Reversible Data Hiding in Image

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Table of contents

Introduction

- Data hiding in image steganography is a method of discreetly embedding information within images, ensuring that there are no discernible alterations to the visual content.
- This technique is invaluable for enhancing covert communication, safeguarding data, and facilitating secure information exchange without raising suspicion or compromising image quality.

Motivation

- Motivation for data hiding in images includes secure communication, data protection, and covert transmission. It enables confidential information exchange while avoiding detection and safeguards against unauthorized access or tampering.

Problem Statement

- The challenge in reversible data hiding within images lies in achieving a high data capacity, minimal perceptual distortion, and resistance to attacks, all while ensuring accurate data retrieval.
- This problem involves developing techniques for seamlessly embedding confidential or auxiliary data into digital images while maintaining reversibility ensuring the original image can be perfectly restored post-data extraction.
- The goal is to balance data capacity and image fidelity, meeting the demands of secure, efficient data transmission, storage, and communication.

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Literature Survey

1. **Reversible Data Hiding in Encrypted Images based on Pixel Prediction and Bit-plane Compression.** (2015)
   Zhaoxia Yin, Member, IEEE, Yinyin Peng, Youzhi Xiang

- **Advantages:** RDHEI based on pixel prediction and bit-plane compression enhances embedding capacity while maintaining lossless extraction and image reconstruction, surpassing current methods.
- **Disadvantages:** RDHEI techniques, including pixel prediction and bit-plane compression, may introduce increased computational complexity and potentially slower processing times.

Literature Survey

2. **DeepMIH: Deep Invertible Network for Multiple Image Hiding** (2023)
   Zhenyu Guan, Junpeng Jing, Xin Deng, Mai Xu, Lai Jiang, Zhou Zhang, Yipeng Li

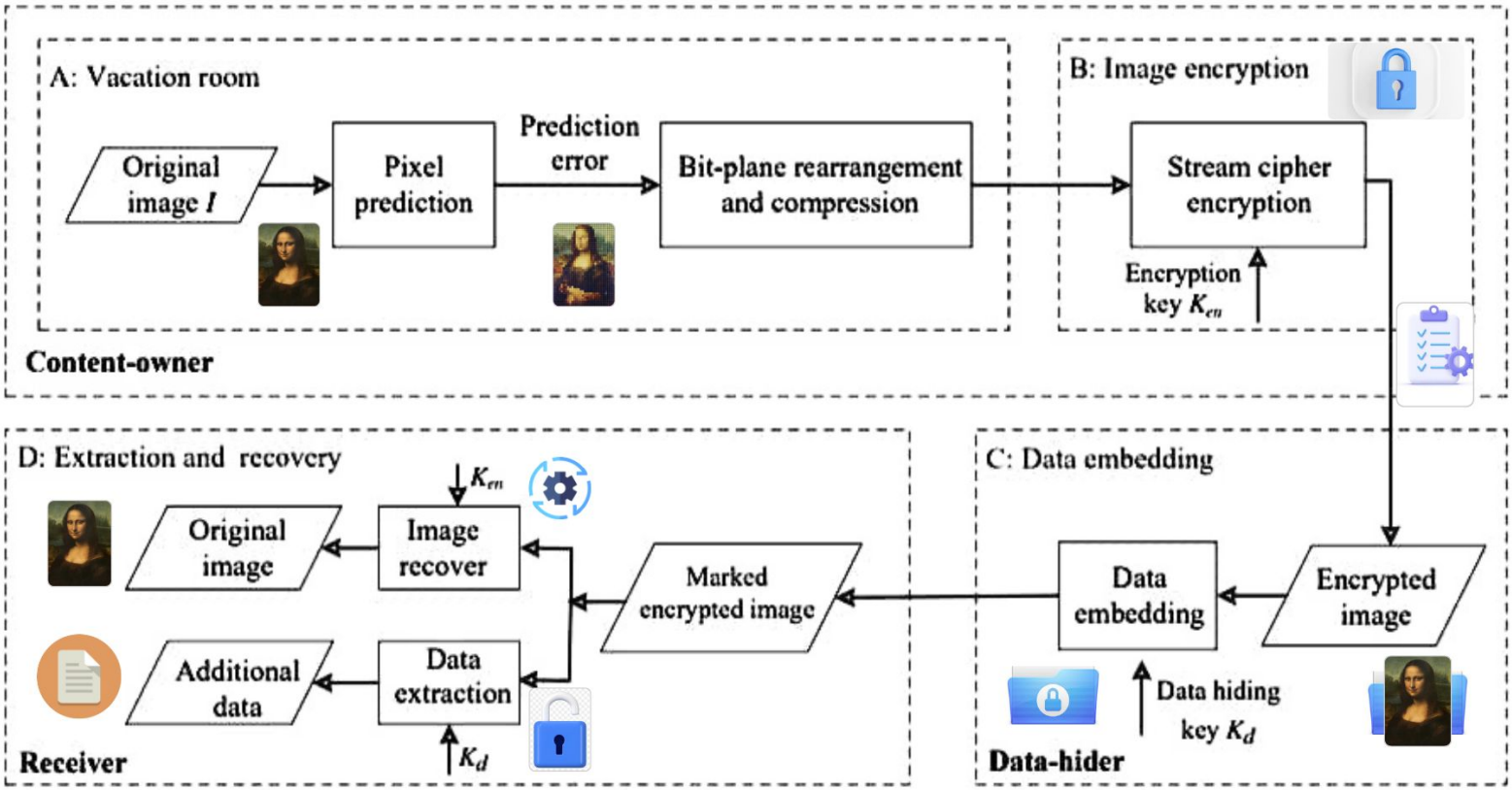
- **Advantages:** DeepMIH utilizes invertible neural networks for high-capacity multiple image hiding, maintaining image quality and outperforming competitors in security and recovery.
- **Disadvantages:** Challenges include potential color distortion, complex network training, and sensitivity to image size. Deployment may demand significant computational resources

