Predicting Neurologic Outcome of Cardiac Arrest Patients Using Wavelet-Based Electroencephalogram Features

Keewon Shin

Biomedical Engineering Research Center, Asan Medical Center
Seoul, Korea

Purpose: To develop a machine learning model that can use complex Electroencephalogram (EEG) data to predict the neurologic outcome of cardiac arrest patients at 3-6 months after the event, based on the cerebral performance category (CPC) score. A CPC score of 3-5 indicates poor recovery and a score of 1-2 indicates good recovery.

Methods: We applied a wavelet DWT-based feature extraction method along with the nine EEG features implemented in the baseline code to a multicenter dataset of 607 cardiac arrest patients. We added a filtering algorithm based on EEG quality prior to feature extraction and did not use demographic variables as they did not improve model performance. We reserved 10% of the data as a test dataset and performed 5-fold cross-validation using the XGBoost, GradientBoost, and RandomForest model ensembles.

Results: The model achieved an average AUC of 0.74 over 72 hours in cross-validation, however, our team (ComaKarma_AMC) scored 0.33 on the PhysioNet 2023 leaderboard in the unofficial phase.

Conclusion: Our model did not perform well on the challenge test dataset. We plan to explore other wavelet-based methods, recalibration techniques, and unsupervised learning approaches for future work to improve classification performance.

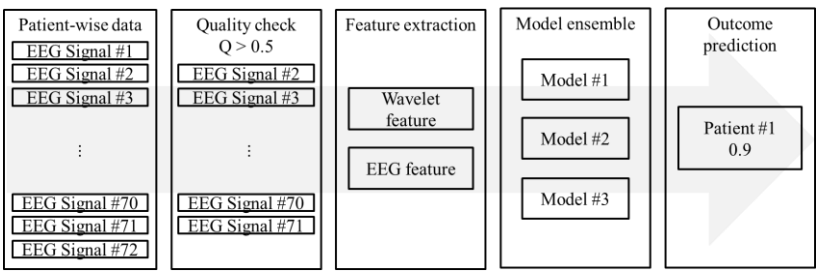

Figure 1. Overall process of our method for PhysioNet 2023 unofficial phase.