

# Realtime Expressive Movement Detection Using the EyesWeb XMI Platform

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In the last few years one of the key issues in Human Computer Interaction is the design and creation of a new type of interfaces, able to adapt HCI to human-human communication capabilities. In this direction the ability of computers to detect and synthesize human *expressivity* of behavior is particularly relevant, that is, computers must be equipped with interfaces able to establish a *Sensitive* interaction with the user (see [3]).

We present a system for realtime analysis of expressivity features in human movement and mapping of these features on a two dimensional space on which we identify four emotions/attitudes: *anger*, *joy*, *sadness* and *relief*<sup>1</sup>. Figure 1 illustrates the structure of our realtime expressivity analysis system:

- we track the body configuration of a user moving in a room using a Kinect controller [2]. This device has been chosen as open drivers are available (<http://www.openni.org>) providing realtime tracking of user's body sections (head, shoulders, hips, arms, hands, legs) in both 2D and 3D coordinates. We analyze 2D data in realtime using the EyesWeb XMI platform [1].
- *smoothness*: from user's left and right hand position we compute smoothness as the correlation between each hand's trajectory curvature ( $k$ ) and velocity ( $v$ ).
- *Quantity of Motion (QoM)*: it is an approximation of the amount of detected movement, based on Silhouette Motion Images.

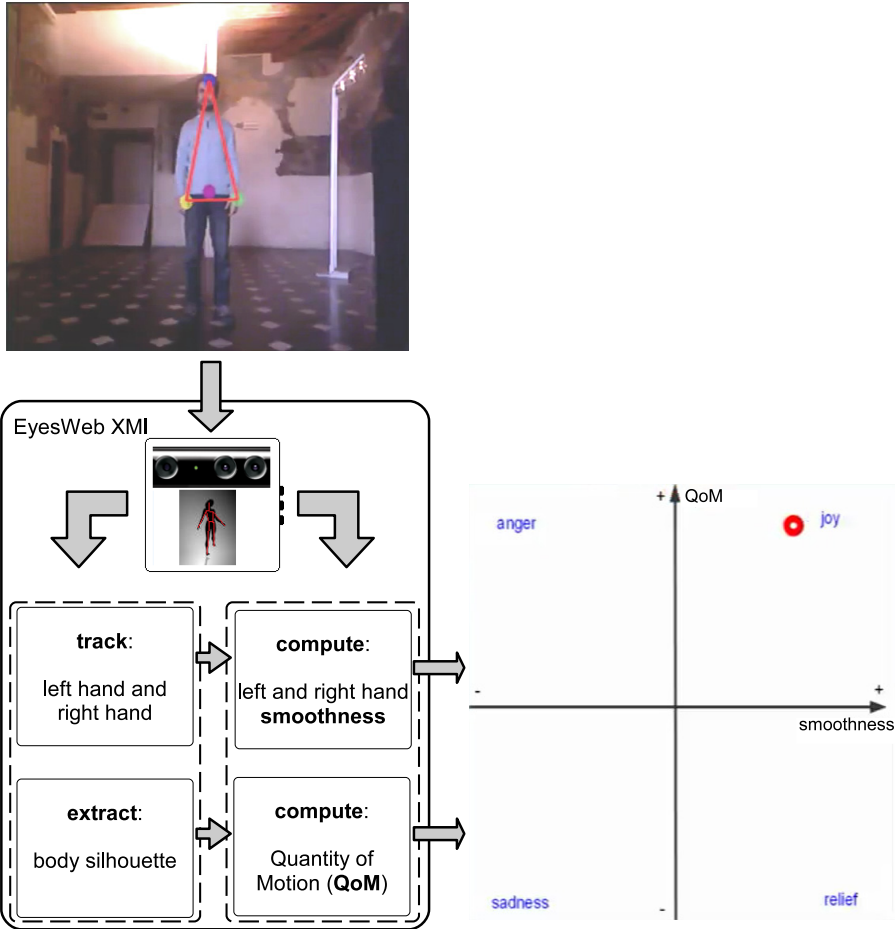
The computed smoothness and QoM are dynamically plotted on a map, as shown in figure 1, on which we highlight some attitudes/emotional states like anger, joy, sadness and relief. The proposed system may be suitable for concrete applications in affective computing, multimodal interfaces, and user centric media applications.

An example of the realtime extraction of expressive features can be downloaded at:

<ftp://ftp.infomus.org/Pub/ftp-user-root/i-search-demo-expressivity.mp4>

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**Fig. 1.** The realtime expressive movement detection system we present. User image is captured by a camera, user body silhouette is extracted and left/right hand position is tracked. Finally we compute user’s Quantity of Motion and hands smoothness and we draw the resulting values on a plane.

## References

1. EyesWeb, <http://www.eyesweb.org>
2. Kinect, <http://www.xbox.com/en-US/kinect>
3. Zeng, Z., Pantic, M., Roisman, G.I., Huang, T.S.: A survey of affect recognition methods: audio, visual and spontaneous expressions. *IEEE Transactions on Pattern Analysis and Machine Intelligence* 31(1) (2009)