

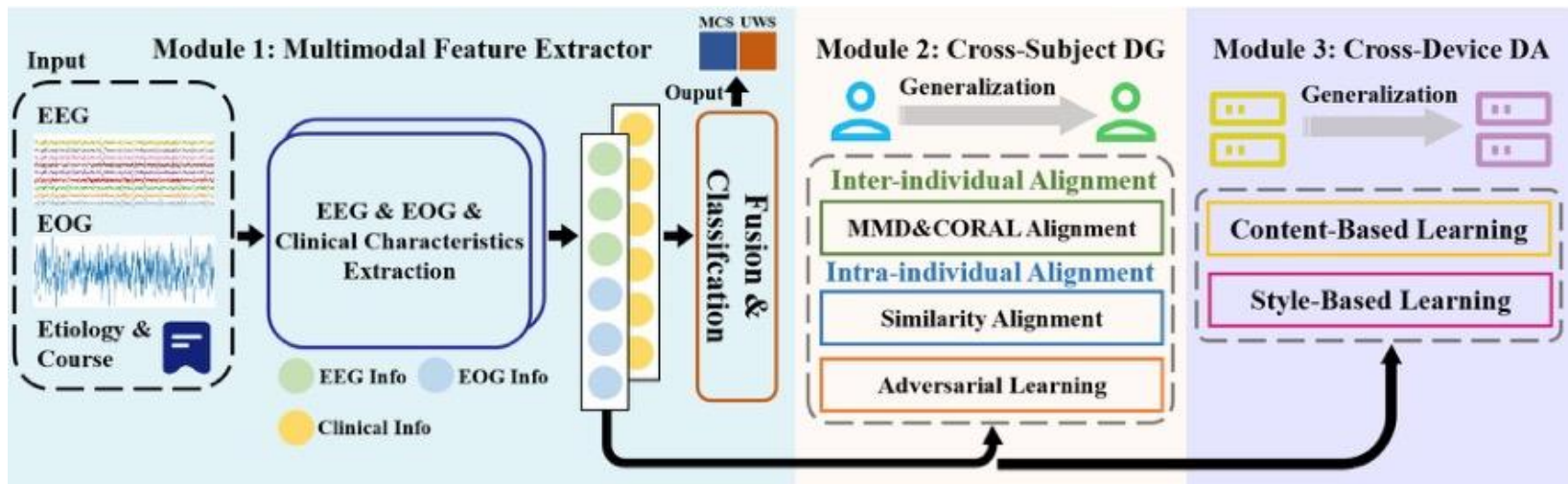
DOCTer-G: A Generalizable Diagnosis Framework for Disorders of Consciousness Using EEG

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Frontiers of Computer Science, DOI: [10.1007/s11704-025-50516-8](https://doi.org/10.1007/s11704-025-50516-8)

Problems & Ideas

- Problems of accessing consciousness level using EEG:
 - Individual and device differences limit the model generalization.
 - Existing datasets are limited to a small population.
- Ideas: We propose a generalizable and end-to-end deep learning framework for DOC diagnosis, named DOCTer-G, which not only learns domain-invariant features across different individuals or devices, but also fully utilizes multimodal data. We collected a large-scale dataset including 409 EEG recordings.



Main Contributions

- Contributions:
 - We propose a generalizable and end-to-end deep learning framework for DOC diagnosis, named DOCTer-G, which learns domain-invariant features across different individuals or devices. To our best knowledge, we are the first to address the generalization problem in clinics for DOC diagnosis.;
 - We collected a large-scale dataset of 441 EEG recordings, where there are 409 ones from 187 MCS and 128 UWS cases, and 32 ones from 32 healthy controls. To our best knowledge, it is the largest EEG dataset so far for assessing the consciousness level.
 - DOCTer-G achieves the state-of-the-art performance.

Table 1 Performance Comparison with other methods for DOC diagnosis.

Metrics	Accuracy (%)	Recall (%)	Precision (%)	Macro-F1 (%)	Subject-wise ACC (%)
EEGNet [5]	66.85±3.07	63.38±13.53	70.99±6.17	66.17±3.47	69.30±4.00
TSception [6]	67.04±3.95	69.09±6.21	67.92±4.21	66.90±3.95	71.16±4.78
Mix-RCNN [7]	67.95±4.56	63.88±7.27	72.53±5.58	67.86±4.60	69.77±5.88
DeepConvNet [8]	69.61±6.07	68.58±11.33	71.38±4.30	69.51±6.13	72.56±8.24
1D-CNN	70.68±4.67	66.70±9.84	74.08±4.97	70.43±4.69	74.88±4.74
1D-CNN-LSTM	71.43±4.78	72.99±7.70	72.05±4.03	71.27±4.82	74.42±5.30
ShallowConvNet [8]	71.88±3.82	67.57±4.67	75.56±4.24	71.81±3.82	74.42±5.88
Conformer [9]	71.91±3.66	66.94±8.07	76.17±4.19	71.76±3.77	74.88±3.42
EEGDOCTer	72.76±5.23	72.53±10.27	74.42±4.71	72.52±5.41	74.88±4.30
DOCTer-G	76.48±2.52	77.81±7.23	77.13±2.74	76.36±2.48	75.81±6.99