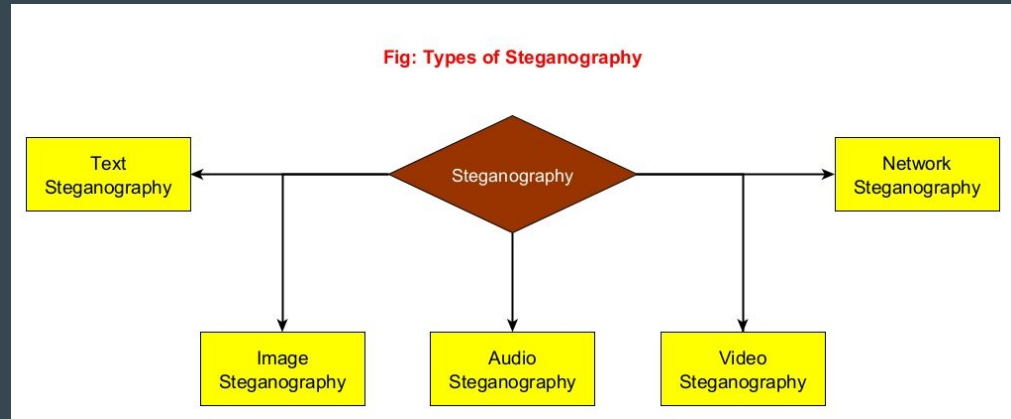# Steganography

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Devin Reichenbach

What is Steganography?

- Steganography is the practice of concealing messages or information within another non secret medium
- Modern day Steganography conceals messages within text, images, video, audio, and networks
- Applications of Steganography?
  - Digital Watermarking
  - Secure Communication
  - Cybersecurity attacks

Fig: Types of Steganography

Text Steganography — Steganography — Network Steganography

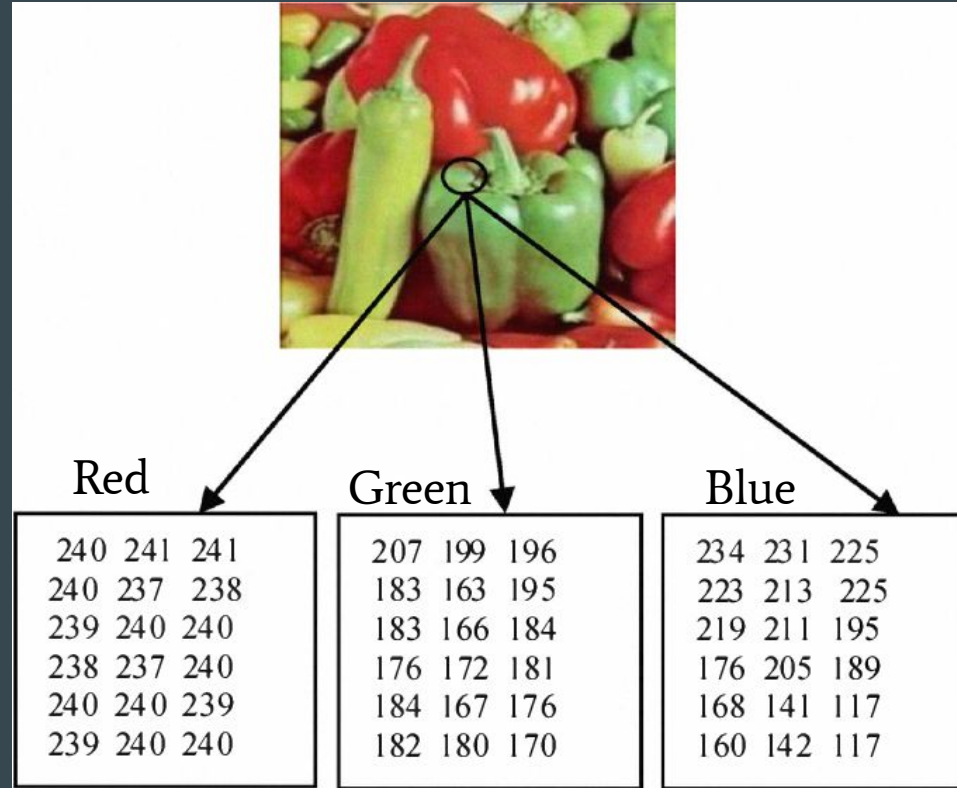Image Steganography — Audio Steganography — Video Steganography

History of Steganography

- Traces of Steganography exist back in Ancient Greece in the writing of Herodotus
  - Describes instances of hiding messages by tattooing secret information on a shaved head, then the regrown hair covers the message
  - Also, writing on the wooden backing of a wax tablet

- However, the first recorded use of the term was in 1499 by Johannes Trithemius
- During both world wars, females spies used knitting to send messages
  - These methods of leaving an intentional hole in the fabric or an irregular stitch was used to give a message

What is an image?