Literature Survey

3. **Social Media and Steganography: Use, Risks and Current Status** (2021)
   R.Gurunath , Mohammad Fadel Jamil Klaib , Debabrata Samanta , (Member, IEEE), Mohammad Zubair Khan

- **Advantages:** social media steganography include covert communication, privacy protection, and potential future advancements in this field.
- **Disadvantages:** misuse for illicit purposes, risk of detection, and potential threats to online security.

System Architecture

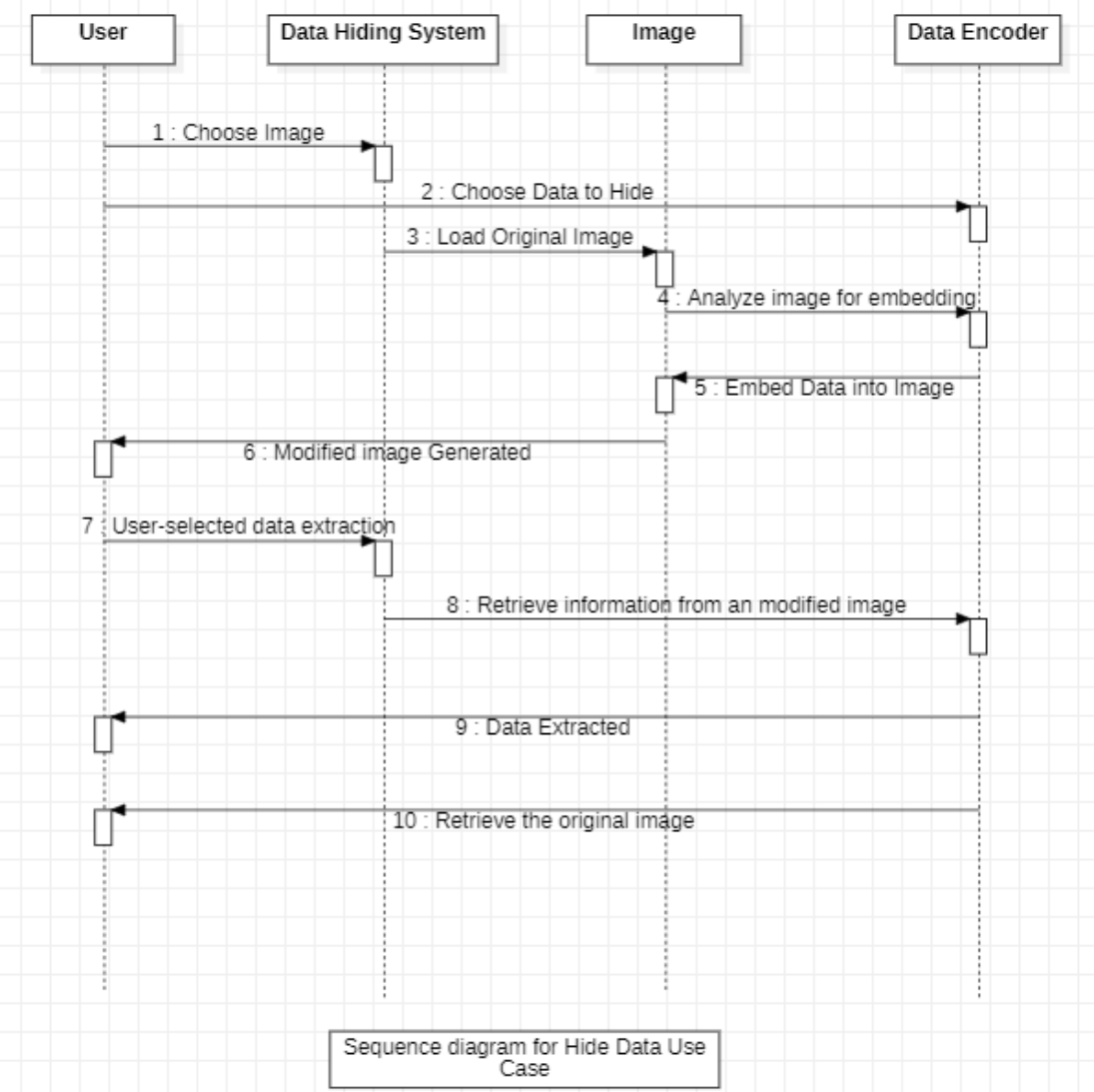


System Architecture

UML diagrams
1.Use case diagram

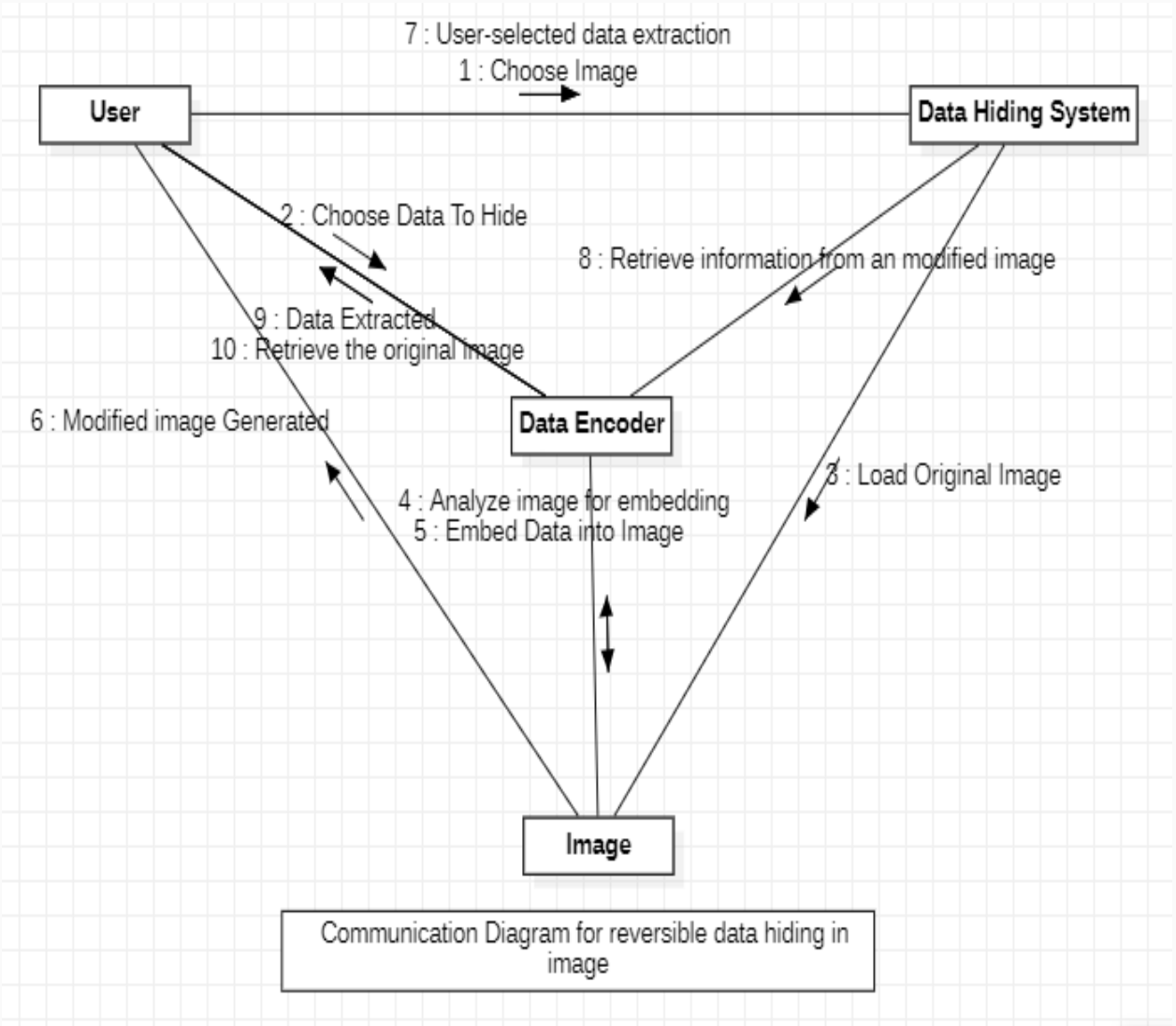
Use case diagram for reversible data hiding in image

