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REVIEWER'S REPORT

Manuscript No.: IJAR-56634

Title: Image Steganography in Color Conversion

Recommendation:

Accept as it is

Accept after minor revision.....YES.....

Accept after major revision

Do not accept (*Reasons below*)

Rating	Excel.	Good	Fair	Poor
Originality	√			
Techn. Quality		√		
Clarity		√		
Significance		√		

Reviewer's ID: JPR-094

Detailed Reviewer's Report

Overall Evaluation

This manuscript presents a steganographic framework that integrates **de-colorization and colorization networks** with a **robust embedding algorithm based on Quaternion Exponential Moments (QEM)**. The objective is to mitigate the detectable artifacts introduced by traditional embedding processes by transforming the stego image through grayscale conversion and subsequent color reconstruction. The study addresses an important problem in image steganography, namely **the statistical detectability of embedded information in cover images**.

Strengths

1. **Novel methodological concept**

The integration of **de-colorization and colorization as a transformation stage in steganography** is innovative and offers a new perspective on hiding embedding artifacts.

2. **Hybrid framework**

The combination of **traditional embedding techniques (QEM)** with **deep learning architectures (U-Net based networks)** strengthens the robustness of the proposed approach.

3. **Experimental evaluation**

The authors provide quantitative evaluation using commonly accepted metrics such as:

* PSNR

* SSIM

REVIEWER'S REPORT

* BER

4. **Security evaluation**

The use of steganalysis networks such as **SRNet and YeNet** provides a reasonable assessment of detection resistance.

5. **Comparative analysis**

The method is compared with several existing deep learning-based steganography approaches, demonstrating improved performance in terms of BER under certain conditions.

Weaknesses

1. **Limited dataset diversity**

The experiments are conducted using a relatively small dataset (approximately 3K images from an anime dataset), which may limit generalization to real-world image datasets.

2. **Some methodological descriptions lack clarity**

Several equations and variables are not fully explained, which may make reproduction difficult for readers.

3. **Language and formatting issues**

The manuscript contains minor grammatical errors and repetition in certain sections.

4. **Payload limitations**

Experimental results indicate that when the secret image size increases to **64×64**, the method becomes more detectable by steganalysis algorithms.

Significance

The work contributes to the field of **information hiding and multimedia security** by proposing a transformation-based steganographic approach that attempts to obscure embedding artifacts through color space manipulation. This concept may stimulate further research in **image transformation-assisted steganography and secure multimedia communication**.

Recommendation to the Editor

Recommendation: Accept (Minor Editorial Revisions)

The manuscript presents a **novel and technically sound contribution** to the field of image steganography. Although some improvements in language clarity and experimental diversity would strengthen the paper, the core methodology and results are sufficient to justify publication.