**Literature Review: AI Approaches to Classifying Emotion States from EEG Signals**

This review synthesizes recent advancements in the use of artificial intelligence (AI) for classifying emotional states from electroencephalography (EEG) signals. The focus is on the methodologies, features extracted, and results achieved in the studies outlined below.

**1. Towards Bi-Hemispheric Emotion Mapping through EEG: A Dual-Stream Neural Network Approach (2024)**

**Approach:**

This study introduced a two-stream neural network leveraging a bi-hemispheric model. Separate neural pathways were dedicated to analyzing EEG data from the left and right hemispheres, which were later integrated for final emotion classification.

**Features:**

The network utilized spatial and temporal EEG data from standard datasets. Bi-hemispheric features were specifically modeled to capture inter-hemispheric asymmetries related to emotional states.

**Results:**

The model significantly outperformed baseline methods, achieving a classification accuracy of 92.3% on the SEED dataset. This study demonstrated the importance of considering bi-hemispheric features for emotion recognition.

**2. A Hybrid End-to-End Spatio-Temporal Attention Neural Network with Graph-Smooth Signals for EEG Emotion Recognition (2023)**

**Approach:**

This research proposed a spatio-temporal attention neural network (STANN) that integrates spatial and temporal EEG data representations. The model incorporated graph signal processing to smooth the EEG input data, enhancing signal integrity.

**Features:**

The model extracted spectral band power and spatial connectivity features. Temporal attention mechanisms highlighted emotion-related dynamics in the EEG signals.

**Results:**

Using the DEAP dataset, the proposed method achieved a peak accuracy of 89.7%. The fusion of spatio-temporal attention and graph signal smoothing was found to be effective in improving classification performance.

**3. Improving EEG-based Emotion Recognition by Fusing Time-frequency and Spatial Representations (2023)**

**Approach:**

A novel network architecture fused time-frequency and spatial domain features. Spectral features were extracted using short-time Fourier transforms (STFT), while spatial patterns were modeled using topographical EEG maps.

**Features:**

Key features included time-frequency spectrograms for capturing frequency-specific activities and spatial correlations derived from electrode positioning.

**Results:**

The fusion-based approach achieved state-of-the-art results on multiple datasets, including 90.2% accuracy on the DEAP dataset. It demonstrated that combining frequency and spatial information improves emotion recognition accuracy.

**4. Unveiling Emotions from EEG: A GRU-Based Approach (2023)**

**Approach:**

This study explored Gated Recurrent Units (GRUs) for temporal sequence modeling of EEG signals. The GRU model was trained end-to-end to capture long-term dependencies in the EEG time-series data.

**Features:**

The method relied on raw EEG signals without extensive preprocessing. Temporal dynamics of the signal were modeled directly through the GRU layers, bypassing the need for explicit feature engineering.

**Results:**

The GRU-based network achieved 100% validation accuracy on the SEED dataset, demonstrating the effectiveness of GRUs in capturing the temporal evolution of emotional states.

A screenshot of a computer

Description automatically generated



2023, 2024, go back 5 to 10 years.

Attention: list of papers

Aha: list of papers

Etc.

* [Paperdigest](https://www.paperdigest.org/): <https://www.perplexity.ai/>
* [Research Rabbit](https://www.researchrabbit.ai/)
* [Perplexit](https://www.perplexity.ai/)y
* <https://scite.ai>

LaTeXiT: Picture

Zotero:

Paper list

* Paper 1: attention, KNN, CNN

**AI Slide:**

Contact Atharv Patil

I will let him know….

**Paper Structure:**

1. **Introduction:** information, research question, Contribution
   1. **Bullet points**
2. **Background:** literature review, methods
3. **Methodology:** 
   1. Data processing
   2. Feature extraction
   3. Model selection
4. **Experiment and results (output)**
   1. **Outcomes**
   2. **Address**
5. **Discussions**
   1. **Summary table**
6. **Conclusion**

**Approach**