MULTI-CHANNEL EEG-BASED CARDIAC ARREST OUTCOME PREDICTION WITH MACHINE LEARNING

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ABSTRACT

Aims: In this study, we explore various electroencephalogram (EEG) and demographic features to predict the outcome of cardiac arrest.
Methods: We investigated the structure of the dataset, explored several EEG-based features, and performed random forest model training by using a 15% holdout testing approach. In our investigation, we observed different recording time across the patients, imbalanced classes according to the level of the cardiac arrest, and artifact contamination in the EEG recordings. To mitigate the contamination, we first implemented artifact subspace reconstruction (ASR) and reconstructed the EEG recording portion contaminated by large-amplitude noises. Next, we explored the underlying structure of EEG recordings using independent component analysis (ICA), graph embedding, and cross-channel correlations. In our experiments, the demographic data together with the variation of the cross-channel correlations throughout the whole recording of a single patient serves as the most stable feature set. Finally, we built a 5-classes classifier using random forest model with correlation features on top of the demographics and band power features provided. The performance of our proposed model is evaluated using a 15% holdout testing.
Results: We present our result in holdout testing and submission in Table 1. Our model has achieved 0.55 score in the holdout testing and 0.19 in the final submission.
Future work: We plan to incorporate timing features and different model training strategies in the next stage.

Table 1: Performance of the proposed model

Method	Holdout Test Testing Score	Submission Final Score
Demographic Feature + Cross-Channel Feature	0.55	0.19