



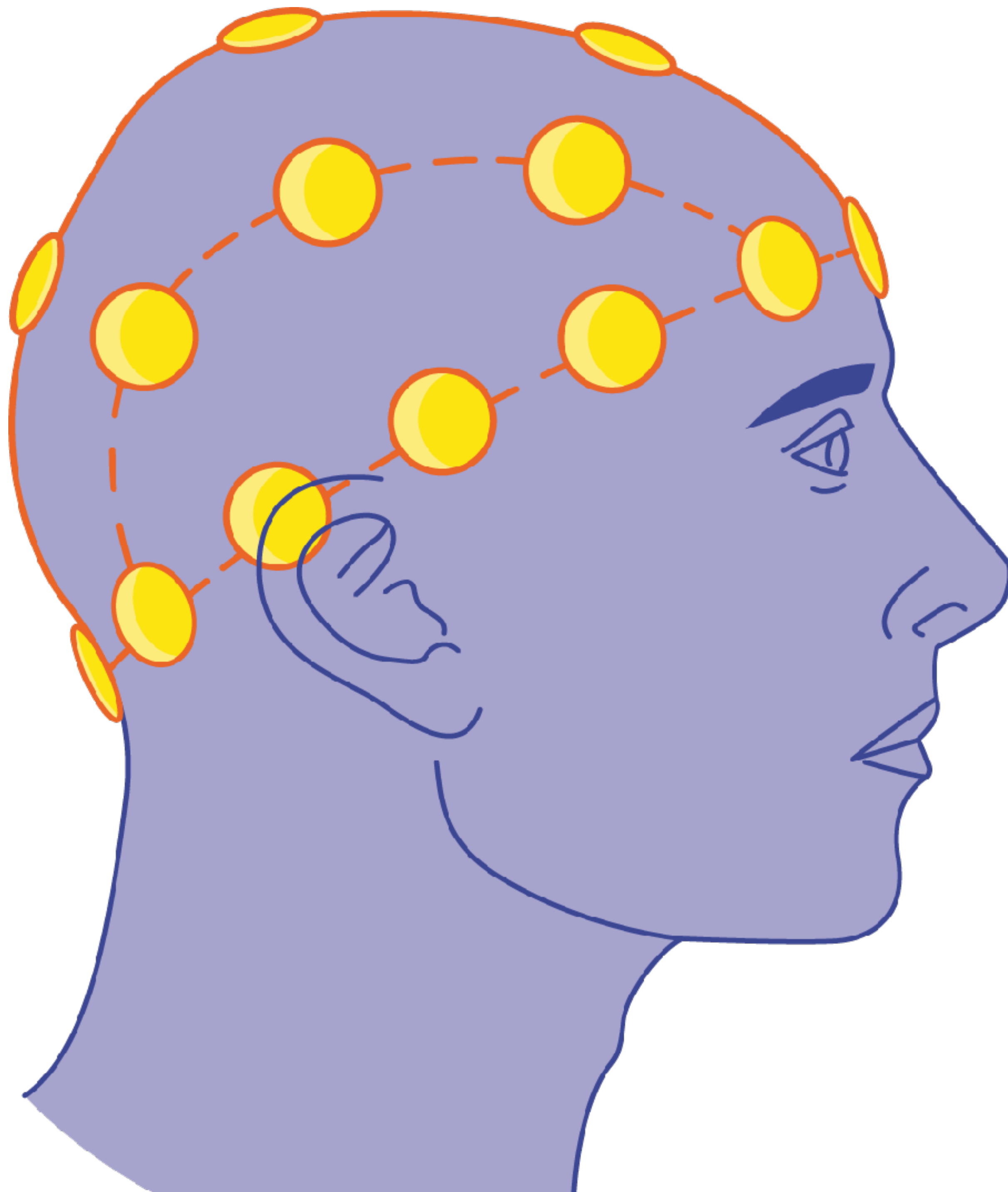
EEG Classification

Predicting seizures from electrical brain wave activity

Epileptic Seizure

