论文

基于Log-WT的人脸图像超分辨率重建

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摘要
目前已有的基于学习的人脸超分辨率图像重建算法大都对亮度变化特别是阴影非常敏感, 针对这一缺点, 该文提出了一种不随光照变化的图像表示方法——对数-小波变换(Log-WT), 并在此基础上构造了一种新的人脸超分辨率图像重建算法。该方法首先利用Log-WT变换提取低分辨率图像与光照无关的内在特性, 然后借助流形学习的思想建模高分辨率图像和低分辨率图像之间的关系, 并对其加入人脸图像的"专用"先验约束, 从而同时实现了超分辨率重建和图像增强。仿真结果表明该算法有效克服了传统方法受光照因素影响的缺点, 在提高图像分辨率的同时克服了光照因素的影响, 特别是对阴影效应的消除具有明显效果, 将该方法应用于人脸识别, 有效提高了识别率。

关键词   人脸超分辨率   Log-WT变换   流形学习   阴影消除

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A Log-WT Based Super-resolution Algorithm

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Abstract
Most learning-based super-resolution algorithms neglect the illumination problem. In this paper, a new image representation called Logarithmic-Wavelet Transform (Log-WT) is developed for the elimination of the lighting effect in the image. Meanwhile, a Log-WT based method is proposed to combine super-resolution and shadow removing into a single operation. In this method first intrinsic, illumination invariant features of the image are extracted with exploiting logarithmic-wavelet transform. Then an initial estimation of high resolution image is obtained based on the assumption that small patches in low resolution space and patches in high resolution space share the similar local manifold structure. Finally the target high resolution image is reconstructed by applying the special face constraints in pixel domain. Experimental results demonstrate that the proposed method simultaneously achieves single-image super-resolution and image enhancement especially shadow removing. After that, reconstruction results are used for face recognition which improves the recognition rate.

Key words   Face super-resolution   Logarithmic-Wavelet Transform (Log-WT)   Manifold learning   Shadow removal

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