UML diagrams
2.Sequence diagram



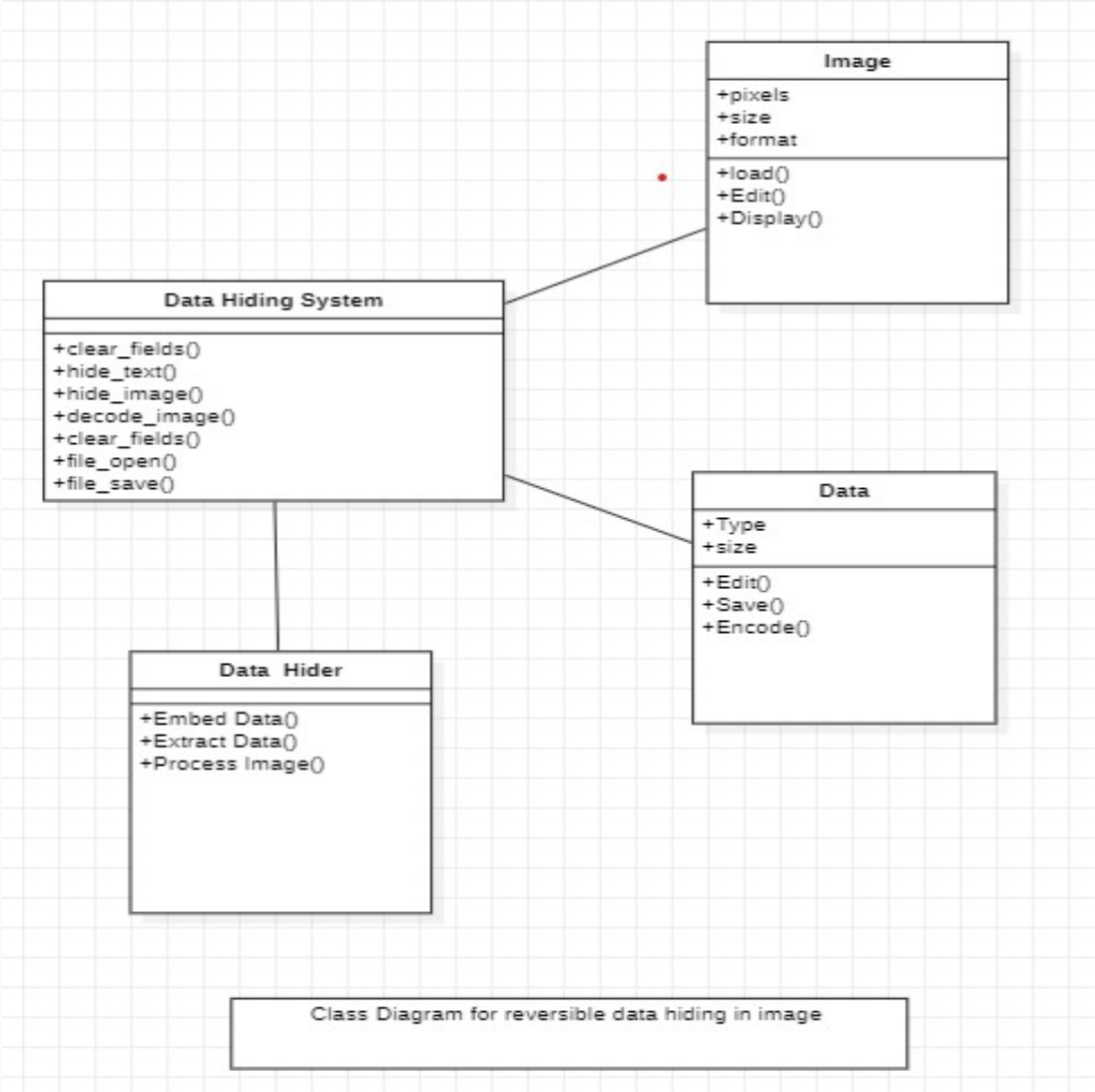
Sequence diagram for Hide Data Use Case

UML diagrams
