Utilization of CNN embedding extractactor and Transformer encoder for predicting neurological recovery from coma based on EEG

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This paper introduces a new method to predict patients' recovery from coma using EEG data - a topic of the PhysioNet Challenge 2023.

We propose a hierarchical classification method consisting of two deep-learning models optimized by a custom loss function penalizing false negative predictions. The first model - embedding extractor - is trained to predict the outcome using a single random 5-minute EEG segment. Subsequently, embeddings extracted from each EEG segment using all available data (up to preceding 72 hours) are used as input for the second model (transformer encoder)trained to predict patient recovery.

The proposed method achieved challenge scores on a hidden validation set of 0.25, 0.54, 0.51, and 0.67 for 12, 24, 48, and 72 hours after cardiac arrest, respectively. Our solution was ranked 5th out of 159 submitted solutions during the Unofficial phase of the challenge (team ISIBrno-AIMT).