sudden change in behavior due to a change in the electrical functioning of the brain



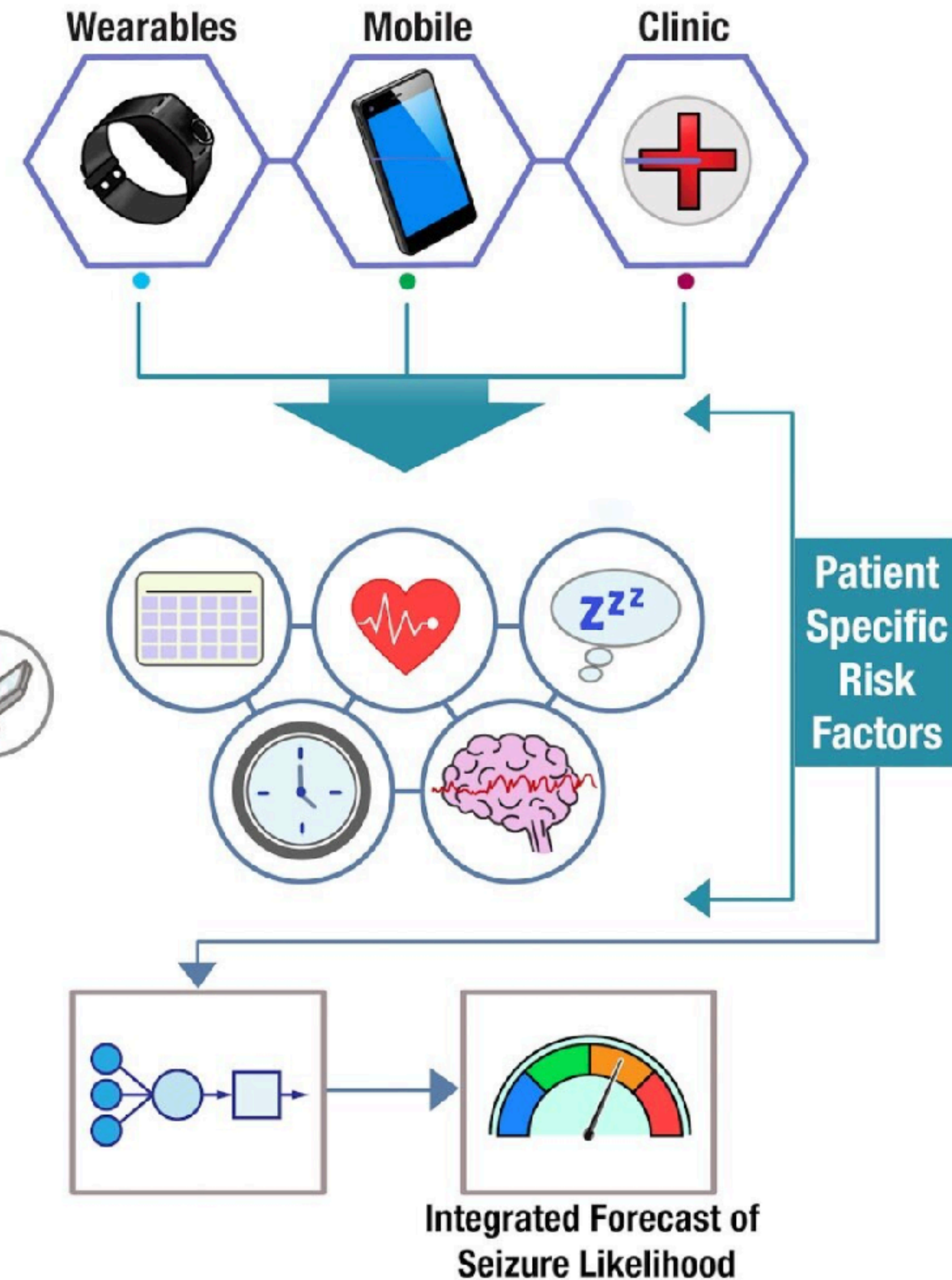
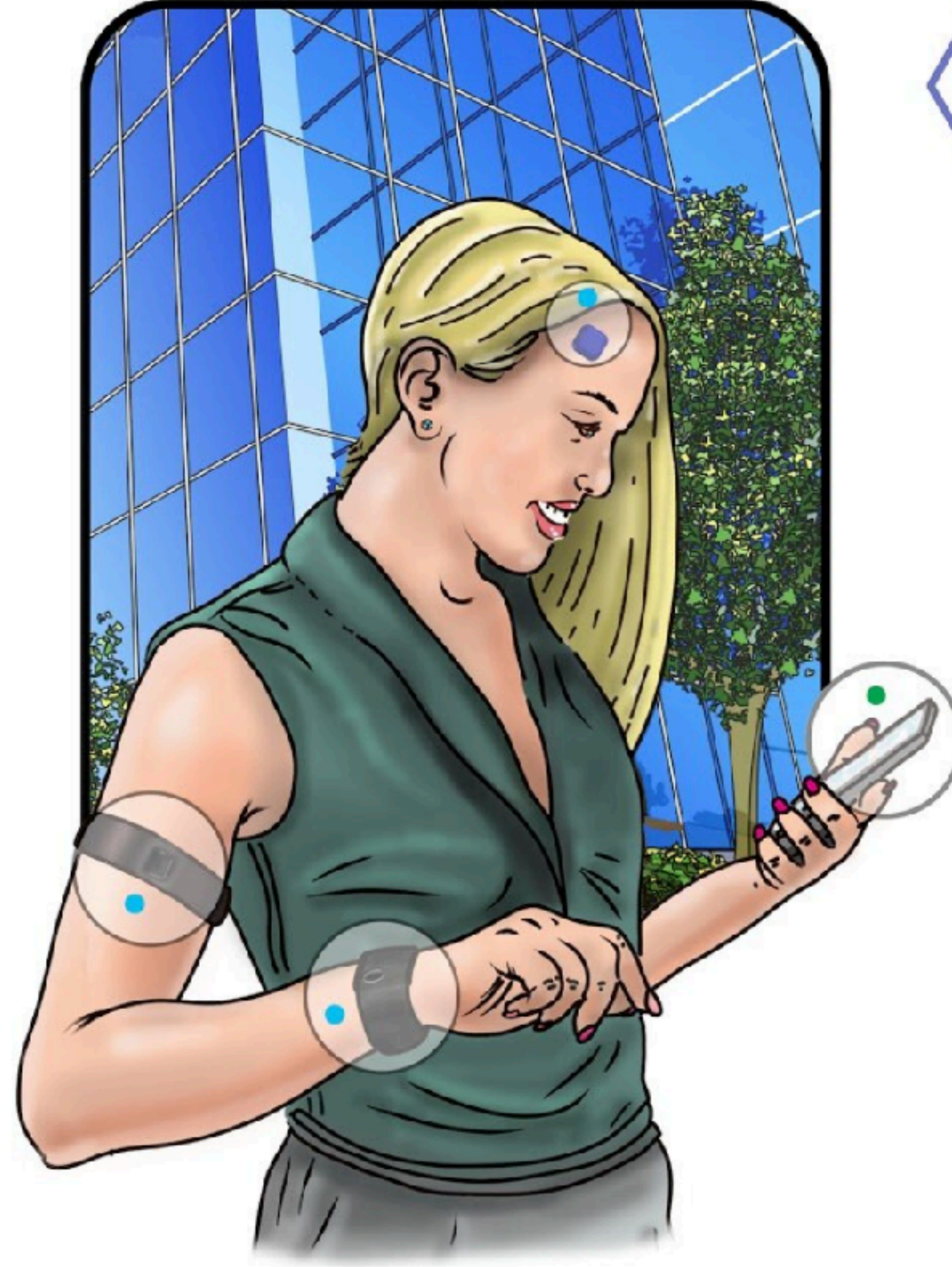


