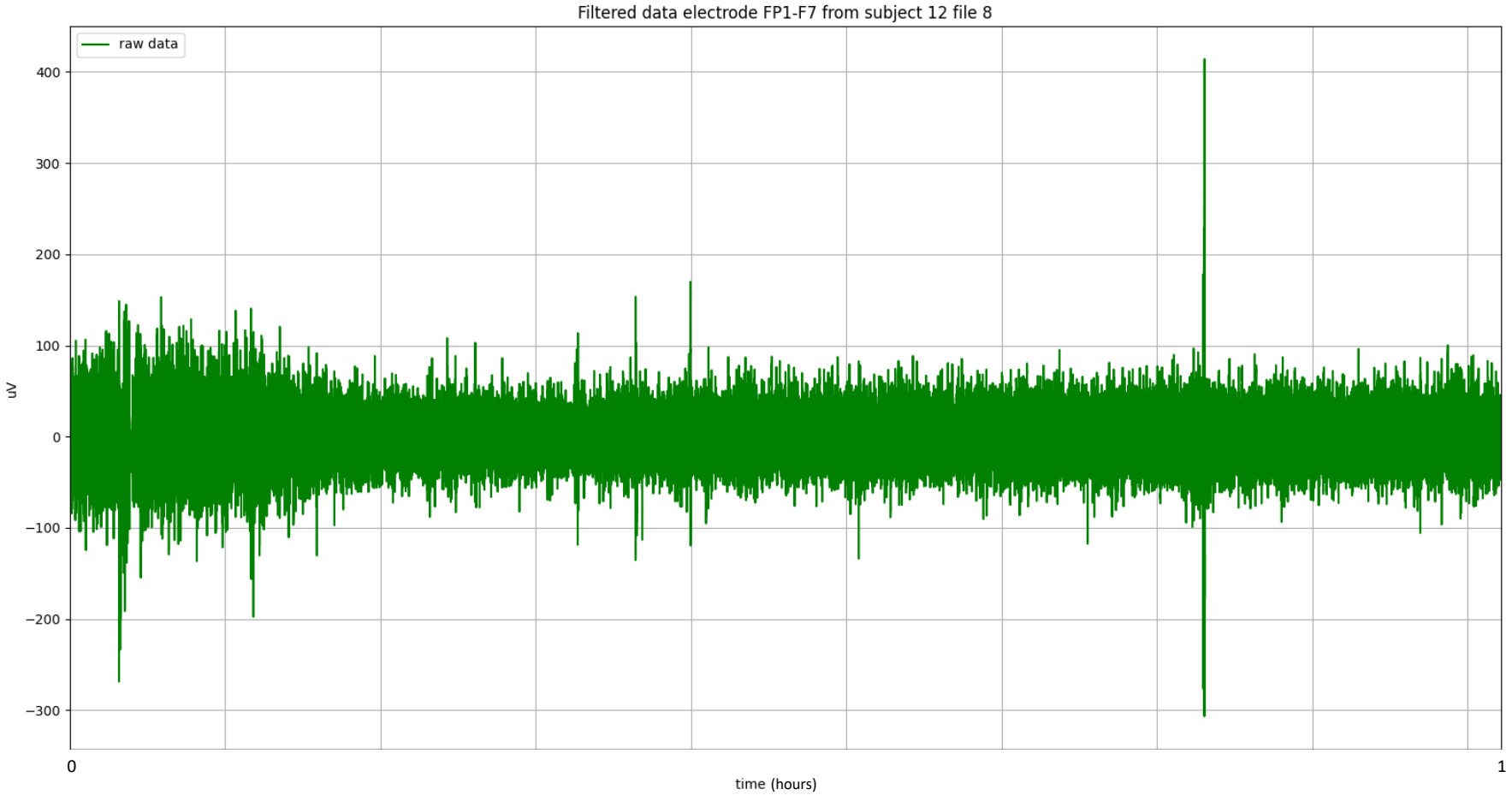
CHB-MIT Scalp EEG Database

- 23 cases
  - 9 to 42 .edf files
- 256Hz, 16bit resolution
- 22 electrodes
- 1 to 4 hours long
- Interruptions

