对局部内容篡改敏感的感知图像散列

倪丽佳，王朔中，吴首珉，裴蓓
（上海大学通信与信息工程学院，上海 200072）

摘　要：提出了一种基于图像内容和颜色分布的感知图像散列。先将图像尺寸规格化并分成小块，根据各块亮度矩阵的奇异值判断其是否属于复杂区域，由此得到复杂区分布索引表。计算各图像块 Y 分量的均值和 R、G、B 均值两两之差的最小值，构成表征亮度和颜色分布的特征向量，将它与复杂区索引组合并加密得到图像散列。实验结果表明，由此提取的图像散列对保持图像内容不变的 JPEG 压缩、平滑滤波、缩放等处理具有良好的稳健性，而对内容篡改敏感并能准确定位篡改部位。

关键词：图像认证；图像散列；奇异值分解；篡改定位
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Perceptual image hashing sensitive to content modification

NI Li-jia, WANG Shuo-zhong, WU Qiu-min, PEI Bei
School of Communication and Information Engineering, Shanghai University, Shanghai 200072, China

Abstract: A perceptual image hashing method based on the image content and color distribution was proposed. The image was scaled to a fixed size and divided into blocks. Each block was then classified semantically into *complex* or *plain* according to the ratio of the first two singular values of its luminance matrix so as to give a table of complexity indices. RGB components of each complex block were used to form a color-feature vector, which was combined with the complexity table and encrypted to produce the image hash. Experiments show that the hash is robust against content-preserving image manipulations such as JPEG compression, smoothing and re-scaling, and sensitive to tampering of the image content.

Key words: image authentication; image hashing; singular value decomposition; tampering localization