Evaluating Deep Convolutional Neural Network Architectures for Facial Emotion Recognition in Autistic Children

Abstract

Facial emotion recognition (FER) is a crucial element in supporting therapeutic interventions for children with autism spectrum disorder, particularly in developing emotional awareness and social communication skills. In this study, we present a comparative analysis of several advanced Deep Convolutional Neural Network (DCNN) architectures to evaluate their effectiveness in recognizing facial emotions in children with ASD. Models such as VGG, ResNet, DenseNet, MobileNet, Inception, Xception, EfficientNet, and ConvNeXt were adapted for the FER task using a transfer learning approach that includes full fine-tuning of convolutional layers and the addition of custom dense layers for classification. Experiments were conducted using the publicly available Autistic Children Emotions dataset, which includes six emotion categories. The models were trained and evaluated under a consistent experimental protocol to ensure fair comparison. The results highlight the potential of general purpose DCNNs in therapeutic contexts and underline the need for specialized FER models tailored to neurodiverse populations.

This study provides a foundation for future systems aimed at enhancing therapy and emotional support for autistic children.