

CENG 374E - INTRODUCTION TO COMPUTER SECURITY

Prof. Dr. Şeref SAĞIROĞLU

Gazi University
Engineering Faculty
Computer Engineering Department
Maltepe/Ankara

[SS@gazi.edu.tr](mailto:ss@gazi.edu.tr)
<http://w3.gazi.edu.tr/~ss>

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STEGANOGRAPHY

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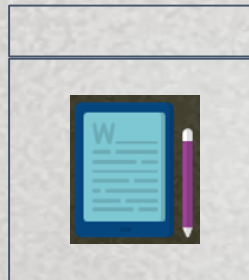


Steganography

“Steganos” = hidden or covered

The word steganography is derived from Greek words.

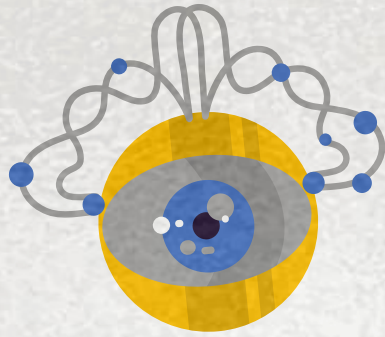
These are the words steganos and graph.



+

“Graph” = write





Steganography

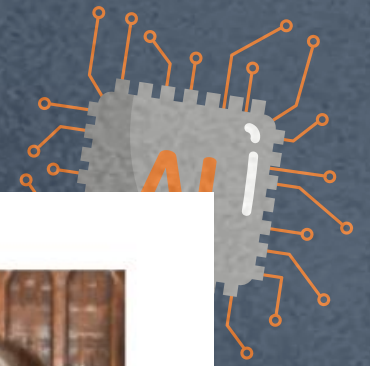
- Steganography is simply hiding a message inside a file. It is a form of covert communication.
- Any environment can be used to hide messages.
- Steganography is not an encryption method.



A Brief History of Steganography

- ❑ Herodotus engraved the rebellion message he would send during the Persian attack on the head of one of his slaves.
- ❑ Wax tablets were widely used in ancient Greece.
- ❑ In the war between the French and the Germans, both sides provided messaging with invisible inks.
- ❑ During the Second World War, the Japanese national agent hid in New York in disguise.
- ❑ In A Beautiful Mind, it is seen that John Nash, a mathematician, searches for hidden messages in newspapers and magazines.

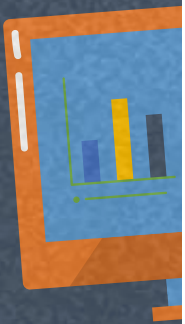
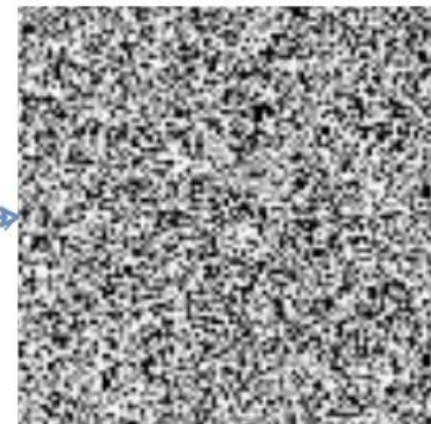
STEGANOGRAPHY VS CRYPTOGRAPHY