EEG

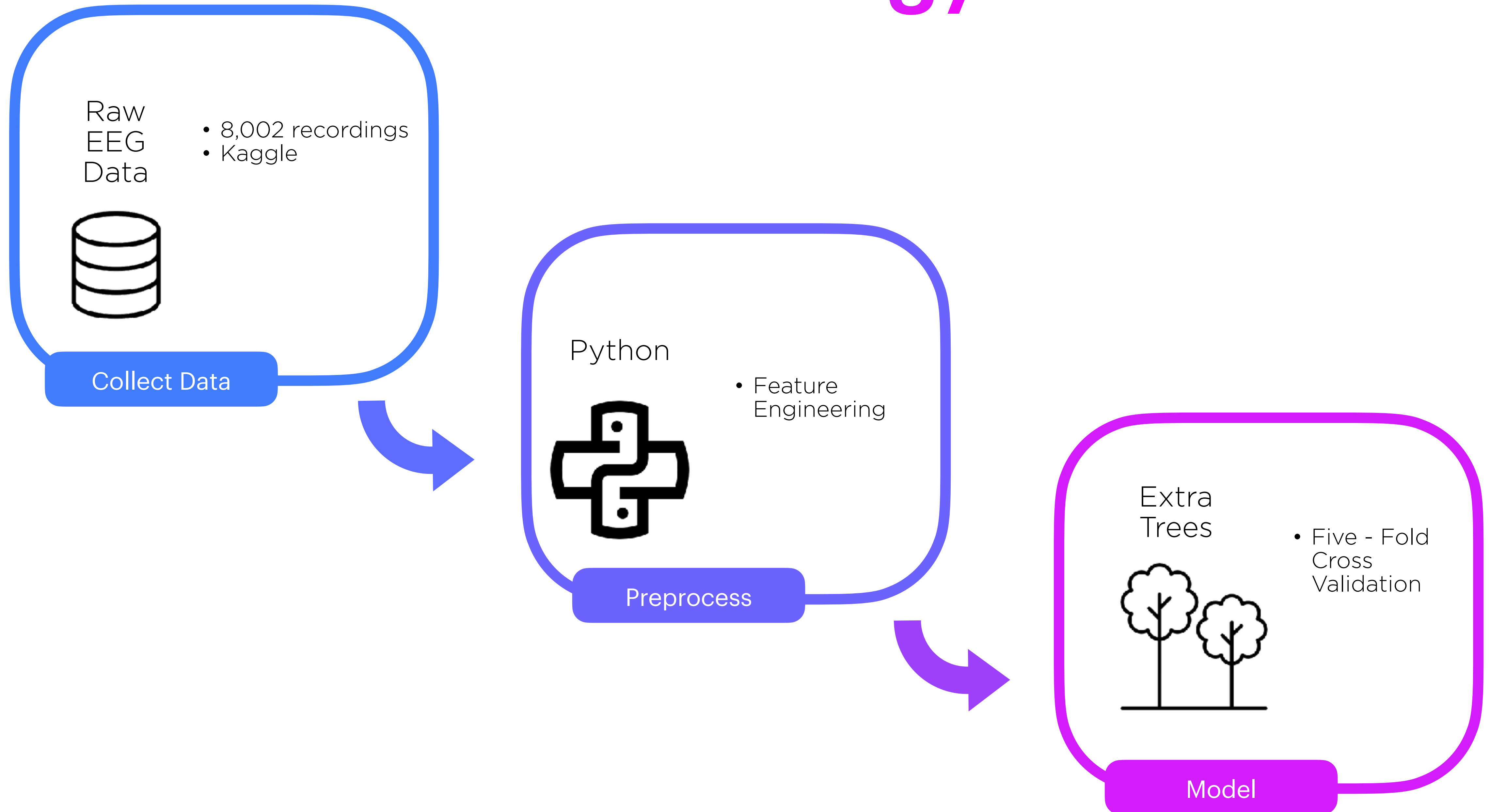
Data that is collected using non-invasive electrode placement on the scalp

