WEBCAM BASED ANALYSIS OF FACIAL EXPRESSIONS

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Head pose and facial expression monitoring offers a wide range of applications in assessment, including the measurement of stress level or tiredness or for cheat detection. A novel, webcam based facial expression estimation system were developed to meet these needs. The so called Constrained Local Model (CLM, *Cristinacce* & *Cootes*, 2008, *Saragih* et al., 2011) was applied together with non-linear approximators trained on facial emotion databases, including the 3D facial database of the Binghamton University and the Cohn-Kanade Plus database of Carnegie Mellon University. The technology offers precise off-line evaluation and has real time evaluation capabilities. The novelty of our method lies in the exploitation of the changes of the shape of the face, giving rise to large tolerances against light conditions and robustness against head poses (*Jeni* et al., 2012). These features are of high relevance for assessment and for behavioural classification.

Performances on the dependences of facial expressions on light conditions and head poses are reported here. High quality facial expression estimation is achieved under broad conditions. For example, the method is robust against roll angle and can deal with ±30o and ±10o degrees of yaw and pitch angles, respectively. Trained CLMs can compensate for small dynamic range, when the range of the grey level of the face covers only 10 units on the 0-255 scale. The software works in real time so it can be used for interaction with „intelligent tutors".