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Show Your Emotion: Using EEG Decoupled Emotion Representations for 3D Face Generation

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Abstract

Recent advances in generative AI have enabled the creation of realistic 3D faces, expanding practical applications. Although prior work has improved expression rendering using visual features, current models still struggle to convey the emotions of users with physical disabilities. EEG signals have been explored to decode patients' emotional states. However, research on generating faces based on EEG signals remains limited due to challenges such as feature fusion, emotion-to-face alignment, and individual differences. To address these challenges, we propose **EEGFace** (EEG Emotion Generation Face), a novel framework that decouples emotion representations from EEG signals and uses the SRVAE (Separation and Recombination Variational Autoencoder) module to generate personalized emotion features for 3D face generation. Extensive cross-subject and cross-dataset experiments demonstrate the effectiveness of EEGFace, supporting a wide range of brain computer interface applications.

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