Steganography



Cryptography

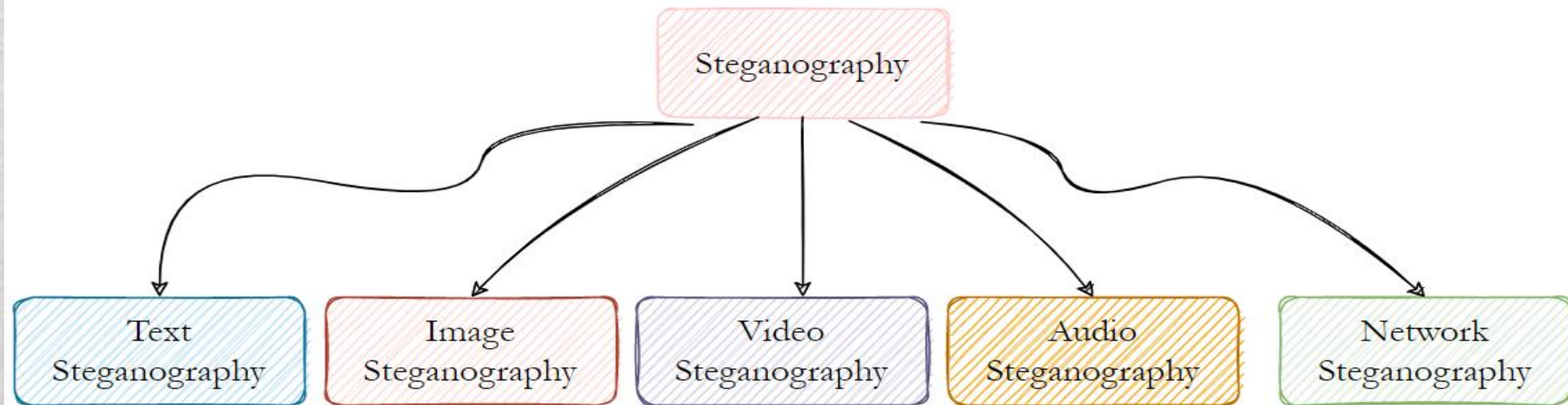




TYPES OF STEGANOGRAPHY

Types of Steganography

Steganography types are divided into five according to the environment in which the messages are hidden: Text Steganography, Image Steganography, Audio