Wearable Technology

- life enhancing
- live saving



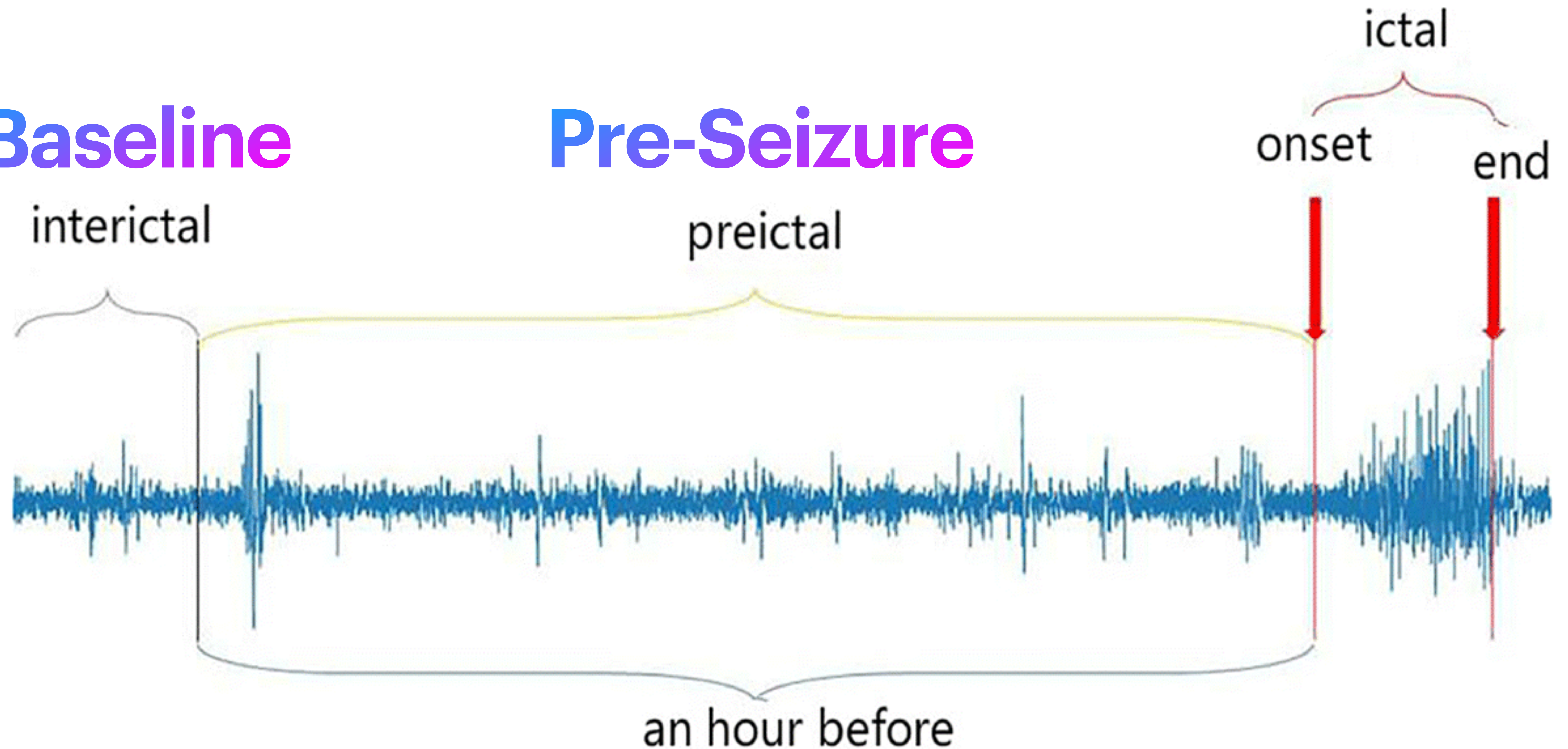
Methodology



Classification

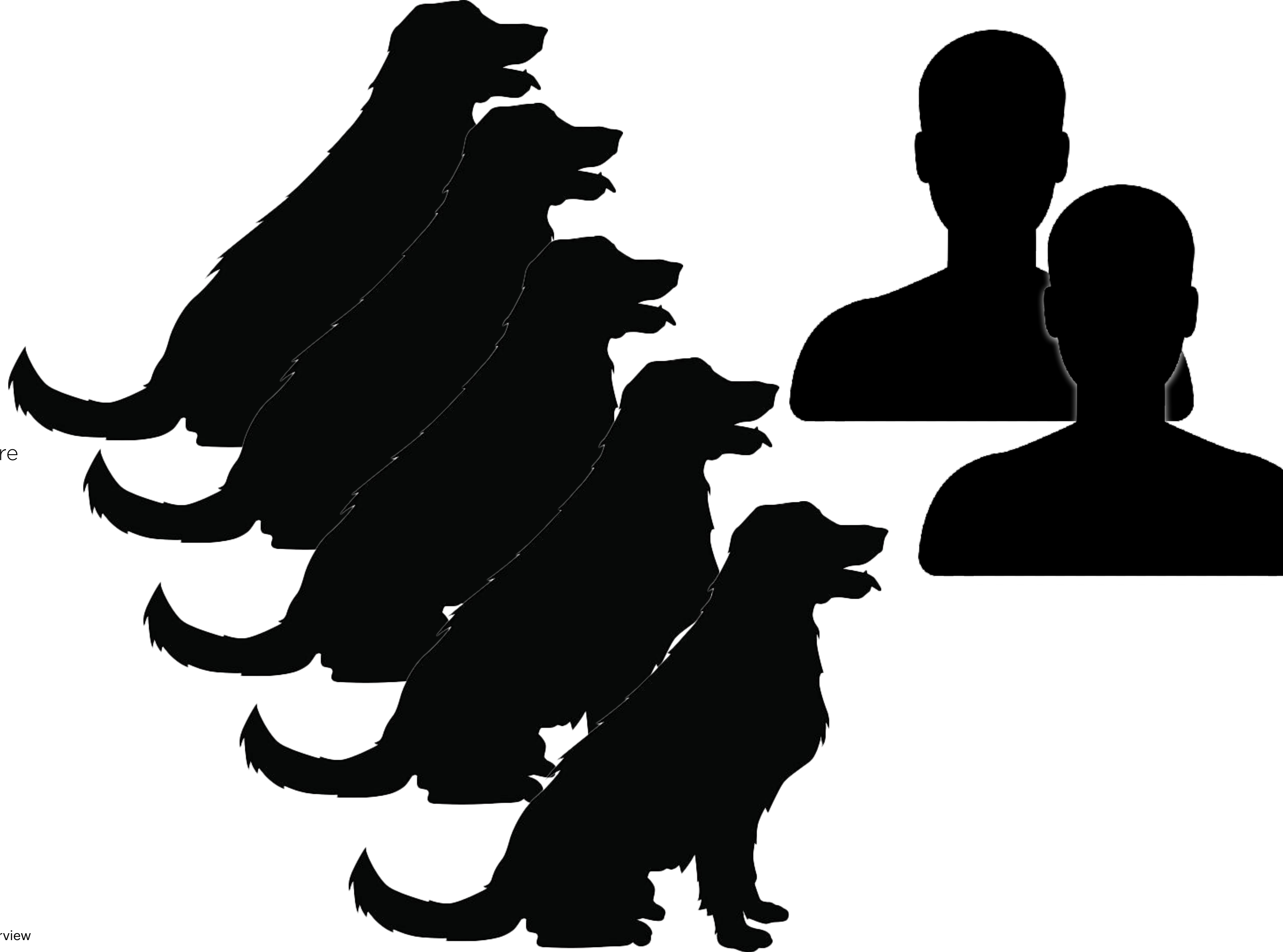
Baseline

Pre-Seizure



