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Detecting Music Enjoyment Level Using Electroencephalogram Signals and Machine Learning Techniques

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Abstract : An electroencephalogram (EEG) is a non-invasive technique that records electrical activity in the brain using scalp electrodes. Researchers have studied the use of EEG to detect emotions and moods by collecting signals from participants and analyzing how those signals correlate with their activities. In this study, researchers investigated the relationship between EEG signals and music enjoyment. Participants listened to music while data was collected. During the signal-processing phase, power spectral densities (PSDs) were computed from the signals, and dominant brainwave frequencies were extracted from the PSDs to form a comprehensive feature matrix. A machine learning approach was then taken to find correlations between the processed data and the music enjoyment level indicated by the participants. To improve on previous research, multiple machine learning models were employed, including K-Nearest Neighbors Classifier, Support Vector Classifier, and Decision Tree Classifier. Hyperparameters were used to fine-tune each model to further increase its performance. The experiments showed that a strong correlation exists, with the Decision Tree Classifier with hyperparameters yielding 85% accuracy. This study proves that EEG is a reliable means to detect music enjoyment and has future applications, including personalized music recommendation, mood adjustment, and mental health therapy.

Keywords : EEG, electroencephalogram, machine learning, mood, music enjoyment, physiological signals
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