Fuzzy linear projection on combined multi-feature characterisation vectors for facial expression recognition enhancement

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Abstract: Facial expression recognition became an important research subject for its diverse applications in human machine interaction. However, many challenges still to be overcome. By the presented work in this paper, we try to provide a new facial expression recognition technique based on combined vectors of multi-feature characterisation of the face. Thus, the face within an image is firstly localised using a simplified method, then it will be characterised in three different ways; by obtaining its Zernike moments feature vectors, known to compact geometric characteristics of the image, then by compiling AR model, supposed to be a representation of its spectral source model and at last, a statistical distribution analysis of the luminance information is performed through the LBP method. Obtained feature vectors were used to train neural network classifiers (NNC) in different manner. To demonstrate the effectiveness of the proposed technique, we record and compare recognition rates for NNC trained with each type of feature vector firstly, then for NNC trained with directly combined feature vectors and finally for NNC trained with composite feature vectors which underwent a fuzzy linear projection operation. Experiments were performed on the JAFFE and Yale database. Recorded results along with comparisons to other methods have affirmed the potency of the proposed approach attaining promising results compared to those reported in the literature.

Keywords: face detection; expression recognition; AR model; Zernike moments; LBP; fuzzy linear projection.

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