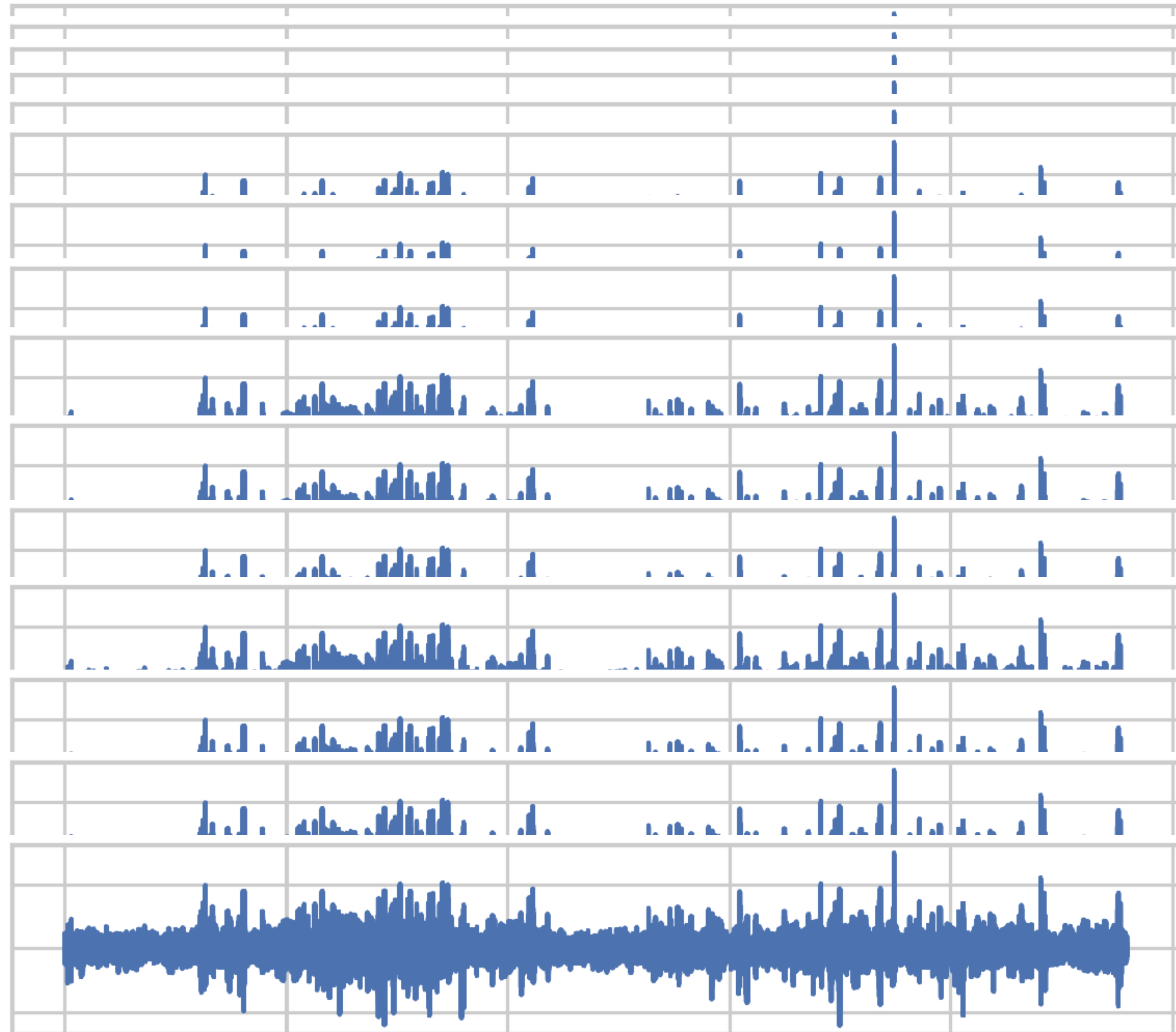
Data

American Epilepsy Society Seizure
Prediction Challenge



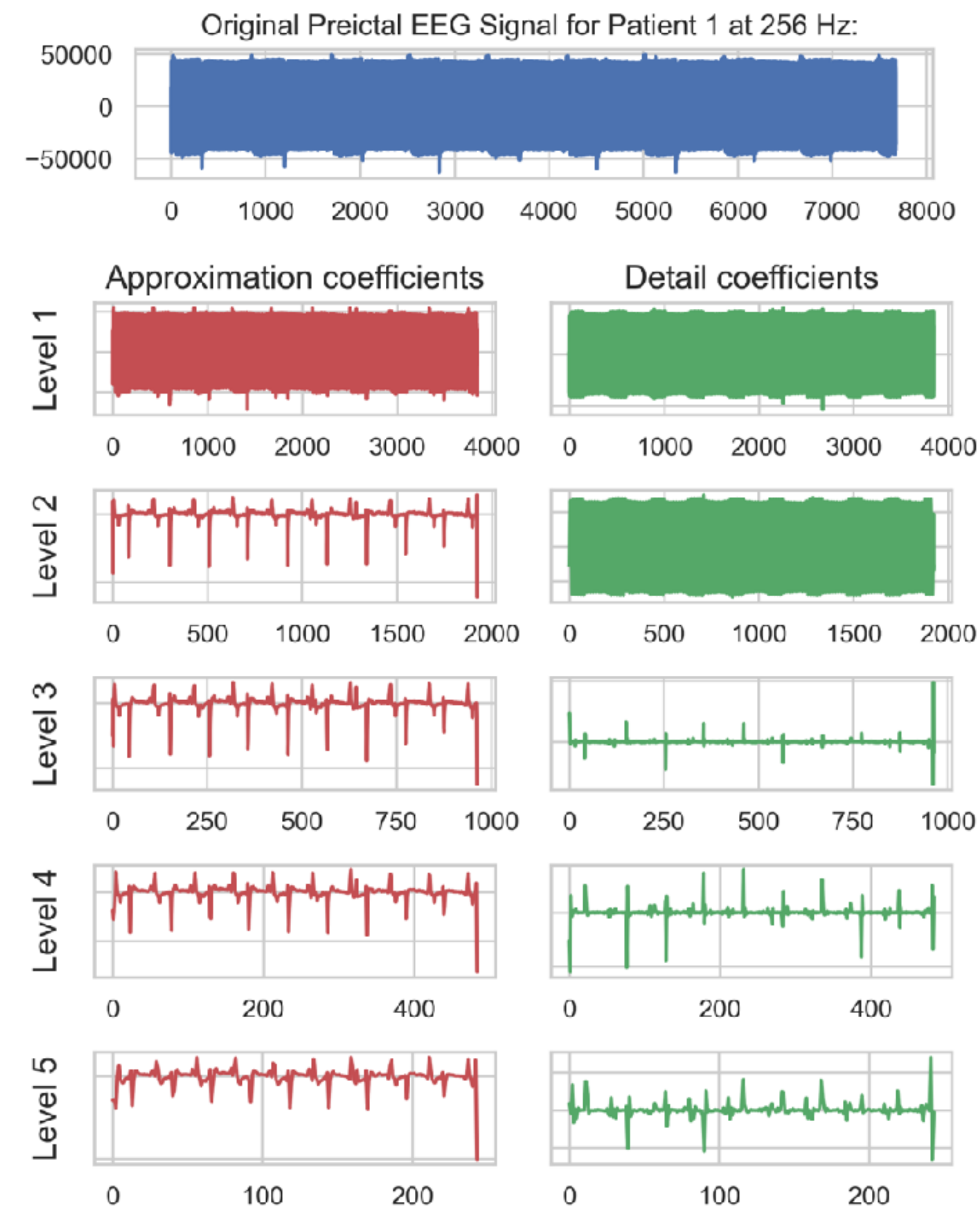
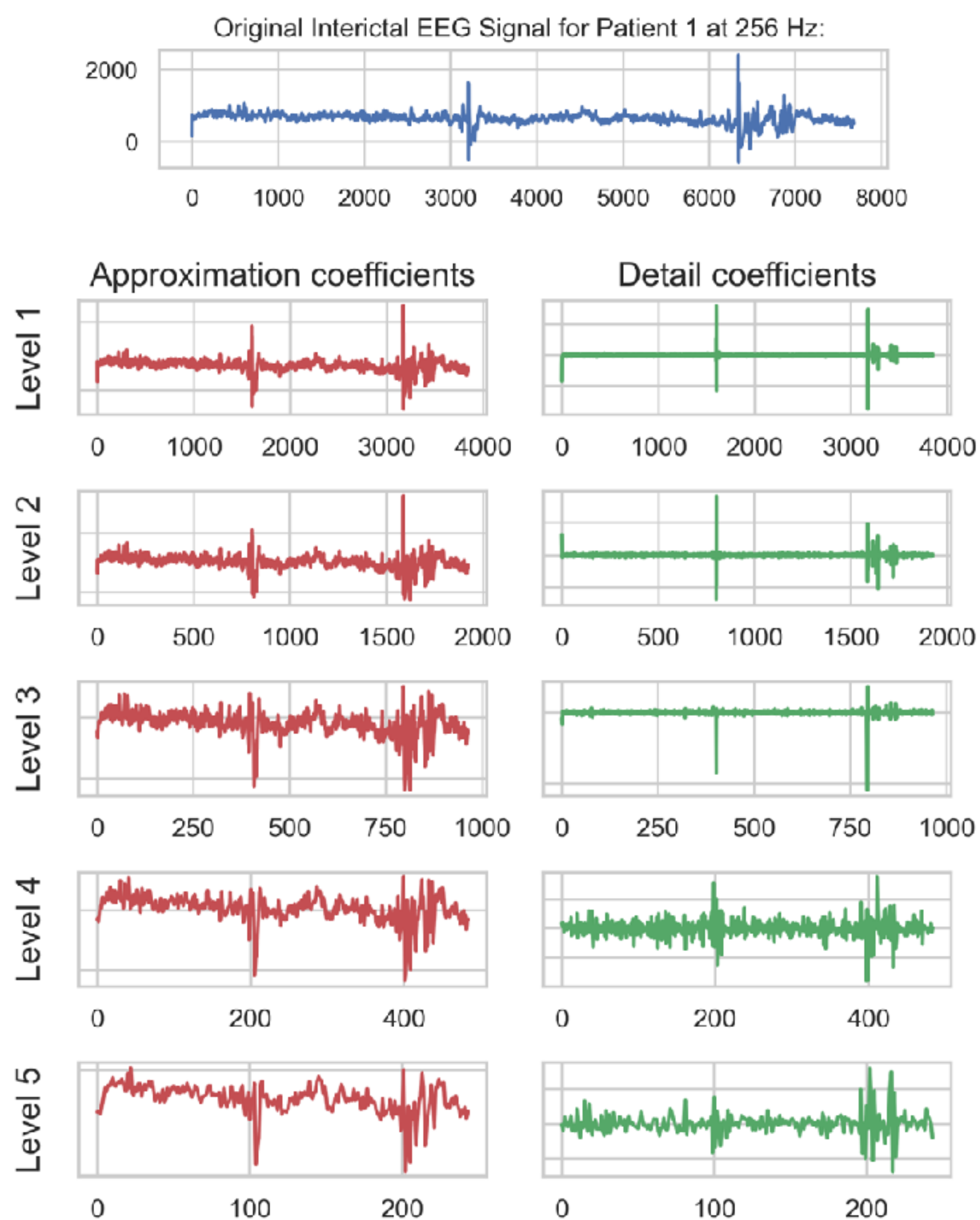
Data