Text Steganography

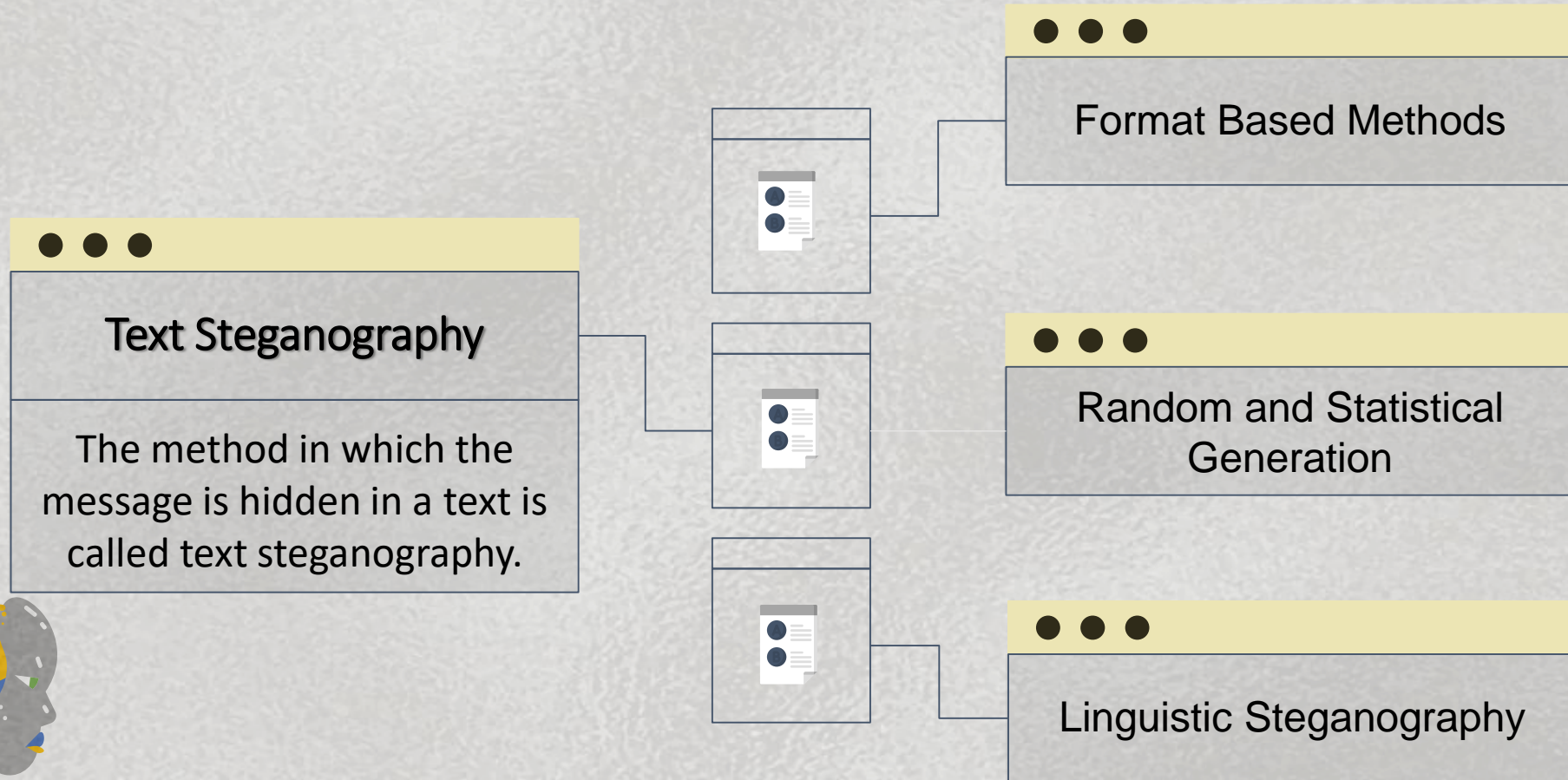


Image Steganography

Image Steganography

Image steganography is the hiding of a message such as text or sound inside the image.

