A New Spatial Steganographic Scheme by Modeling Image Residuals with Multivariate Gaussian Model

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ABSTRACT

We propose a new spatial steganographic method that models the image residuals with a multivariate Gaussian model to improve the performance. We also develop a model-driven scheme that uses the residuals to embed data. The performance of our scheme is evaluated using BOSSBase ver.1.01, and the results show that our proposed method performs better compared to existing methods.

1. Residual model

Let \( Y = X + N \), where \( X \) and \( N \) are the cover image and the embedding changes, respectively. The residual image is defined as:

\[ Y = X + N, \quad H = Y - X = X + N - X = N, \]

where \( H \) is the difference image between the cover and the stego image. The residual image is obtained by applying a high-pass filter to the stego image.

2. Impact of parameters

The performance of our scheme is affected by various parameters, such as the high-pass filter coefficients and the embedding strength. We analyze the impact of these parameters on the performance of our scheme.

3. Comparison to Existing Methods

We compare our scheme with the existing methods, such as MG, MiPOD, and S-UNIWARD. The results show that our scheme outperforms the existing methods in terms of performance.

4. Computation complexity

Our scheme is computationally efficient compared to existing methods. The computational complexity of our scheme is lower than that of MiPOD and S-UNIWARD.

5. Conclusion

Our scheme provides a new approach to steganography by modeling image residuals. It outperforms existing methods in terms of performance and computational efficiency.

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Références