15 - 24 Electrodes per 10 minute recording



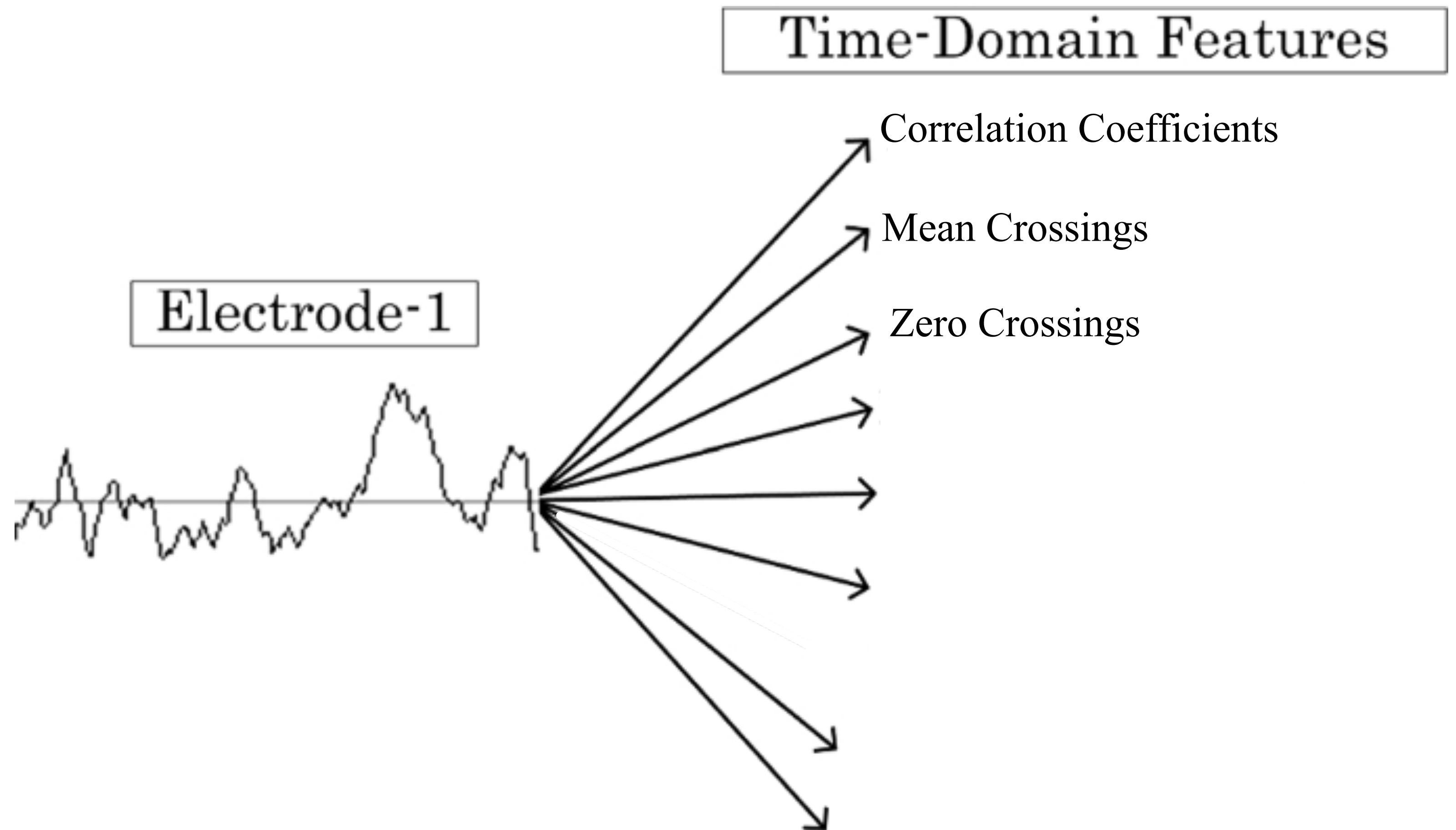
Data

Discrete Wavelet Transformation



Data

Statistical Analysis



Model

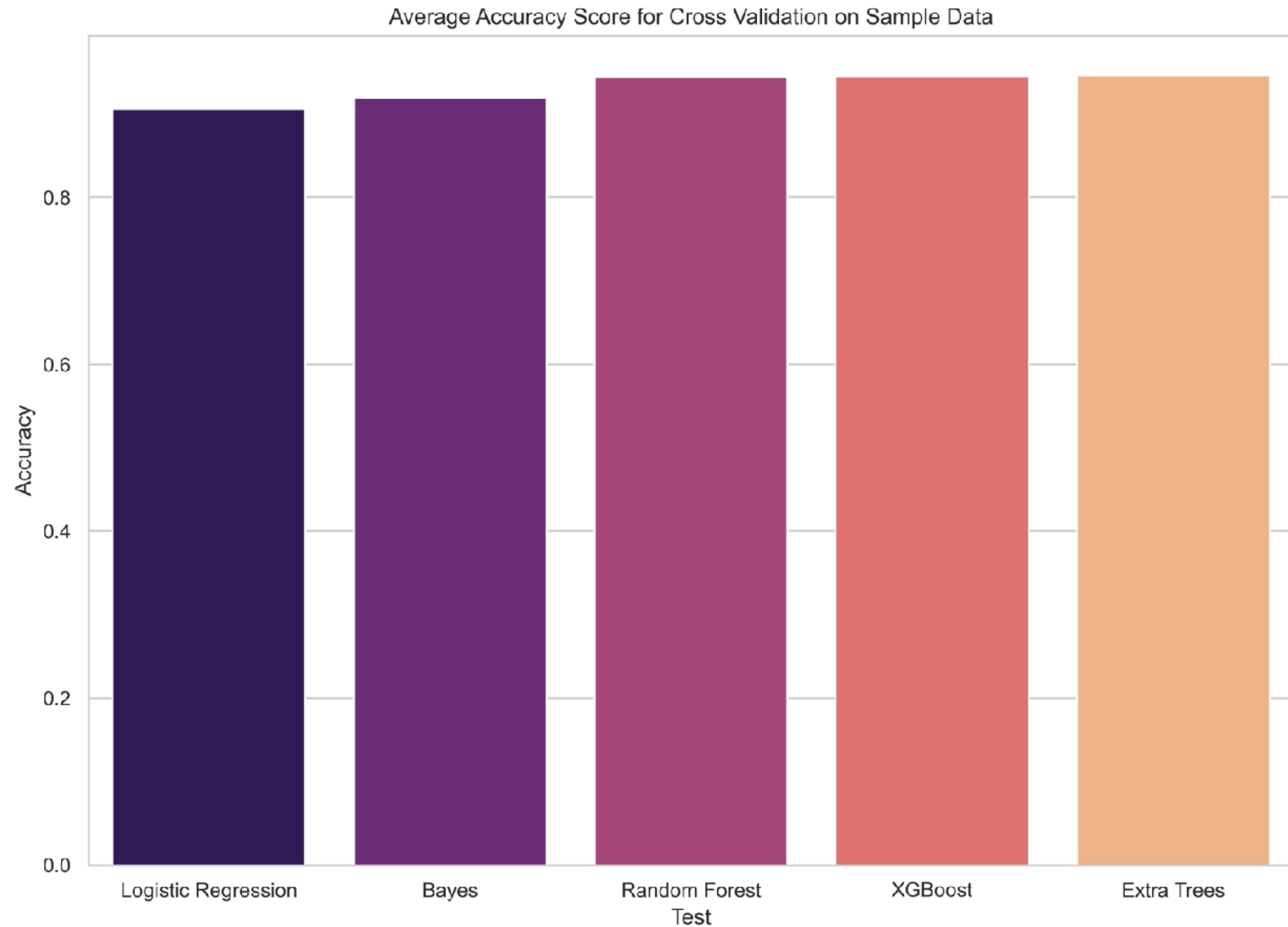
Feature Engineering

- 10 minute recording
 - 15 single electrode readings
 - 5 levels of decomposition
 - 7 statistical features
 - 15 correlation coefficients
- 855 Features

$$\int_{R_n} \frac{\partial}{\partial \theta} f(x, \theta) dx = \int_{R_n} \frac{\partial}{\partial \theta} f(x, \theta) dx = \int_{R_n} T(x) \cdot \left(\frac{\partial}{\partial \theta} \ln L(x, \theta) \right) \cdot f(x, \theta) dx = \int_{R_n} T(x) \cdot \left(\frac{\partial}{\partial \theta} \ln L(x, \theta) \right) \cdot f(x, \theta) dx$$
$$f_{a, \sigma^2}(\xi_1) = \frac{(\xi_1 - a)}{\sigma^2} f_{a, \sigma^2}(\xi_1)$$
$$\frac{\partial}{\partial \theta} f(x, \theta) dx = M \left(T(\xi) \cdot \frac{\partial}{\partial \theta} \ln L(\xi) \right)$$