3. Collaboration diagram



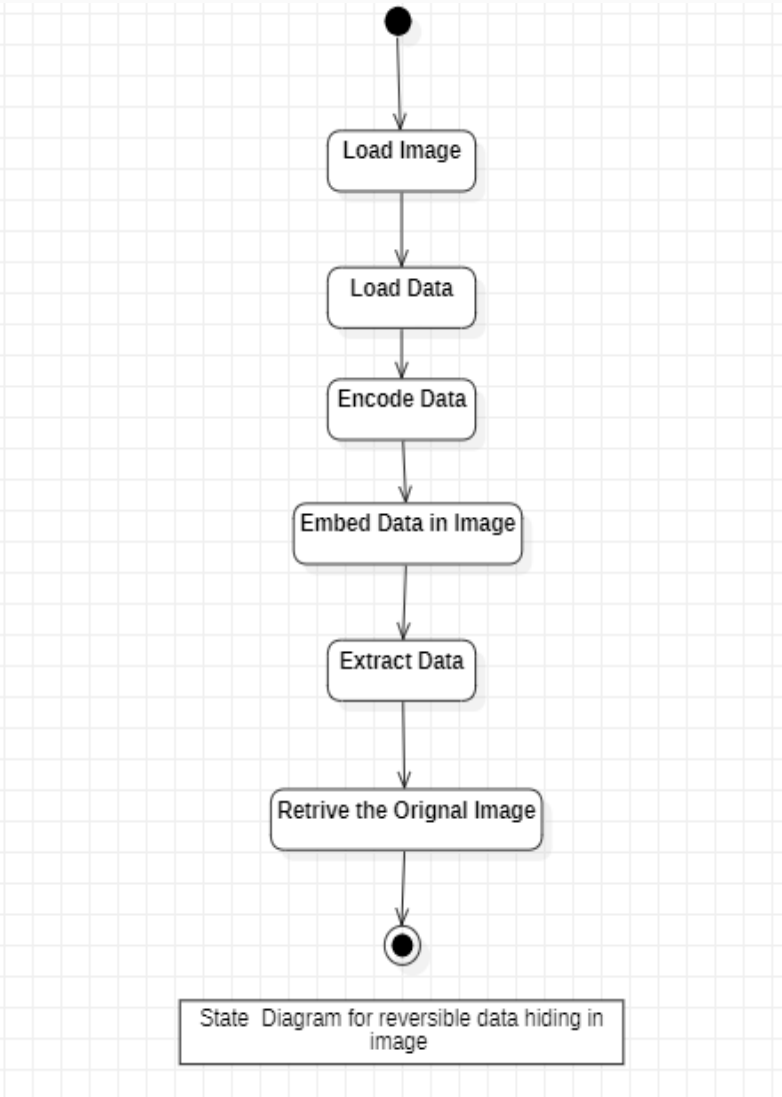
Communication Diagram for reversible data hiding in image

