

Face Detection with Expression Recognition using Artificial Neural Networks

Abstract:

This paper presents a Face Detection System with Expression Recognition using Artificial Neural Networks. It is an automated vision system designed and implemented using MATLAB. The Face Detection with Expression Recognition system accomplishes facial expression recognition through two phases. The captured image is processed first to detect the face, and then the facial expression is recognized. These two phases are completed in five stages. The first two stages of the system deal with detecting and cropping the face using image processing, in particular the Viola-Jones object detection framework. The third stage deals with converting the colors of the cropped image from RGB into gray scale and applying the appropriate smoothing filter. The fourth stage consists of feature extraction using Artificial Neural Networks, so as the extracted features are compared with training samples. The final stage classifies the given outputs and shows facial expression recognition results. It then determines whether the subject is happy, angry or in neutral state. The Artificial Neural Network uses Multi-Layer- Perceptron (MLP) with back propagation algorithm for features extraction and classification. It has 4097 input nodes, one hidden layer with 50 neurons, and one output layer. Testing results show that this system can be used for interpreting three facial expressions: happiness, anger and neutral. It extracts accurate outputs that can be employed in other fields of studies such as psychological assessment. Finally, the high precision of the results allow future development of different applications which respond to spontaneous facial expressions in real time.