The problem of emotion prediction from the face is twofold. First, it requires that the facial Action Units (AUs) and their intensities are identified and second interpreting the recorded AUs and their intensities as emotions. This work focuses on developing an accurate model to predict emotions from Facial Action Coding System (FACS) coded facial image data based on a Hidden Markov Model (HMM) approach. The novelty of this work is: 1) A new and more accurate model for emotion prediction from AU data is proposed by assigning a set of N HMMs to every AU where N is the number of emotions we consider while conventional studies have assigned at most one HMM per AU or lesser like 6 emotion specific HMMs for the entire set of AUs [3-6]. Assigning N HMMs per AU takes away the errors that might creep in due to non-consideration of the insignificant or non-present AUs by calculating separately the probability contributions towards each emotion by every single AU in the entire AU set which is used later to calculate the mean probability for each emotion considering all AUs together. 2) A percentage score of each emotion that composed the face of a subject is predicted rather than to just identify the lead or prominent emotion from the maximum probability considerations as exhibited by majority of similar researches. 3) Discuss the gender differences in the depiction of emotion by the face.
An HMM based Model for Prediction of Emotional Composition of a Facial Expression using both Significant and Insignificant Action Units and Associated Gender Differences


An HMM based Model for Prediction of Emotional Composition of a Facial Expression using both Significant and Insignificant Action Units and Associated Gender Differences


**Index Terms**

Computer Science

Artificial Intelligence

**Keywords**

Facial Action Units Hidden Markov Model Plutchik’s Wheel Of Emotions

Baum-welch Algorithm

Forward-backward Procedure

Ck+ Database
An HMM based Model for Prediction of Emotional Composition of a Facial Expression using both Significant and Insignificant Action Units and Associated Gender Differences