UML diagrams
4. Class diagram



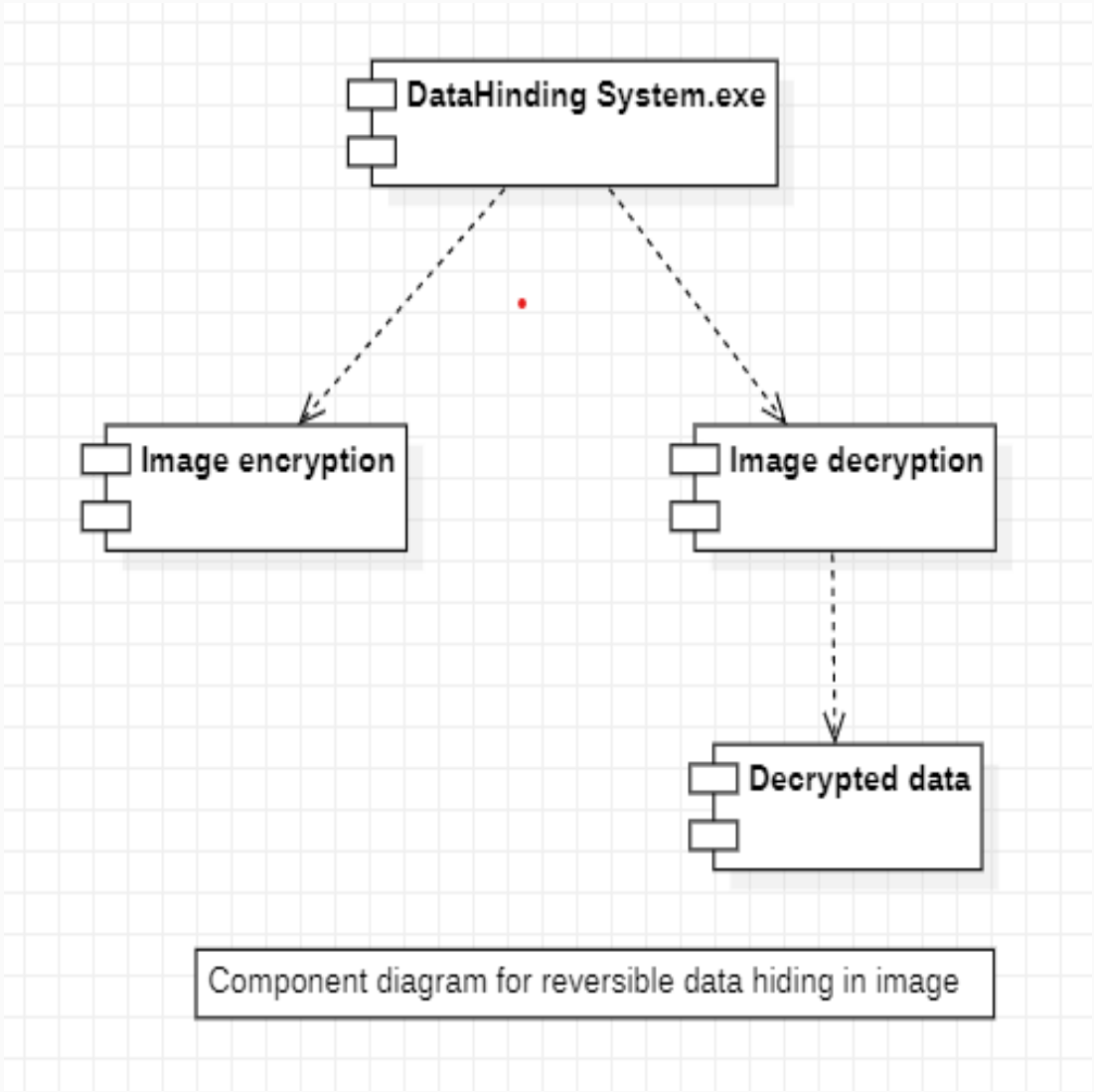
Class Diagram for reversible data hiding in image

