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Methodological Challenges in AI-Based Facial Expression Recognition: A Comparison of Methods

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Recent developments in psychological assessment have seen the rise of AI-based automatic detection of emotional facial expressions, now widely implemented in both commercial and open-source software. Despite its growing prominence, this AI-based approach encounters practical, measurement, and diagnostic challenges.

Our initial study (N = 18) involved a comparative analysis of OpenFace, an AI-based system, and blenderFace, a non-AI-based system for facial expression assessment. To facilitate a fair comparison, participants were recorded using both a UV-sensitive Webcam for blenderFace, marked with trackable sunscreen, and a standard Webcam for OpenFace. This methodology addressed potential biases introduced by facial markers in AI-based recognition. The blenderFace method, employing an optical, pattern-based tracking system, avoids the pitfalls of AI-driven methods by not relying on a point distribution model or predefined emotion categories.

In a larger study (N = 106), we conducted statistical analyses of raw facial movement data from blenderFace. This approach offered a nuanced understanding of facial expressions, using three-dimensional coordinates for in-depth analysis, particularly beneficial for high-precision research such as microexpressions or the Component Process Model.

Overall, our research provides insights into the comparative effectiveness of AI-based and direct measurement methods in facial expression analysis. While AI-based systems mark a technological advance, they also introduce certain limitations. Our findings suggest a balanced approach that combines AI's efficiency with the accuracy of direct movement data to improve psychological assessment practices.

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Primary authors: Dr ZINKERNAGEL, Axel (University of Wuppertal); Prof. ALEXANDROWICZ, Rainer (University of Klagenfurt); Prof. LISCHETZKE, Tanja (University of Kaiserslautern-Landau (RPTU))

Presenter: Dr ZINKERNAGEL, Axel (University of Wuppertal)

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