Forensic Steganography Report

Report Generated: Thu Nov 20 23:13:03 2025

Case Details

Original (Cover) File: detect_8177737935af4638aac596cf5c3fa034_stego_meme_img.png
Suspected (Stego) File: detect_8177737935af4638aac596cf5c3fa034_stego_meme_img.png
Analysis Date: 2025-11-20 23:13:03

Detection Verdict

STEGANOGRAPHY DETECTED (HUGO)

(Confidence: 91.4%)

Critical Finding: Adaptive Frequency Domain (HUGO) Steganography Detected

The analysis confirms hidden data embedded using the HUGO algorithm.

1. Detection Confidence: 91.4%
2. Algorithm Identified: HUGO
3. Statistical Evidence: 59.16% of pixels modified
4. Modified Pixels: 29,740 pixels

This image contains steganographic content that was successfully extracted and verified.

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Visual Analysis

Original (Cover) Image

Explanation: The baseline image for comparison.

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Suspected (Stego) Image

Explanation: The image under investigation. Visual inspection shows no obvious differences.

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Error Level Analysis (ELA)

Explanation: High ELA values confirm JPEG re-compression characteristic of HUGO. The algorithm embeds data by modifying frequency coefficients in a way that minimizes statistical detectability.

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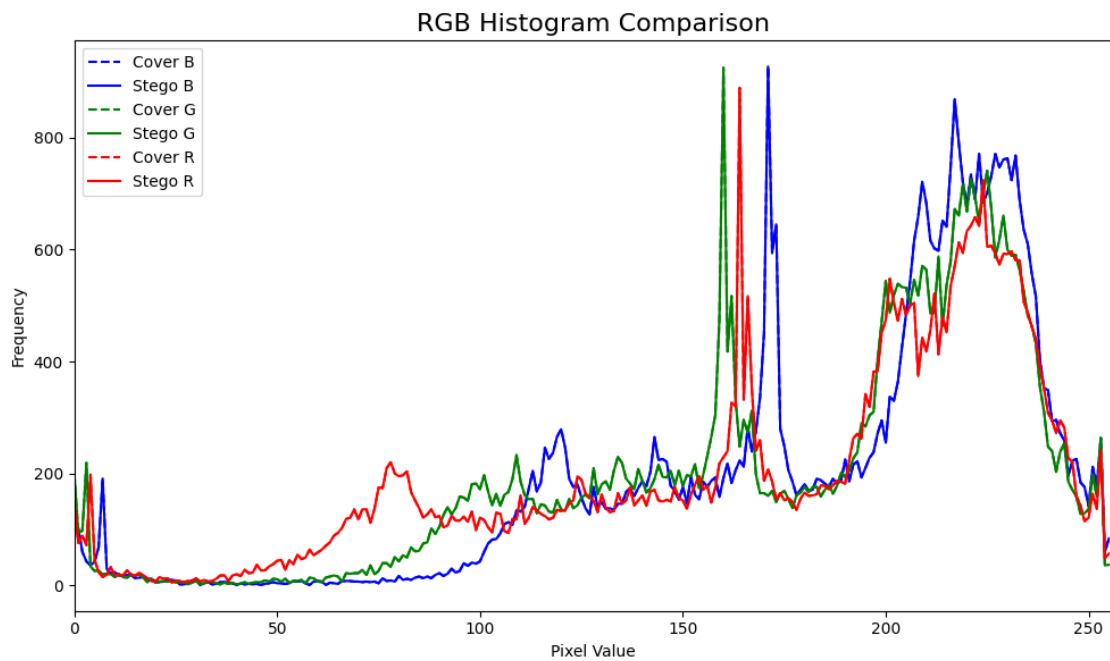Report Generated: Thu Nov 20 23:13:03 2025

LSB Plane Visualization

Explanation: The LSB plane shows artifacts from the frequency domain embedding process, appearing as structured noise patterns distributed throughout the image.

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RGB Histogram Analysis

RGB Histogram Comparison

Explanation: Histogram analysis reveals statistical anomalies consistent with HUGO embedding. Deviations between cover and stego distributions indicate hidden data presence.

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Forensic Quality Metrics

Metric	Value
PSNR	65.95 dB
SSIM	1.0000
MSE	0.00
Changed Pixels	29,740 (59.2%)
File Size Change	+4.03 KB
Estimated Payload	~1,213 Bytes

Metric Explanations:

PSNR (Peak Signal-to-Noise Ratio): Measures image quality. Higher is better (>40dB is visually identical).

SSIM (Structural Similarity Index): Measures structural similarity. Closer to 1.0 is better.

MSE (Mean Squared Error): Measures the average error. 0.0 means no change.

Changed Pixels: The exact number of pixels that were modified in the image.

Estimated Payload: A rough guess of the hidden data size.