- An image is a matrix of pixels
- Each pixel contains three color channels Red, Green, and Blue
- These three channels each have an 8-bit data value
- These color channels are where we are going to store our secrets

Red

240	241	241
240	237	238
239	240	240
238	237	240
240	240	239
239	240	240

Green

207	199	196
183	163	195
183	166	184
176	172	181
184	167	176
182	180	170

Blue

|		
234	231	225
223	213	225
219	211	195
176	205	189
168	141	117
160	142	117

Least Significant Bit (LSB)

- To hide our secret message we will store our binary message in the last bit of the color channels
- Each pixel allows for 3 bits of data to be stored in the traditional LSB method
- In ASCII a character is 8 bits, therefore it is required to have 2.67 pixels for each character

R = 1010011 ☒
G = 1110000 ☒
B = 1011111 ☒

LSBs

These bits can be used to hide the secret data bits
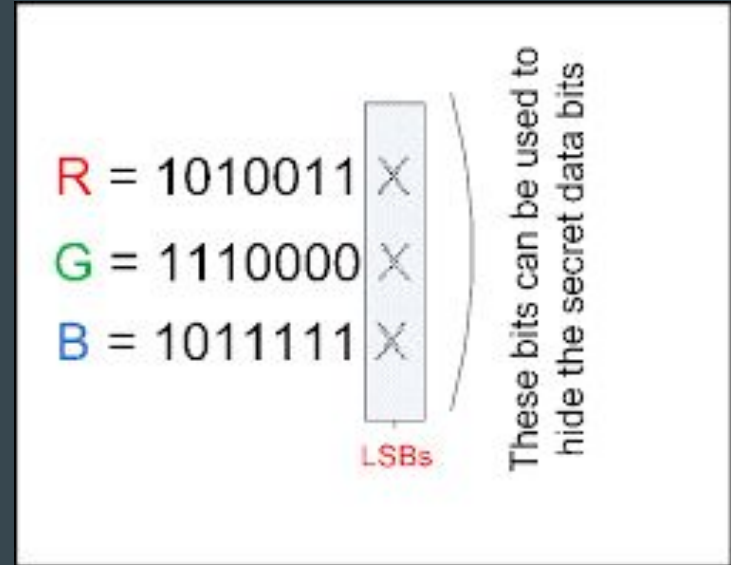
Least Significant Bit (LSB)

- A way of cramming more data into an image is to use the least 2 significant bits rather than just 1
- However, this will alter the original image more, making it more likely a change could be detected
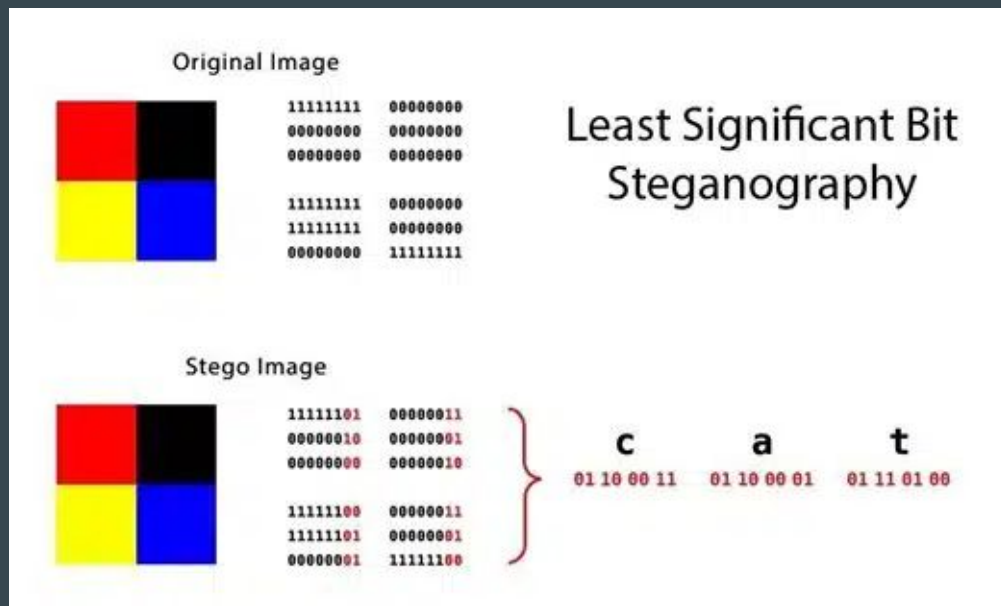
Example 1 - "Chicken is for Dinner"

C:\Users\Devin\PycharmProjects\Steganography
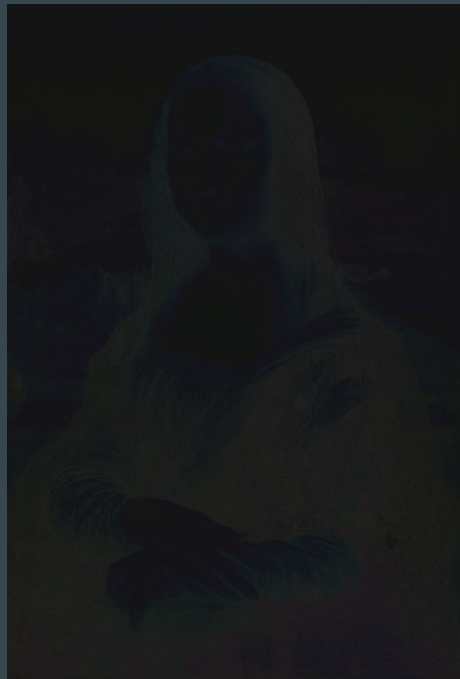Decoded Message: Chicken is for dinner

Process finished with exit code 0

Original Image Size: 3.4 MB   Encoded Image Size: 3.66 MB

My Encoder/Decoder Properties

- My program allows you to specify the message you want to encode through direct injection into the code or through the reading of an external text file
- You can also specify a starting row and starting column where the message should begin encoding in the image matrix
- As seen in the previous two examples a large sign something has been encoded is the increase in size of the image

Questions?