Pipeline

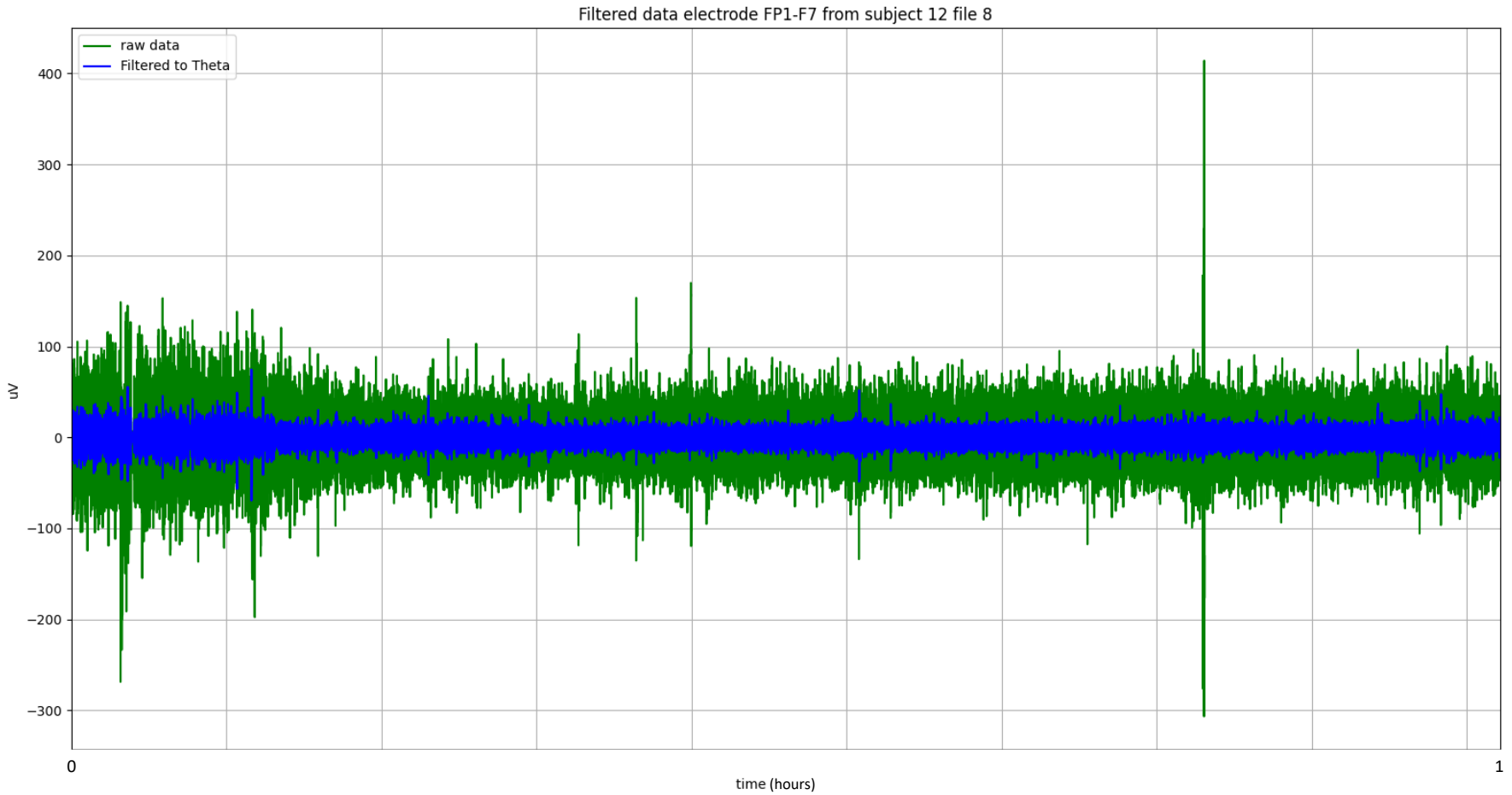

Data Processing
• Filtering
• Labeling
• Windowing
• Formatting
Data classification
• Normalize
• Split
• Train
• Test
Results
• Save
• Plot results

