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Spontaneous and Posed Smile Detection: Deep Learning, Traditional Machine Learning, and Human Performance

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Abstract : A computational model of affect that can distinguish between spontaneous and posed smiles with no errors on a large, popular data set using deep learning techniques is presented in this paper. A Long Short-Term Memory (LSTM) classifier, a type of Recurrent Neural Network, is utilized and compared to human classification. Results showed that while human classification (mean of 0.7133) was above chance, the LSTM model was more accurate than human classification and other comparable state-of-the-art systems. Additionally, a high accuracy rate was maintained with small amounts of training videos (70 instances). The derivation of important features to further understand the success of our computational model were analyzed, and it was inferred that thousands of pairs of points within the eyes and mouth are important throughout all time segments in a smile. This suggests that distinguishing between a posed and spontaneous smile is a complex task, one which may account for the difficulty and lower accuracy of human classification compared to machine learning models.

Keywords : affective computing, affect detection, computer vision, deep learning, human-computer interaction, machine learning, posed smile detection, spontaneous smile detection
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