

## Assignment 1: LSB Steganography

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I pledge my honor that I have abided by the Stevens Honor System. *Justin Ho*

The stegano key is defined in the source files (`encode.py` and `decode.py`) as  $(1600 \cdot 3) \cdot 500 + (1200 \cdot 3) = 2403600$ .

In analyzing the resultant MSB steganograph, there is a noticeable difference in the MSB steganography method versus the LSB steganography method.



Figure 1: LSB method



Figure 2: MSB method

As shown in the figures, there is a notable string of assorted colors that clash against the white feathers of the bird in the MSB method, whereas the LSB method is virtually indistinguishable from the original photo to the human eye.

The reason why there is such a difference between the LSB and MSB method is exactly in the names: the LSB method uses the *least* significant bit in a byte to encode a steganographic message while the MSB uses the *most* significant bit to encode a steganographic message. More specifically, the LSB method, if a bit is flipped, only contributes a change of a binary 1, whereas the MSB method contributes a change of a binary 10000000 (decimal 128). Because the LSB method only contributes a change of a binary 1 to a byte, the change that happens to the affected pixels in the steganograph is nigh imperceptible, as seen in Figure 1. However, since the MSB method contributes a change of a binary 10000000, the change to any byte affected by the MSB method is monumental, thus making the affected pixels in the steganograph extremely noticeable, especially against a solid background, as seen in Figure 2.