Data processing

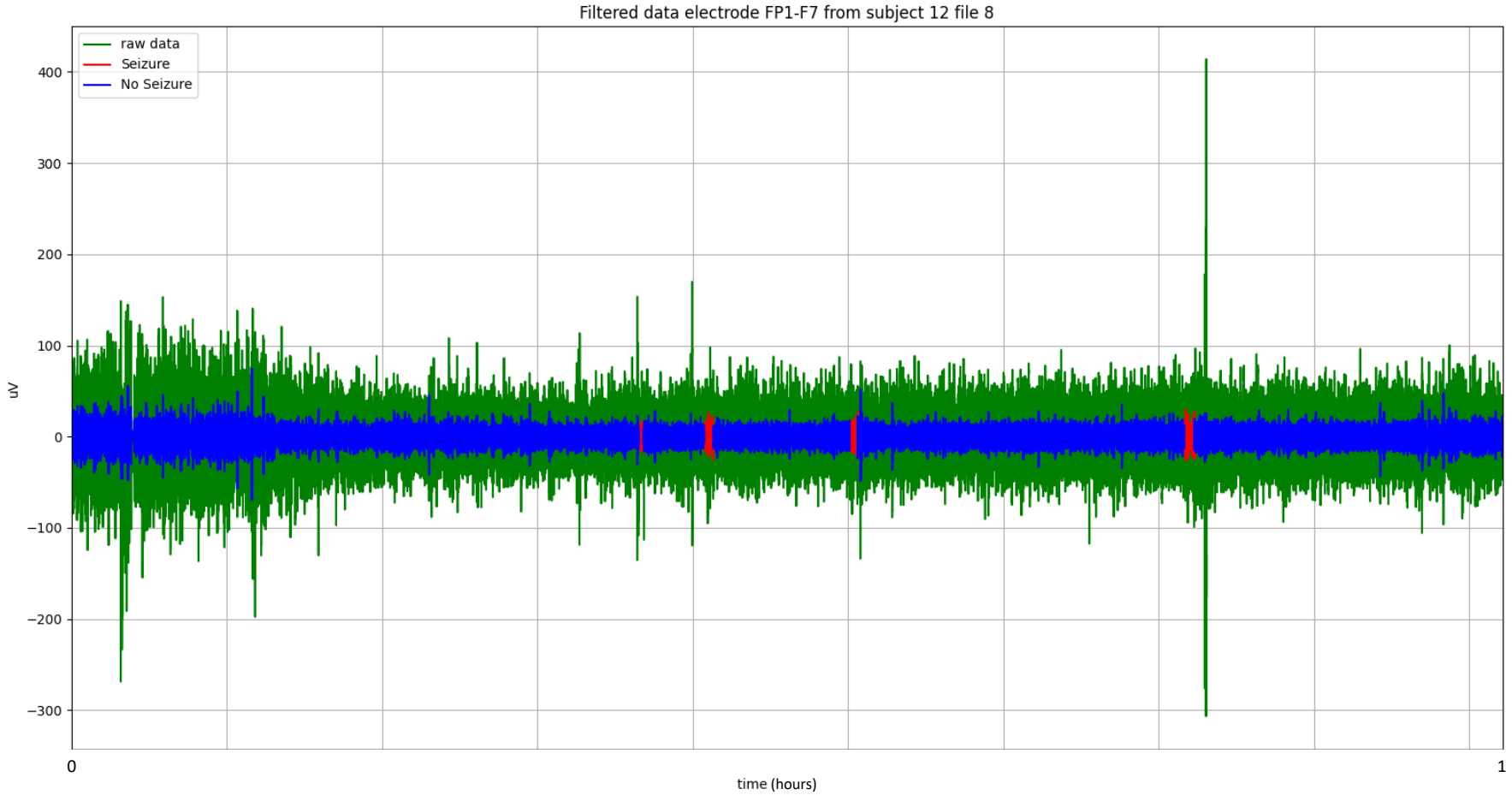


Data processing

Butter band pass filter: Theta 4Hz – 8Hz



Data processing

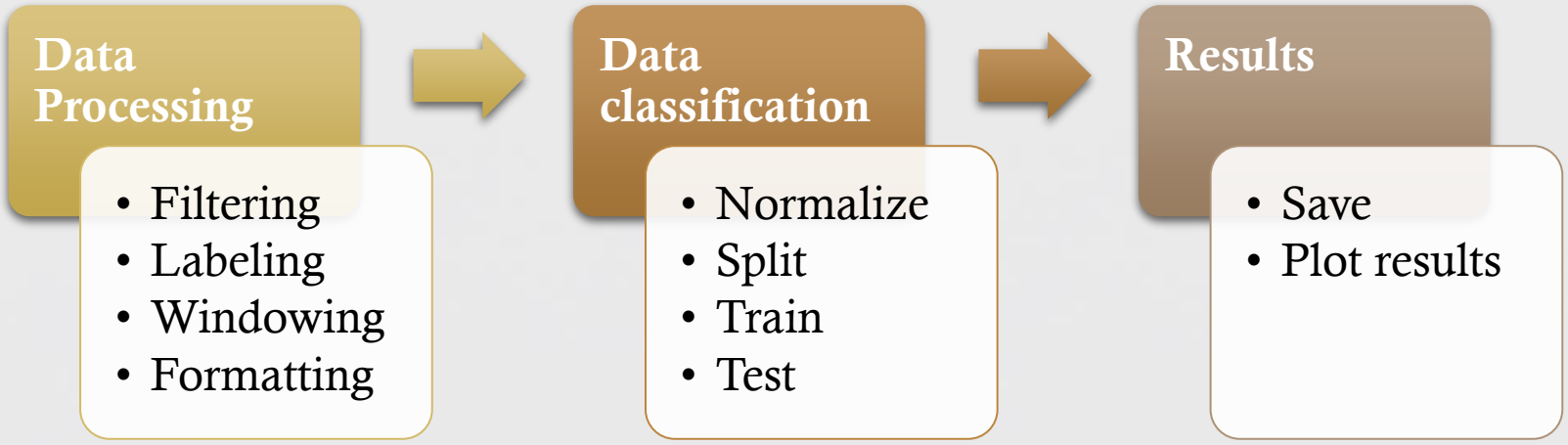


Data processing

- Filtering
- Labeled data in parquet
- Windowed data in numpy
