Comparative Analysis of Conventional, Real and Complex Wavelet Transforms for Face Recognition

Abstract

Face recognition has been studied for many years in the context of biometrics and is one of the most successful applications of image analysis and understanding. Various methods, approaches and algorithms for recognition of human faces were proposed. In this paper, independent, comparative study of conventional discrete wavelet transform (DWT), real dual-tree discrete wavelet transform (R-DT-DWT), and complex dual-tree discrete wavelet transform (C-DT-DWT) based features for face recognition is carried out. In 2005, Delac et al. [26] presented an independent comparative study of PCA, ICA, and LDA on the FERET data set where it was concluded that no particular distance–metric combination is the best. In this paper we intend to bring further conclusions. Unlike the contribution by Delac et al., our conclusions are in context of DWT, R-DT-DWT, and C-DT-DWT. Moreover, these approaches are tested on nine different databases at different levels and under three different distance metrics, which allowed us to compare their performance independently. Our simulation results show that no particular distance–metric combination is the best across all standard benchmark face databases. However, the overall performance for city block distance measure was found to be better as compared to the Euclidean and cosine distance. Also, the performance for
R-DT-DWT and C-DT-DWT based features were found equivalently efficient in many cases. So taking redundancy into consideration, it may be suggested to opt for R-DT-DWT for face efficient recognition.

References

- The University of Bern face database. Website.
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**Index Terms**

Computer Science

Pattern Recognition

**Keywords**

Real Dual-tree Discrete Wavelet Transform (R-DT-DWT) Complex dual-tree discrete wavelet transform (C-DT-DWT)

Face Recognition Technology (FERET)