

# Towards automatic analysis of gestures and body expressions in depression

**Marwa Mahmoud**

University of Cambridge  
Computer Laboratory, Cambridge, UK  
Marwa.Mahmoud@cl.cam.ac.uk

**Peter Robinson**

University of Cambridge  
Computer Laboratory, Cambridge, UK  
Peter.Robinson@cl.cam.ac.uk

Nonverbal communication plays a central role in how humans communicate and empathize with each other. The ability to read nonverbal cues is essential to understanding, analyzing, and predicting the actions and intentions of others. Nonverbal cues include facial expressions, hand gestures, body posture and tone of voice. These nonverbal cues may indicate expression of emotions and mental states or even some medical conditions such as pain, depression and anxiety. As technology becomes more widespread and personalised, fields like affective computing and socially aware computing have emerged to investigate the possibility of building machines that can sense non-verbal signals and respond to natural human behaviour.

Depression is a common psychological disorder and one of the leading causes of disease burden worldwide. Several theories in depression address the relation between non-verbal cues and different levels of depression. Manual coding of non-verbal cues is the common practice for running such studies, which is time consuming and non-objective. Recent research has looked into automatic detection of cues associated with psychological disorders, like depression [7]. Most of this work has focussed on facial cues such as facial expressions, gaze, head pose [1] or physiology measurements [6, 5]. Few studies have looked into multimodal features, especially for analysing depression, mainly focusing on facial movements, head movements and vocal prosody [2, 8]. Body gestures are an understudied modality in that field.

We propose to investigate assessment of depression using automatic detection of non-verbal signals of gestures and body expressions. Moreover, we propose the use of multimodal fusion of features to incorporate body expressions as well as the face and head features for better inference of depression level. For example, studies showed that depressed patients often exhibit more self-touches or self-adaptors [7]. To that end, we would like to build on our previous work on automatic detection of self-touches, especially on the face area [4], and the work on automatic detection of multimodal descriptors of rhythmic body movements associated with psychological distress [3]. Proposed features will include: self-touch, hand shape, fidgeting behaviour and overall body/joints move-

ments. Automatic analysis of such cues can serve as a tool for experimental psychologists. Also, it can assist physicians in diagnosing by providing quantitative measures after or during face to face sessions or telemedicine sessions or even in systems like a virtual coach.

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