- Modular code

- data_x
  - n_windows
  - electrodes
  - values
- data_y
  - num_seizure_window
  - window_seizure

Pipeline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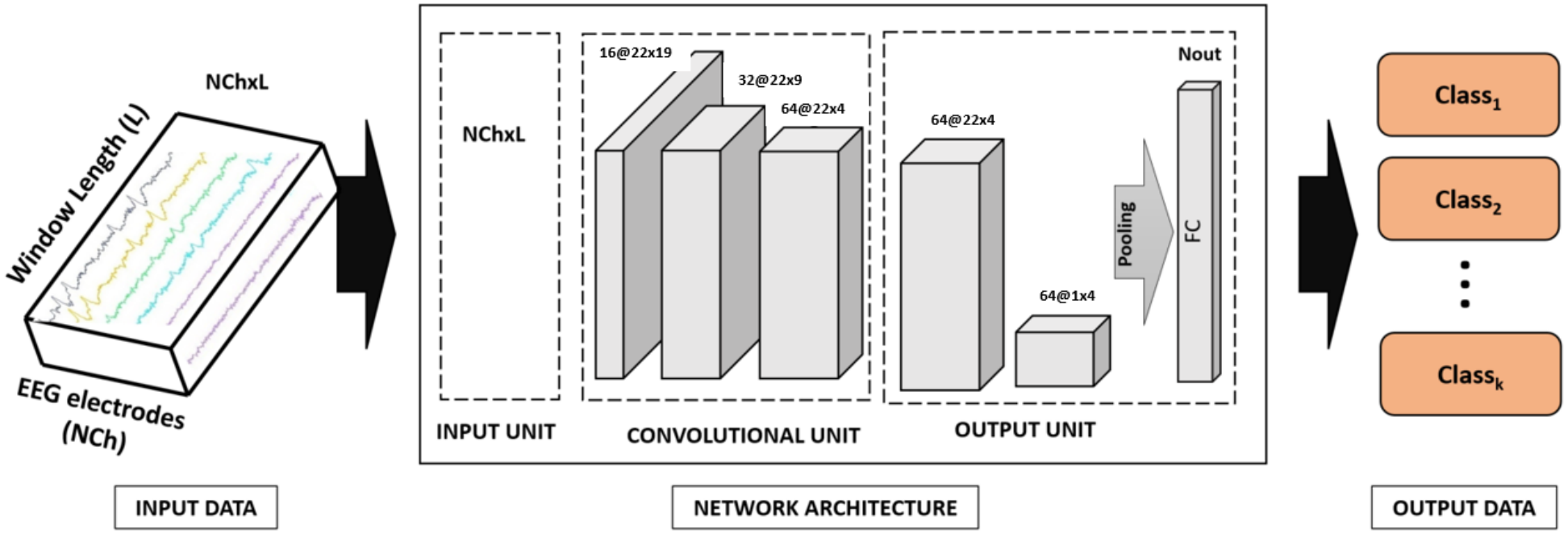
Data classification