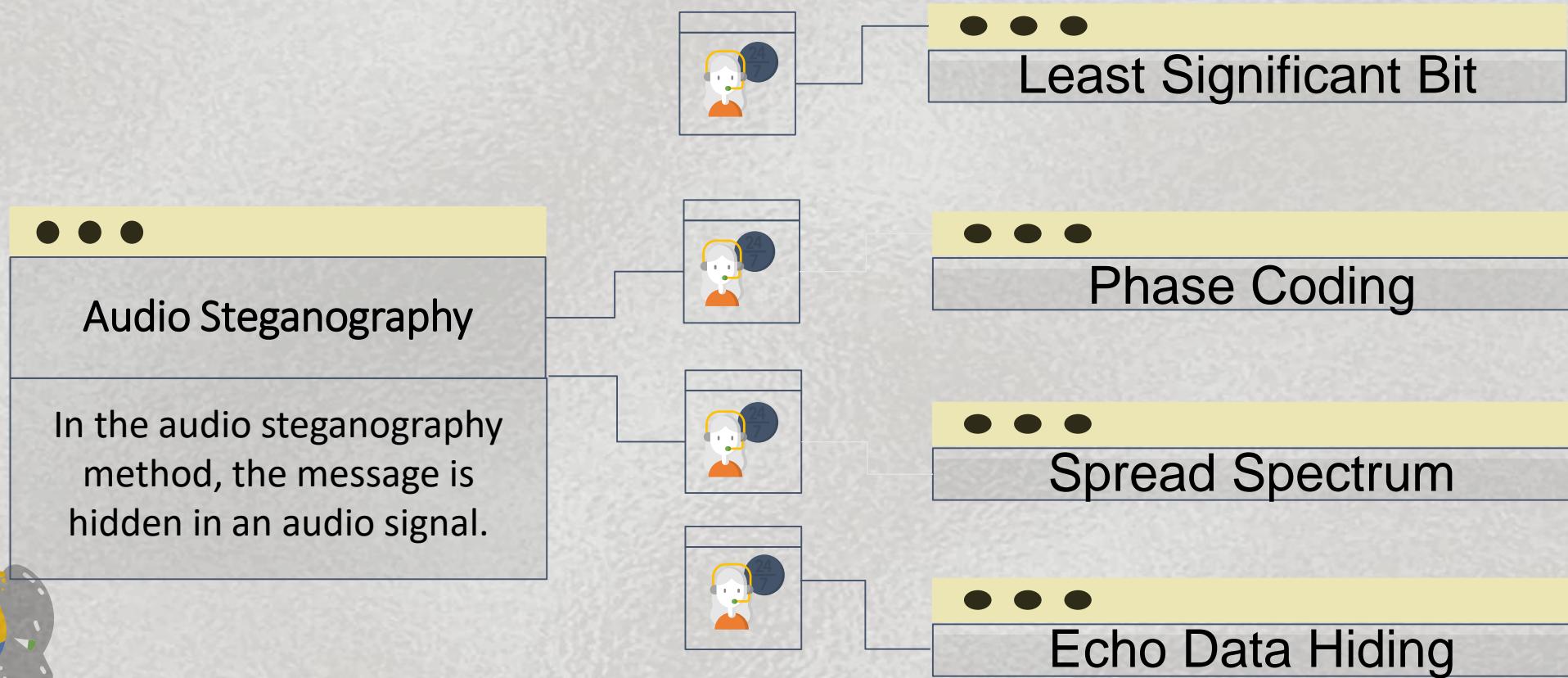
Least Significant Bit

Masking and Filtering

Algorithms and Transformation



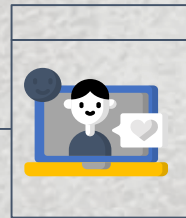
Audio Steganography



Video Steganography

Video Steganography

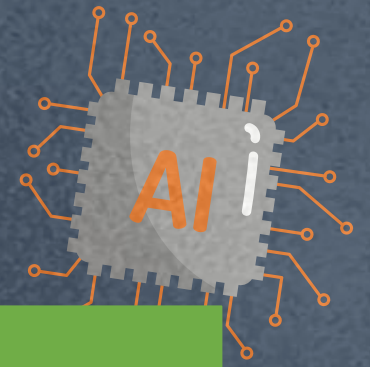
In the video steganography method, the message is hidden in the videos.



Embed the message in the uncompressed raw video.

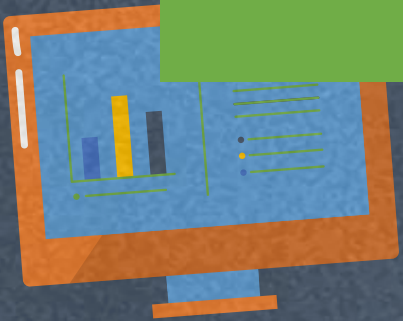
Embed the direct message into the compressed video stream.



