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Reversible Data Hiding for Encrypted Signals by Homomorphic Encryption and Signal Energy Transfer

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Abstract

Reversible data hiding for encrypted signals with perfect reconstruction of directly decrypted signals is introduced in this paper. Each unit in the original image is separated into three components by energy transfer equation, and each component is encrypted by Paillier homomorphic encryption. Additional bits are concealed into the encrypted image by manipulating the encrypted signals. Finally, the original image can be perfectly recovered when direct decryption is applied. The embedded bits are lossless extracted as well. Optimal visual quality and improved embedding rate are obtained by the proposed approach, since the value of the directly decrypted unit is the same as the original one. Experimental results and comparisons are demonstrated to illustrate the effectiveness and advantages of the proposed method. Moreover, the proposed method can be extended to deal with encoded multimedia, which further enriches the application scenarios.

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