- Model CNN ProjOut Conv



Data classification

- Execution modes
  - Check model
  - Train
  - Test

Data classification

- Execution modes → cuda
  - Check model
  - Train
  - Test

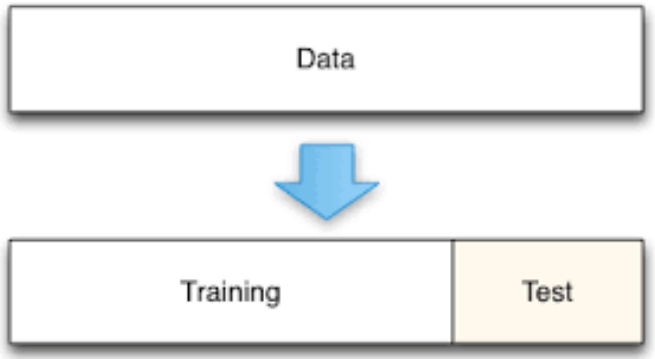
Data classification

- Execution modes
  - Check model → torch.rand
  - Train
  - Test

Data classification

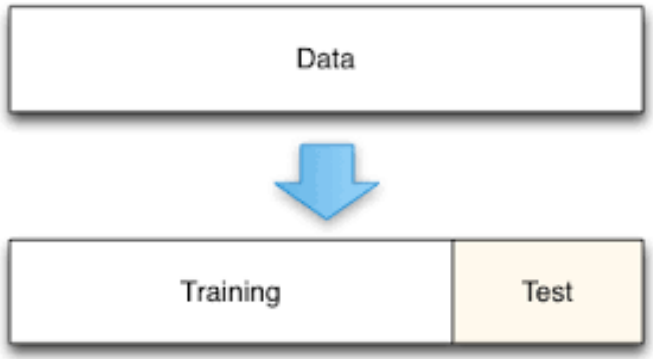
- Execution modes
  - Check model
  - Train
  - Test

Train →
- From 1 to 10 case
- 0% to split



Data classification

- Execution modes
  - Check model
  - Train
  - Test
    - From 11 to 16 case
    - 100% to split