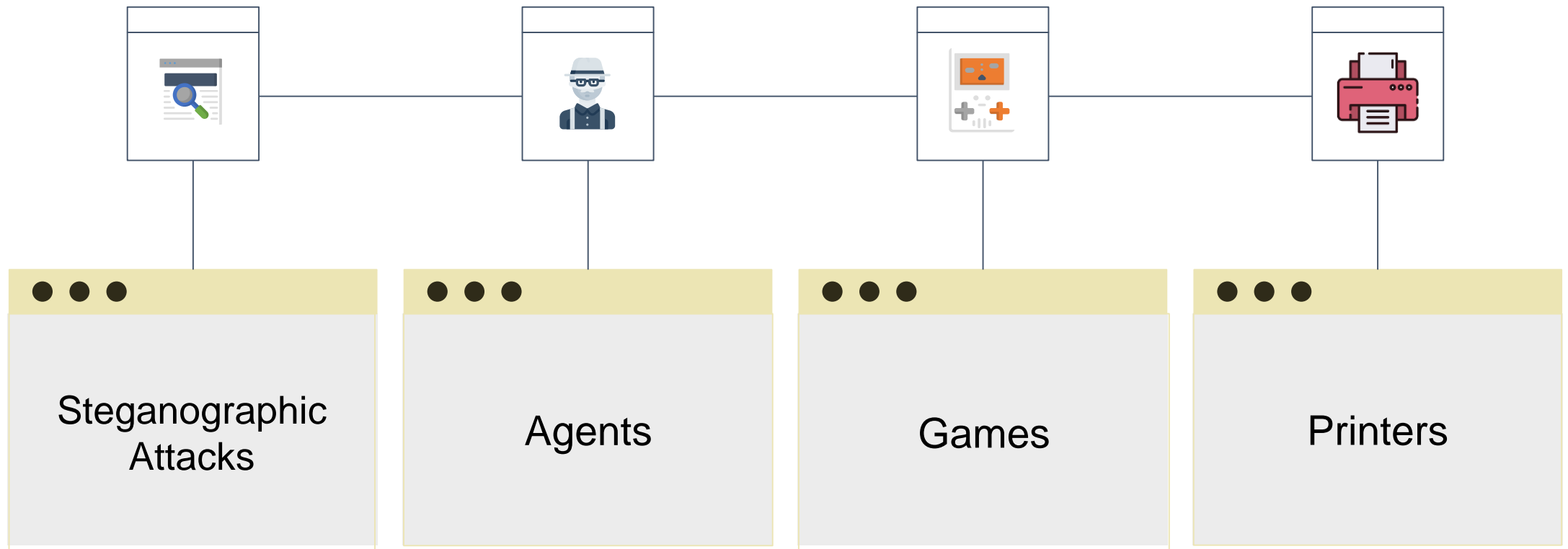


Areas

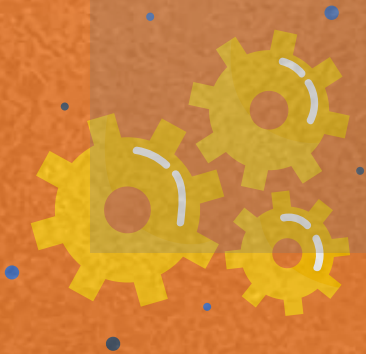
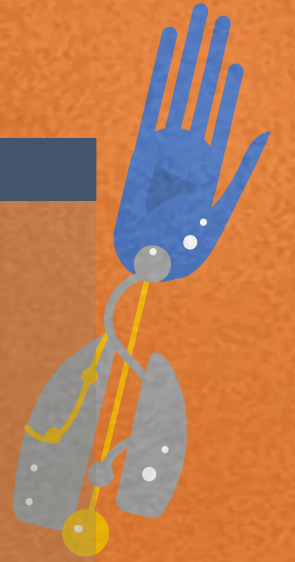
Where Steganography Is Used



Areas Where Steganography Is Used



STEGANALYSIS



Steganalysis

Steganalysis is used to detect the presence of a hidden message in a file.



Steganalysis

Visual Detection

It is called visual detection of some anomalies that occur as a result of data embedding in images.

Histogram Analysis

This method is based on the statistical analysis of the changing pixel value pairs as a result of data embedding in the image.

High-Order Statistical Analysis

In this method, in addition to the histogram analysis, statistical analysis of the positions of the pixels where the change takes place is also performed.

Steganalysis

Algorithm or Type-Specific Detections

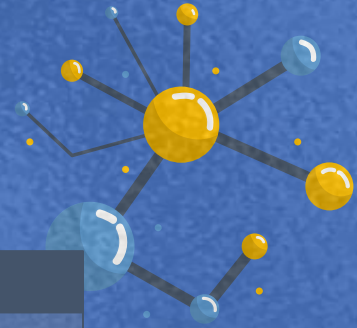
It includes steganalysis methods developed specifically for image types with extensions such as JPEG.

Universal Detection Systems

The features of the image are extracted and compared with the original image.

PROJECT

Methods Used In the Project



Project

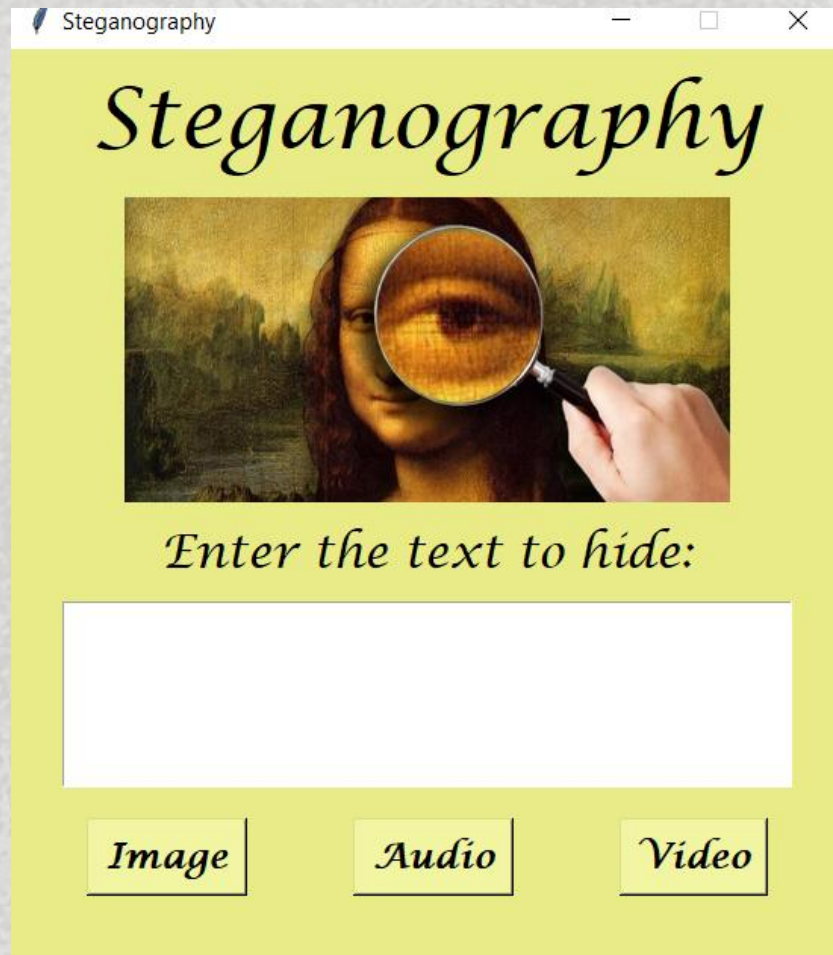
Methods

For STEGANOGRAPHY:

