■■■■■ Steganography Tool – Project Report

1. Introduction

Steganography is the technique of hiding secret information within other non-secret data, such as embedding a message inside an image file, so that only the intended receiver can extract it. This project implements a simple image steganography tool that allows users to encode and decode secret messages into images using Python.

2. Objective

• To develop a Python tool for embedding secret messages into images.
• To provide a simple interface for encoding and decoding messages.
• To ensure the hidden data is hard to detect by unauthorized users.

3. Tools & Technologies

• Programming Language: Python 3.x • Libraries Used:
- Pillow – for image manipulation
- argparse – for command-line arguments
- os – for file handling
• Development Environment: Visual Studio Code / PyCharm
• Version Control: Git & GitHub

4. Features

• Encode secret text messages into PNG images.
• Decode the hidden message from the encoded images.
• Simple command-line interface with clear arguments.
• Sample data provided for testing.

5. System Design & Workflow

1. Encoding Workflow:
- User provides an input image and a secret message.
- The message is embedded into the least significant bits of the image pixels.- The output is a new image file containing the hidden message.

2. Decoding Workflow:
- User provides the encoded image.
- The tool reads the least significant bits from pixels to reconstruct the hidden message.

Workflow Diagram:
[Input Image + Secret Message] → [Encode using Python script] → [Output Image with Hidden Data]
[Encoded Image] → [Decode using Python script] → [Reveal Secret Message]

6. Sample Usage

• Encoding a message:python steganography-tool/src/stego_app.py --encode --input sample.png --message "Hidden message" --output encoded_sample.png

- Decoding a message:python steganography-tool/src/stego_app.py --decode --input encoded_sample.png

7. Conclusion

This project provides a lightweight solution for secure message hiding using steganography. It demonstrates how data can be concealed within images while remaining invisible to the naked eye. The tool is extendable and can be enhanced further with advanced algorithms or GUI for better usability.

8. Project Repository

GitHub Repository Link: https://github.com/AbidInTech/stego-image-app