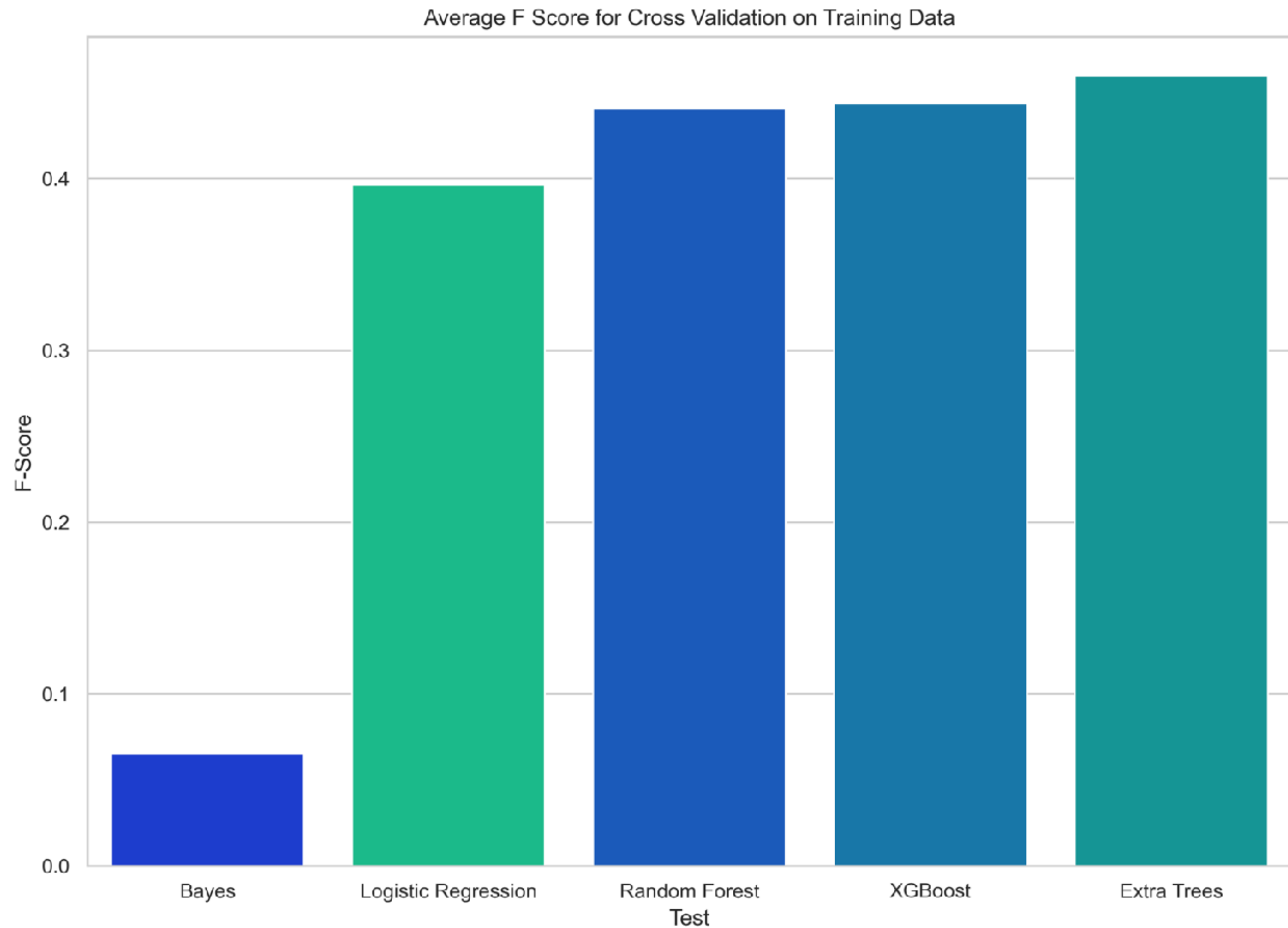
Accuracy Score

Same Metric used in Kaggle Competition



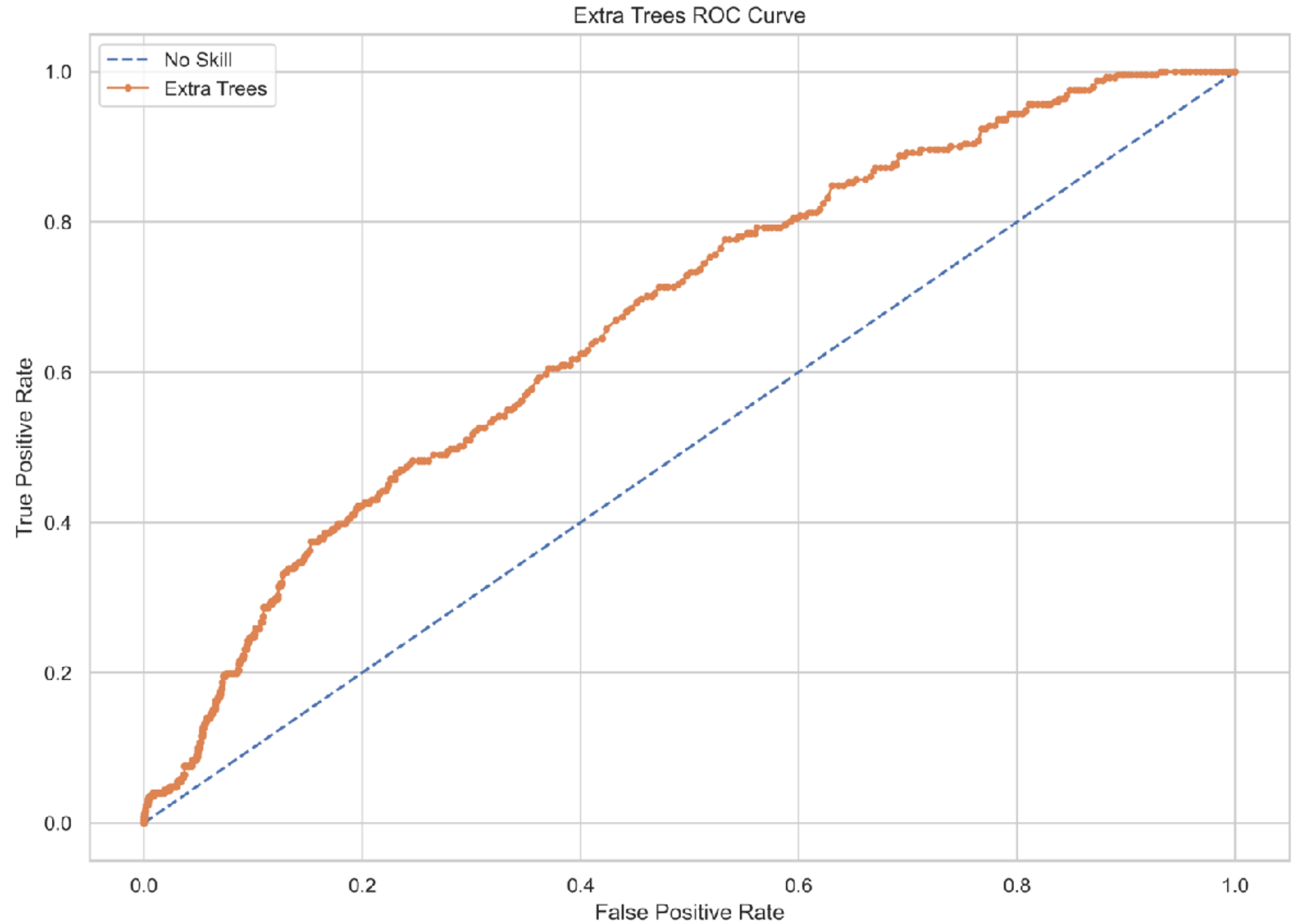
F- Score

Important for identifying interictal EEG signals



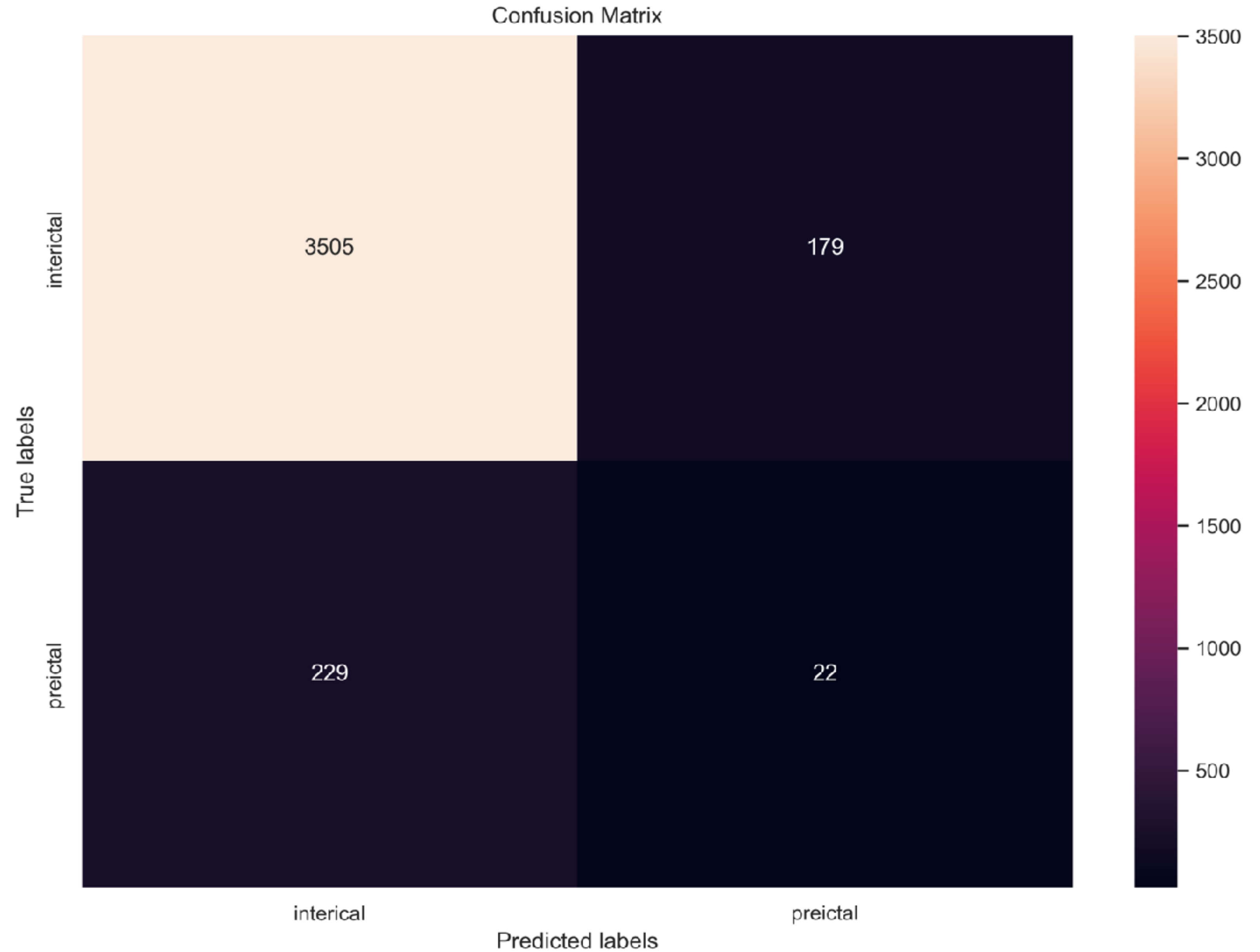
Competition Test

Accuracy Score: 89.6%
F Score: 9.7%



