High-Capacity Image Steganography using Wavelet-based Fusion on Deep Convolutional Neural Networks

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Abstract : Steganography has been known for centuries as an efficient approach for covert communication. Due to its popularity and ease of access, image steganography has attracted researchers to find secure techniques for hiding information within an innocent looking cover image. In this research, we propose a novel deep-learning approach to digital image steganography. The proposed method, DeepWaveletFusion, uses convolutional neural networks (CNN) to hide a secret image into a cover image of the same size. Two CNNs are trained back-to-back to merge the Discrete Wavelet Transform (DWT) of both colored images and eventually be able to blindly extract the hidden image. Based on two different image similarity metrics, a weighted gain function is used to guide the learning process and maximize the quality of the retrieved secret image and yet maintaining acceptable imperceptibility. Experimental results verified the high recoverability of DeepWaveletFusion which outperformed similar deep-learning-based methods.