

# Forensic Steganography Report

Report Generated: Thu Nov 20 23:11:53 2025

## Case Details

Original (Cover) File: detect\_0b62ec4d43374693886e8091a8f73a96\_stego\_meme\_img.png

Suspected (Stego) File: detect\_0b62ec4d43374693886e8091a8f73a96\_stego\_meme\_img.png

Analysis Date: 2025-11-20 23:11:53

## Detection Verdict

### STEGANOGRAPHY DETECTED (HUGO)

(Confidence: 99.0%)

## Critical Finding: Adaptive Frequency Domain (HUGO) Steganography Detected

The analysis confirms hidden data embedded using the HUGO algorithm.

1. Detection Confidence: 99.0%
2. Algorithm Identified: HUGO
3. Statistical Evidence: 82.61% of pixels modified
4. Modified Pixels: 41,526 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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## LSB Plane Visualization



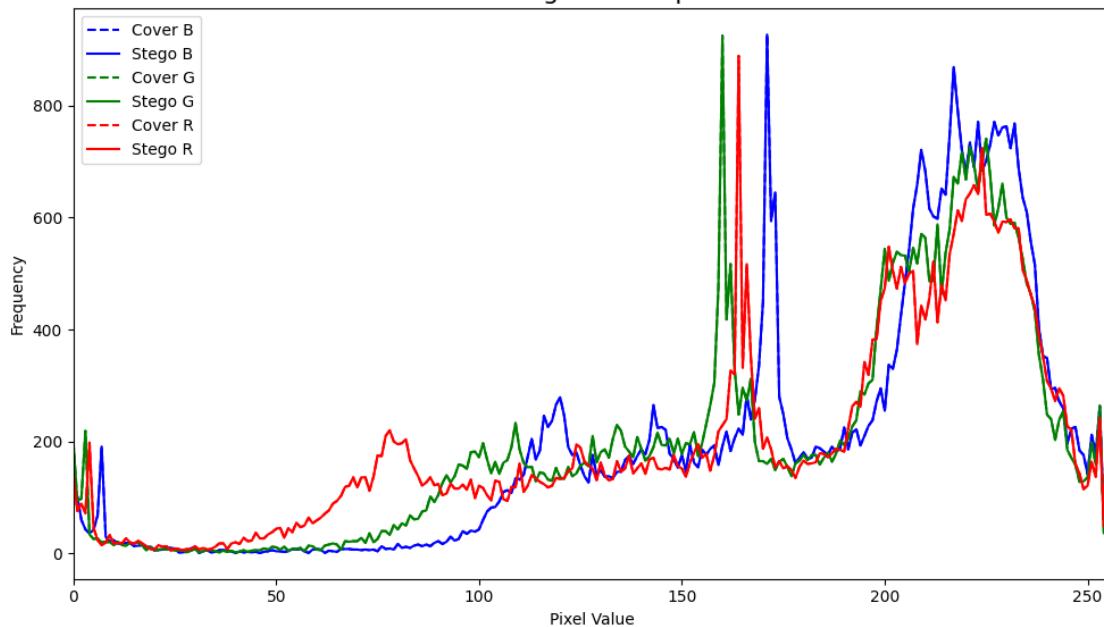
*Explanation: The LSB plane shows artifacts from the frequency domain embedding process, appearing as structured noise patterns distributed throughout the image.*

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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	63.53 dB
SSIM	1.0000
MSE	0.00
Changed Pixels	41,526 (82.6%)
File Size Change	+3.72 KB
Estimated Payload	~1,704 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.*