

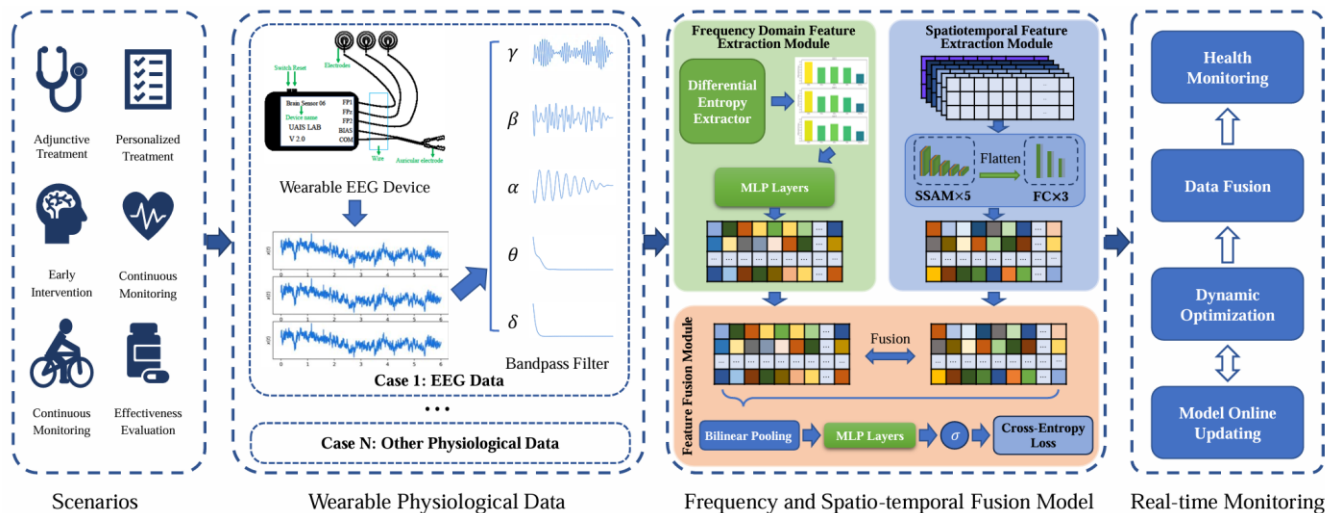
A novel personalized wearable healthcare framework: exploring EEG patterns for depression monitoring

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Problems & Ideas

- Problems of conventional depression recognition approaches:
 - Existing EEG-based depression monitoring methods mainly focus on frequency features, limiting accuracy and missing key information.
 - Current deep learning models struggle with low-channel EEG data, leading to overfitting and poor generalization.
- Ideas: An integrated framework that combines frequency and spatiotemporal features from wearable EEG devices, using a novel deep learning model (SSAFNet) to enable accurate, real-time, and interpretable depression monitoring.

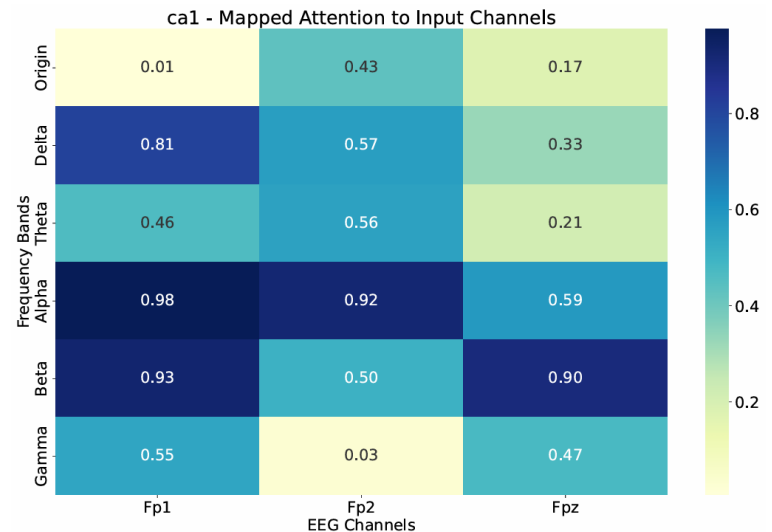


Main Contributions

- Contributions:
 - Proposed a novel personalized health monitoring framework that integrates frequency-domain and spatiotemporal features from low-channel EEG signals, enabling real-time, accurate, and interpretable health assessments.
 - Designed SSAFNet, a neural network enabling effective multi-domain feature fusion for wearable EEG analysis.
 - Achieved higher depression recognition accuracy than existing methods on a 3-channel EEG dataset.

Table 2 Comparing experimental results of SSAFNet and comparative method on the EEG datasets

Models	Accuracy	Sensitivity	Specificity	F1-Score
kNN	54.41%	4.86%	99.19%	8.62%
SVM	51.91%	39.16%	63.38%	42.18%
DT	63.53%	36.66%	88.09%	47.34%
LG	52.35%	38.27%	65.66%	42.53%
NB	66.76%	43.97%	88.44%	54.54%
MLP	60.74%	46.56%	74.42%	51.5%
CNN	57.82%	54.97%	64.13%	49.49%
RNN	62.79%	59.55%	66.93%	59.86%
LSTM	66.62%	62.28%	70.78%	63.31%
BNN	65.00%	48.78%	80.97%	56.12%
DeprNet	60.44%	30.84%	87.22%	42.31%
DepHNN	64.26%	48.28%	78.68%	54.83%
SSAFNet	76.03%	75.17%	85.44%	74.67%



SSAFNet focuses attention on key EEG channels and frequency bands linked to depression.