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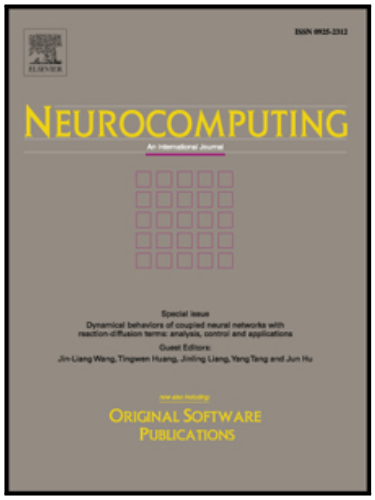

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Illumination Normalization based on Correction of Large-scale Components for Face Recognition

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Abstract

A face image could be decomposed into two components of large- and small-scale components, which carry low- and high-frequency contents of the original image, respectively. The illumination field mainly locates in the spectrum of large-scale components, whereas the small-scale components hold the detailed image cues, like edge, corner, etc., which are less sensitive to the illumination changes. In this paper, we proposed a new illumination normalization framework with the idea of Correction on Large-scale Components (CLC). The logarithmic total variation (LTV) technique is firstly applied to decompose the large- and small-scale components of face images. We assume that there are two main contents in the large-scale components: the smoothly varied illumination field and the large-scale intrinsic facial features. Based on this assumption, an energy minimization framework is proposed to estimate and remove the smoothly varied field of the large-scale components in an interleaving fashion. The final normalization results can then be achieved with the integration of the smoothed small-scale components and the corrected large-scale components. Experiments on CMU-PIE, Extended Yale B and CAS-PEAL-R1 databases show that the proposed method can present a very good visual quality even on the images illuminated with deep shadow and high brightness regions, and attain promising illumination

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