- Least Significant Bit

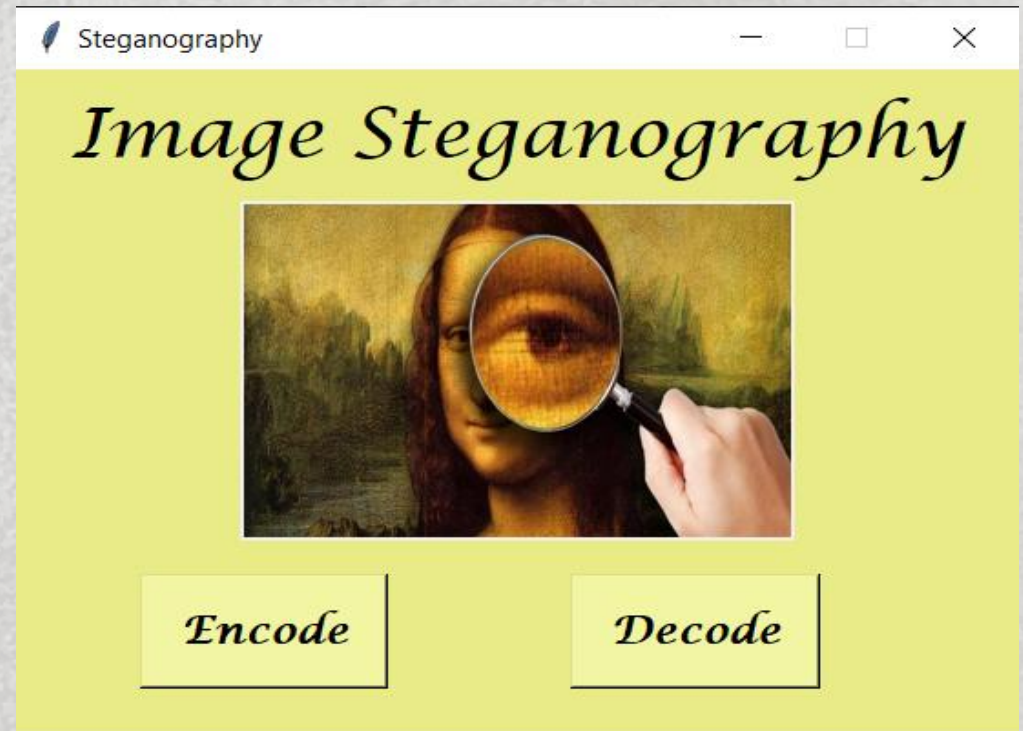
For CRYPTOGRAPHY:

- RSA



Project: Image Steganography

- In the scope of Image Steganography, all images are converted to RGB.
- The message to be hidden is encrypted with the RSA algorithm.
- The message is then sequentially embedded in the least significant bit within the three channels.
- In the decode operation, the reverse of the encode operation is applied.
- Letters are created by combining the values in the least significant bit by going to the 3 channels in the image sequentially.
- The generated letters are decrypted with the RSA algorithm and the message is revealed



Project: Audio Steganography

- The message to be hidden is encrypted with the RSA algorithm.
- The audio file is converted into frames. The frames in the audio file are converted to binary.
- Then, by applying the LSB technique to these binary values, the message is embedded by changing the least significant bit.
- For decoding process, the reverse of the encoding process is applied.
- Only .wav files are supported under Audio Steganography.



Project: Video Steganography

- Within the scope of Video Steganography, the audio is separated from the video and the video is divided into frames. Thus, since there are two different file types as sound and image, steganography techniques of these file types can be used.
- While video steganography is being performed, the message can be embedded in images if desired. Image steganography techniques are used to embed the message in images. Audio steganography techniques can also be used to embed the message in audio files.

