STEGANOGRAPHY

Steganography is the art of hiding information in pictures. The advantage of steganography over cryptography is that a message in a cipher text could be suspicious but a hidden message is less suspicious than that.

UNDERSTANDING PICTURES

A picture is defined by a grid, with each square having a value which defines the intensity of the picture at that point. All the colour variations are due to the 3 primary colours – RGB.

- Each primary colour has a memory of 1 byte
- Images can either be 8-bit or 24-bit
- For 24 bit images, every part of the image is depicted using 3 bytes. Value is either in hexadecimal, or decimal or binary.
- In several web pages, the bg colour is represented using 6-bit hexadecimal code. Which is basically 2 bits per colour.
- 24-bit images are generally not used as the large image size draws attention. Hence, file compressions are used.

FILE COMPRESSIONS

- Lossless Compression – The original message can be fully reconstructed exactly. Usually has the file extensions of BMP and GIF
- Lossy Compression – This type of compression saves space but at the price of the integrity of the image. An example is the JPEG file format. Which gives us a close approximation to the original image but not an exact copy.

EMBEDDING THE DATA

Two files are needed for embedding the data. A cover file and a message. A stegokey may be used along with the cover and the message to generate the stegofile. And the same key must be used later to decode it. Due to the lossy compression nature, JPEG files are not used for steganography, instead grayscale images are used. Best example – GIF. Several people recommend using the 256 shades of grey as each shade has only a slight variation and hence can hold more data.

THERE ARE MAINLY 3 HIDING TECHNIQUES – LSB INERTION, MASKING AND FILTERING, ALGORITHMS AND TRANSFORMATIONS.

LSB INSERTION

This is the simplest type of concealment but is highly susceptible to even minor modifications of the image.
8-bit images are less used for this method because just a modification of the LSB can bring about a change between the primary colours, instead of the shade of those colours. Hence, 24-bit images are used with proper compressions.

DATA MASKING

Instead of loading data into the noise profile of the images, you make the data an integral part of the image (like a watermark) and hence even in case of lossy compressions, the original message is not destroyed.

ALGORITHMS AND TRANSFORMATIONS

A popular algorithm for hiding data is “jpeg-jsteg”. This creates a jpeg-stego image from the message and the cover.

STEGANOGRAPHY IS FOUND NOT JUST IN IMAGES, BUT IN VIDEOS, TEXT AND AUDIO TOO.