短文

一种基于自然图像统计模型的图像合成检测方法

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摘要

Nowadays, digital images can be easily tampered due to the availability of powerful image processing software. As digital cameras continue to replace their analog counterparts, the importance of authenticating digital images, identifying their sources, and detecting forgeries is increasing. Blind image forensics is used to analyze an image in the complete absence of any digital watermark or signature. Image compositing is the most common form of digital tampering. Assuming that image compositing operations affect the inherent statistics of the image, we propose an image compositing detection method on based on a statistical model for natural image in the wavelet transform domain. The generalized Gaussian model (GGD) is employed to describe the marginal distribution of wavelet coefficients of images, and the parameters of GGD are obtained using maximum-likelihood estimator. The statistical features include GGD parameters, prediction error, mean, variance, skewness, and kurtosis at each wavelet detail subband. Then, these feature vectors are used to discriminate between natural images and composite images using support vector machine (SVM). To evaluate the performance of our proposed method, we carried out tests on the Columbia Uncompressed Image Splicing Detection Dataset and another advanced dataset, and achieved a detection accuracy of 92% and 79%, respectively. The detection performance of our method is better than that of the method using camera response function on the same dataset.

关键词　　Image compositing　generalized Gaussian model (GGD)　maximum-likelihood (ML)　support vector machine (SVM)　image forensics

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Detection of Image Compositing Based on a Statistical Model for Natural Images

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Abstract

transform domain. The generalized Gaussian model (GGD) is employed to describe the marginal distribution of wavelet coefficients of images, and the parameters of GGD are obtained using maximum-likelihood estimator. The statistical features include GGD parameters, prediction error, mean, variance, skewness, and kurtosis at each wavelet detail subband. Then, these feature vectors are used to discriminate between natural images and composite images using support vector machine (SVM). To evaluate the performance of our proposed method, we carried out tests on the Columbia Uncompressed Image Splicing Detection Dataset and another advanced dataset, and achieved a detection accuracy of 92% and 79%, respectively. The detection performance of our method is better than that of the method using camera response function on the same dataset.

Key words　　Image compositing　generalized Gaussian model (GGD)　maximum-likelihood (ML)　support vector machine (SVM)　image forensics

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