Novel Face Recognition Approach Using Bit-Level Information and Dummy Blank Images in Feedforward Neural Network

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Abstract. Bit-level information is useful in image coding especially in image compression. A digital image is constructed by multilevel information of bits, called as bit-plane information. For an 8-bits gray level digital image, bit-plane extraction has ability to extract 8 layers of bit-plane information. Conventional neural network-based face recognition usually used gray images as training and testing data. This paper presents a novel method of using bit-level images as input to feedforward neural network. CMU AMP Face Expression Database is used in the experiments. Experiment result showed improvement in recognition rate, false acceptance rate (FAR), false rejection rate (FRR) and half total error rate (HTER) for the proposed method. Additional improvement is proposed by introducing dummy blank images which consist of plain 0 and 1 images in the neural network training set. Experiment result showed that the final proposed method of introducing dummy blank images improve FAR by 3.5%.

1 Introduction

Conventionally, face recognition is using complex mathematical solution, like eigenfaces [1], LDA [2], Gabor feature [2][3], elastic brunch matching [4], 3-D [5][6][7], wavelet [8][9], and line edge map [10] but all these features involving high complexity of mathematical calculation and they only provides single feature extraction.

Bit-level information is useful in image coding especially in image compression [11][12]. Digital image compression method is based on concept of decomposing a multilevel image into a series of binary images and compressing each binary image via one of several well-known binary compression methods [13]. A digital image is constructed by multilevel information of bits, called as bit-plane information.

Since bit-planes are information extracted from binary code of image pixels, they contain useful raw data of image. In this paper, we proposed a novel method of using bit-level images to act as feature extraction input to feedforward neural

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