Facial expression recognition using feedforward neural networks

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Abstract

Our goal was to create a facial expression recognition neural network. This network would take pictures of human faces as input and to identify a specific person, a facial expression, and detect whether or not the subject's eyes were open or closed. For the purpose we used the multi-layer perceptron neural network (MLP) with backpropagation (BP) as a reference platform to determine this architecture's suitability for facial recognition. We compared the efficiency of MLP with sigmoidal activation function in the hidden layer, and a combination of sigmoidal and Gaussian activation functions. The concept of recognizing the facial expression and the state of the eyes is very different from the general face recognition, which has been investigated over the years. We are not only recognizing the individual, but also the subtle changes that take place when one changes their emotional state (although we have tested opposing emotions), or when one has closed their eyes. We have developed and tested four networks, and have also proven that a combination of sigmoidal and radial basis functions hidden neurons is better suited due to the nature of the activation functions in the feed-forward neural net.