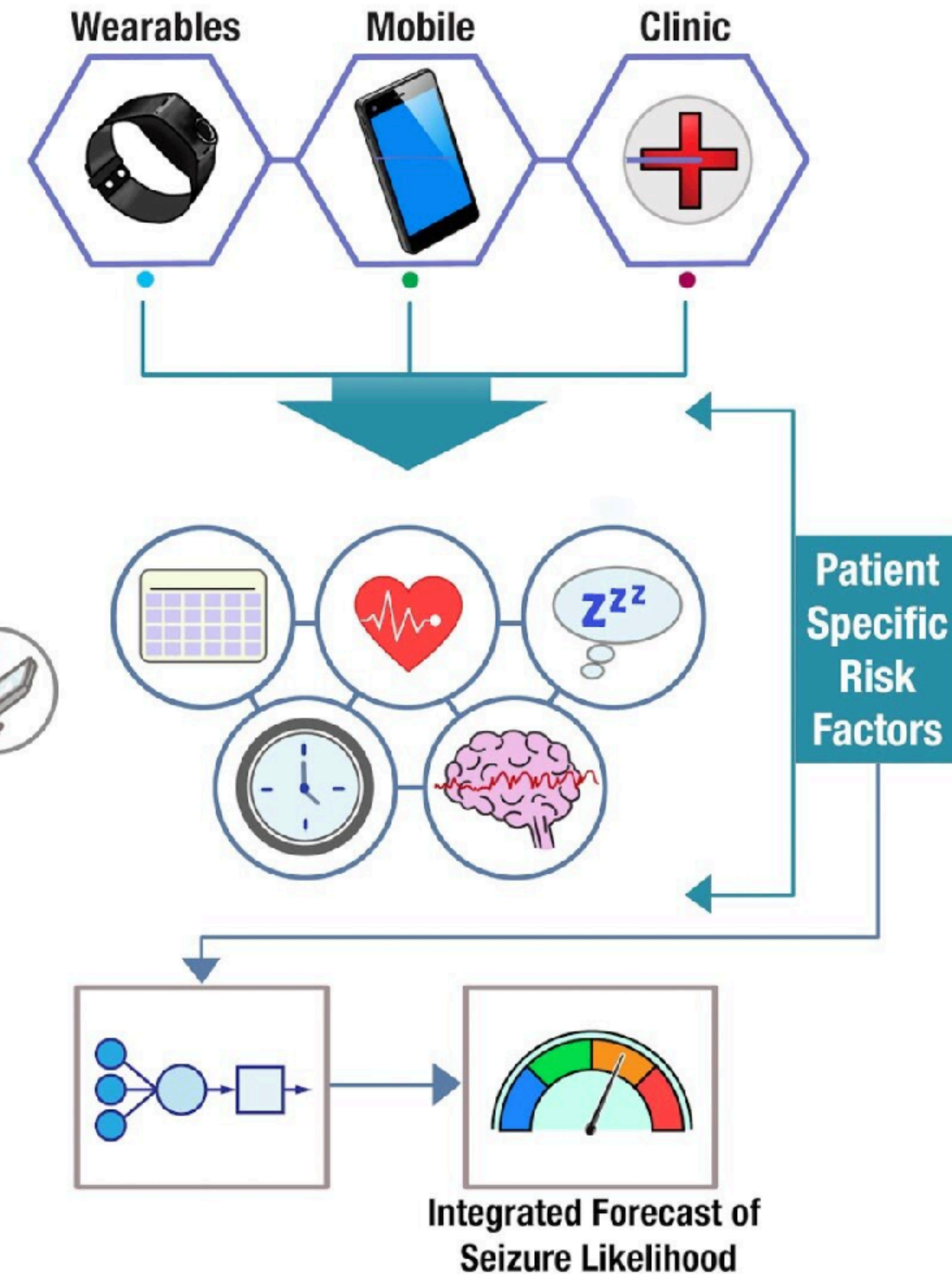
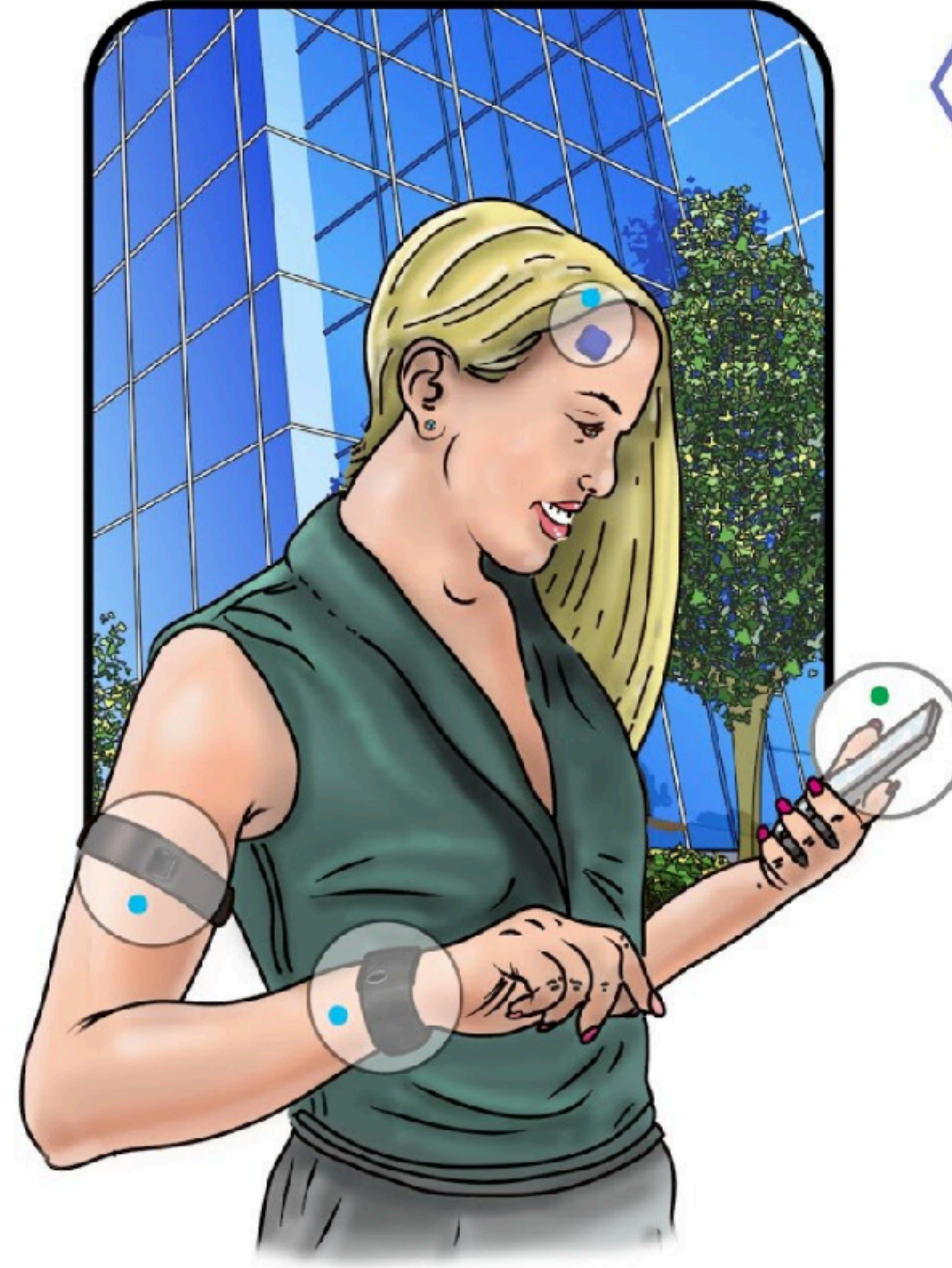
Competition Data

Baseline Prediction: 95.14%
Pre-Seizure Prediction: 8.7%



Next Steps

- Address Class Imbalance
- Refine features
- Focus Patient Specific Algorithms





EEG Classification

Any Questions?