Semester Project Report

# Image Stegonagraphy

**Project Team**

Ahmad Hassan 21F-9095

Ismail Daniyal 21F-9345

Samiullah 21F-9200

Saad Athar 21F-9227

Ahmad Sheikh 21F-9613



Department of Computer Science

National University of Computer and Emerging Science

## 1. Project Overview

The **Image Steganography** project demonstrates the concept of hiding secret messages within digital images. This is achieved by modifying the **least significant bits (LSB)** of pixel values in an image, ensuring that the hidden message is imperceptible to the human eye. The project provides a secure way to share confidential data without arousing suspicion, showcasing an innovative application of **data security and cryptography**.

## 2. Purpose

The primary objectives of the Image Steganography project are to:  
**1. Enhance Data Security:** Provide a method to securely embed secret information in images, protecting it from unauthorized access.  
**2. Raise Awareness:** Highlight the potential use cases and risks of steganography in both legitimate and malicious contexts.  
**3. Educational Tool:** Serve as a learning platform for understanding steganography techniques and their implications in cybersecurity.

## 3. Applications in the Real World

The project has several practical applications:  
**- Secure Communication**: Enables covert communication in scenarios requiring privacy and confidentiality.  
**- Digital Watermarking:** Assists in copyright protection by embedding invisible watermarks in digital images.  
**- Forensic Analysis:** Utilized in forensic investigations to uncover hidden information in digital media.  
**- Data Protection:** Protects sensitive data by concealing it within seemingly innocuous images.

## 4. Requirements

### Hardware Requirements

A system capable of running Python (Windows, macOS, or Linux).

### Software Requirements

**- Programming Language:** Python 3  
**- Libraries:**  
 - Pillow (for image manipulation)  
 - Stepic (for encoding and decoding messages)

### Additional Tools

Python IDE or text editor for coding (e.g., PyCharm, Visual Studio Code).

## 5. Installation and Setup

1. Install Python:  
 - Download Python 3 from the official Python website.  
 - Install Python and ensure the pip package manager is installed.  
   
2. Install Required Libraries:  
 pip install pillow stepic  
  
3. Run the Application:  
 - Save the provided script as image\_steganography.py.  
 - Execute the script using Python:  
 python image\_steganography.py

## 6. Steps to Use the Application

1. Encode a Message:  
 - Open the application.  
 - Select an image file.  
 - Enter the secret message in the provided text box.  
 - Save the encoded image to a desired location.  
  
2. Decode a Message:  
 - Open the application.  
 - Select an encoded image.  
 - View the extracted message.

## 7. Screenshots

## 1. Encoding a message.

## A screenshot of a computer Description automatically generated

## 2. Decoding a message.

## A screenshot of a computer Description automatically generated 3. Viewing the encoded image. A logo of a house and handshake Description automatically generated

## 8. Conclusion

The **Image Steganography** project demonstrates how digital images can serve as a medium for secure communication. By leveraging the least significant bit (LSB) technique, messages can be embedded within images without altering their visual properties. This project provides a foundation for understanding steganography and highlights its potential in cybersecurity and privacy-centric applications.

## Recommendations:

**1.** **Use Strong Encryption:** Combine steganography with encryption to enhance security.  
**2. Raise Awareness:** Educate users about the potential misuse of steganography for malicious purposes.  
**3. Enhance Techniques:** Explore more robust steganographic methods for increased resilience against detection.