Cardiac arrest is one of the leading causes of death and long-term impairment worldwide. Patients who have suffered a cardiac arrest and remain comatose afterward require intensive care and treatment. Therefore, an accurate prediction of the neurological outcome is crucial for medical professionals for further treatment regime. EEG is a non-invasive technique to assess brain activity and may be used to predict neurological outcomes in comatose patients. However, existing methods for analyzing EEG data rely heavily on manually constructed features and require specially trained experts.

Recent research has shown that end-to-end deep learning is a promising approach that addresses the challenge of explicit feature extraction. For instance, end-to-end deep learning has already been established as an effective method for analyzing medical data and has the potential to assist physicians. Furthermore, combining end-to-end learned features with domain-specific features might improve overall performance.

In our approach, we implement an ensemble of two model architectures, where each model votes on the patient outcome. This architecture is called BrainFusion and is displayed in Figure 1. The first model is an adapted ConvNeXt-T model for 1D signal data, while the second model is the PhysioNet winner model of 2020. Both models are trained end-to-end, eliminating the need for pre-processing. We also incorporate domain-specific features, such as peak alpha frequency and scale-wise entropy, into both models. In the PhysioNet model, we incorporate these features using the existing wide component. Meanwhile, in the ConvNeXt-T model, we combine the learned features with the domain-specific features through convolution before sending them to the classification head.

Our current classifier, which is based solely on the ConvNeXt-T model architecture and does not yet implement domain-specific features, achieved a challenge score of 0.0 on the hidden validation set. However, with a 5-fold cross-validation of the training data, we achieved a challenge score of 0.28 for 72 hours.