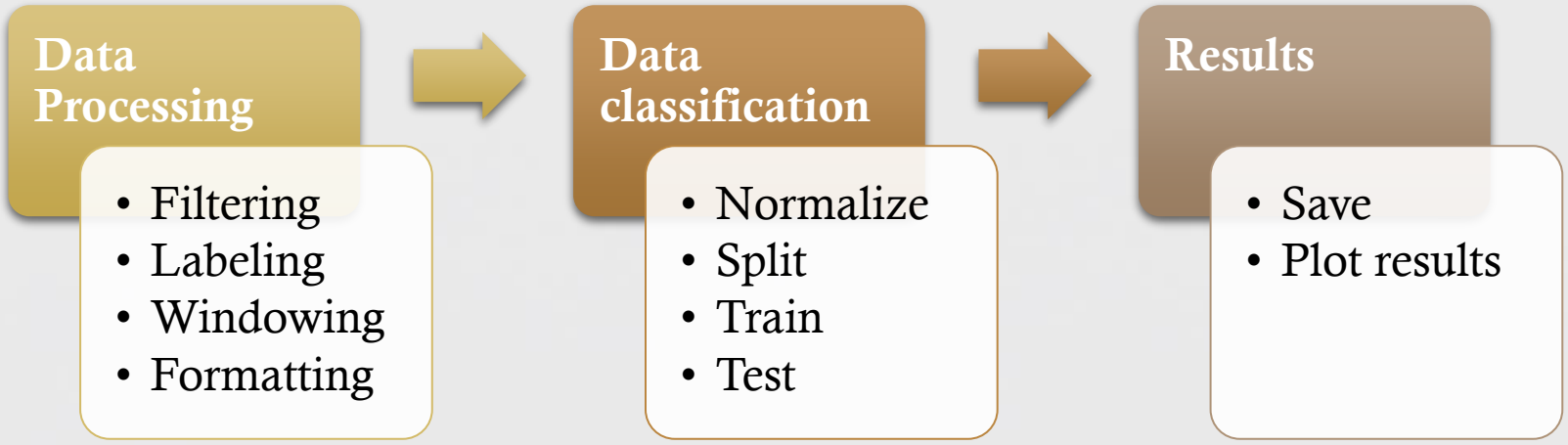


Data classification

- Execution modes
  - Check model
  - Train
  - Test

- Normalization
  - Get Scalers

Pipeline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Results

	0	Accuracy
Precision	1,0	1,0
Recall	1,0	1,0
support	360.0	1,0

Results From Subject Chb14 File 11

Results

	0	1	Accuracy
Precision	0,983	0,0	0,983
Recall	1,000	0,0	0,994
F1-score	0,997	0,0	0,994
Support	358.00	2,0	0,994

Results From Subject Chb14 File 6

Results

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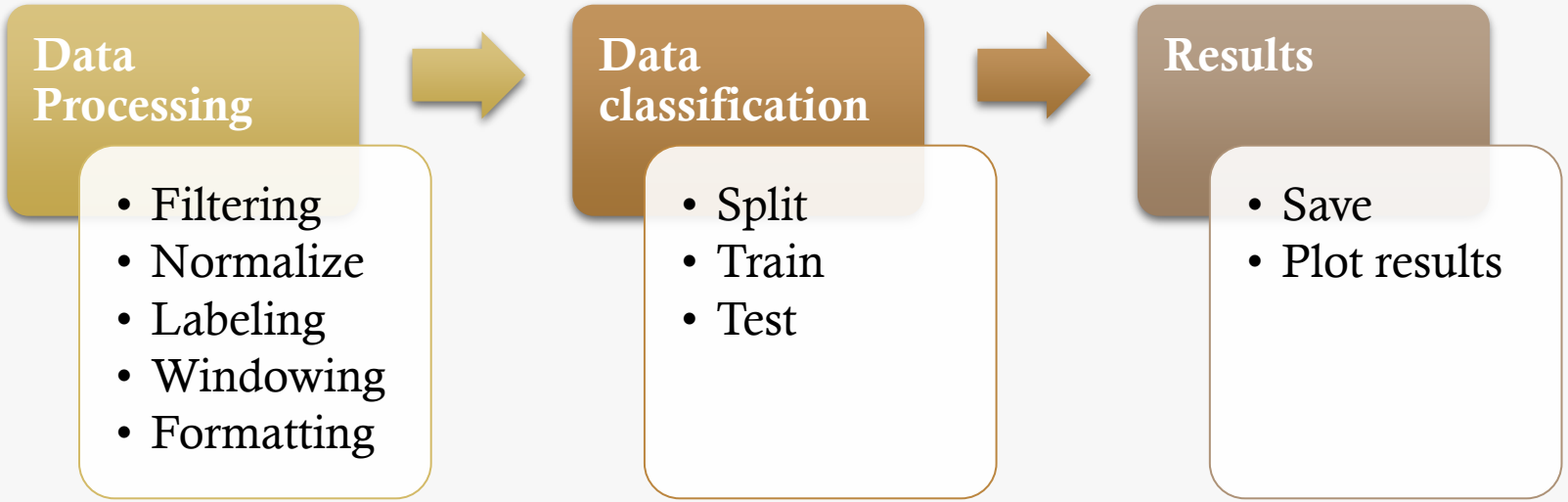
Results From Subject Chb14 File 6

Conclusions

- Results
  - Inconsistent data processing
- Add normalization to data processing
- Different strategies



Thank you for your attention

Any Questions?