Multimedia Tools and Applications (2024) 83:11669–11686
https://doi.org/10.1007/s11042-023-17853-x

A novel descriptor (LGBQ) based on Gabor filters

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Received: 31 October 2022 / Revised: 18 October 2023 / Accepted: 12 December 2023 /
Published online: 23 December 2023

Abstract
Recently, many existing automatic facial verification methods have focused on learning the optimal distance measurements between facials. Especially in the case of learning facial features by similarity which can make the proposed descriptors too weak. To justify filling this gap, we have proposed a new descriptor called Local Binary Gabor Quantization (LGBQ) for 3/2D face verification based on Gabor filters and uses tensor subspace transformation. Our main idea is to binarize the responses of eight Gabor filters based on eight orientations θ as a binary code which is converted into a decimal number and combines the advantage of three methods: Gabor, LBP, and LPQ. These descriptors provide more robustness to shape variations in face parts such as expression, pose, lighting, and scale. To do this, we have chosen to merge two techniques which are multilinear whitened principal component analysis (MWPCA) and tensor exponential discriminant analysis (TEDA). The experimentation is using two publicly available databases, namely, Bhosphorus, and CASIA 3D face database. The results show the supremacy of our method in terms of accuracy and execution time compared to state-of-the-art methods.

Keywords Binarisation Gabor filter · Face verification · LGBQ · Tensor subspace · MWPCA · TEDA · LBP · LPQ

1 Introduction and motivation

Since the 1960s, face verification from face images attracted the attention of many researchers. Certainly, a large number of existing automatic facial verification methods center on learning the optimal distance metrics between facials. Moreover, learning facial features coincidently may cause the proposed descriptors to be too weak. Moreover, the procedure of facial manipulation is complex and time-consuming, needing sophisticated checking tools and scientific expertise. Especially the challenges that affected several applications such as biometrics,

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