UML diagrams
5.State diagram



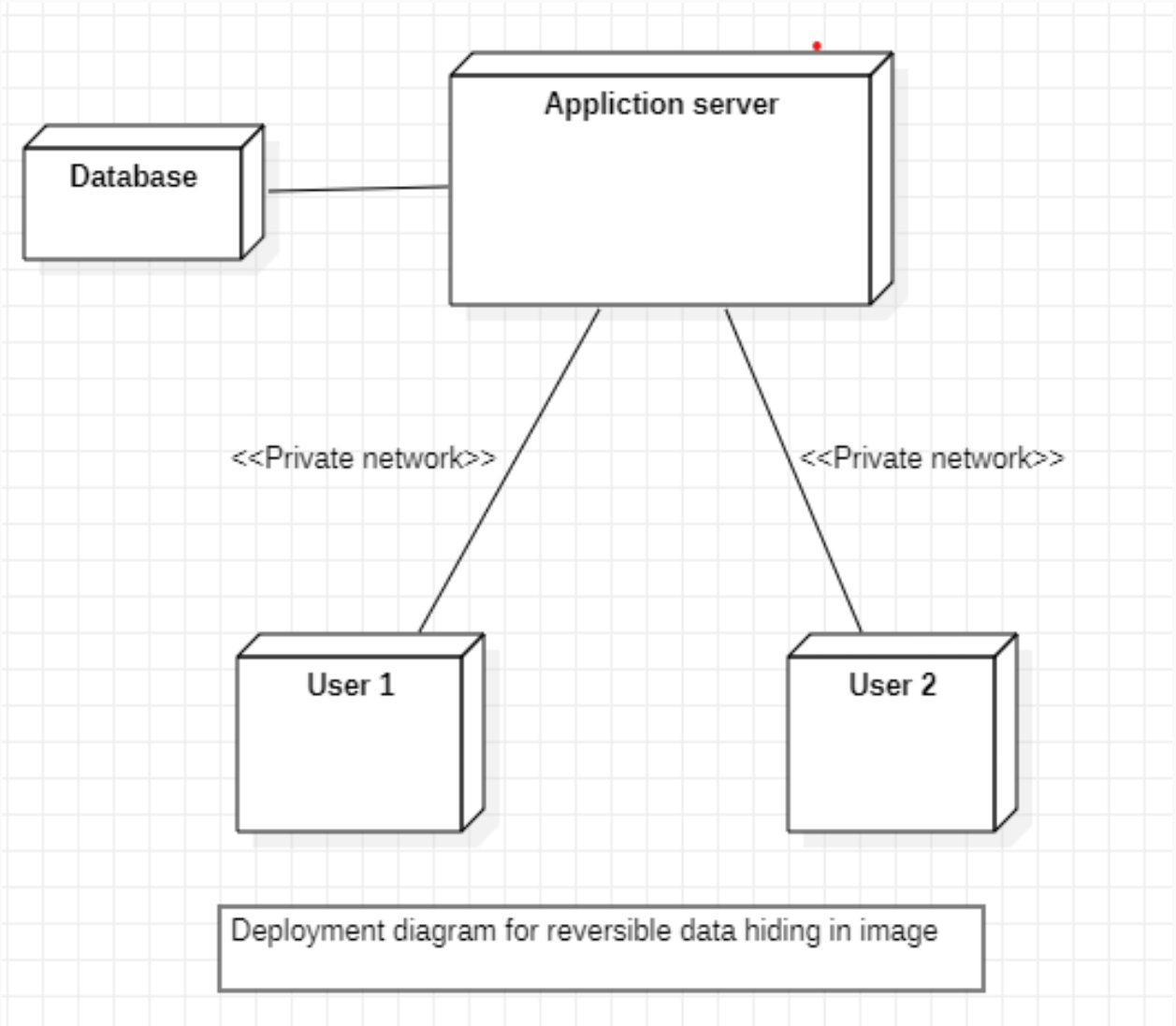
State Diagram for reversible data hiding in image

UML diagrams
6. Component diagram



Component diagram for reversible data hiding in image

UML diagrams
7. Deployment diagram



Functional Requirements

- Data Embedding
- Data Extraction
- Data Integrity
- Image Quality Preservation

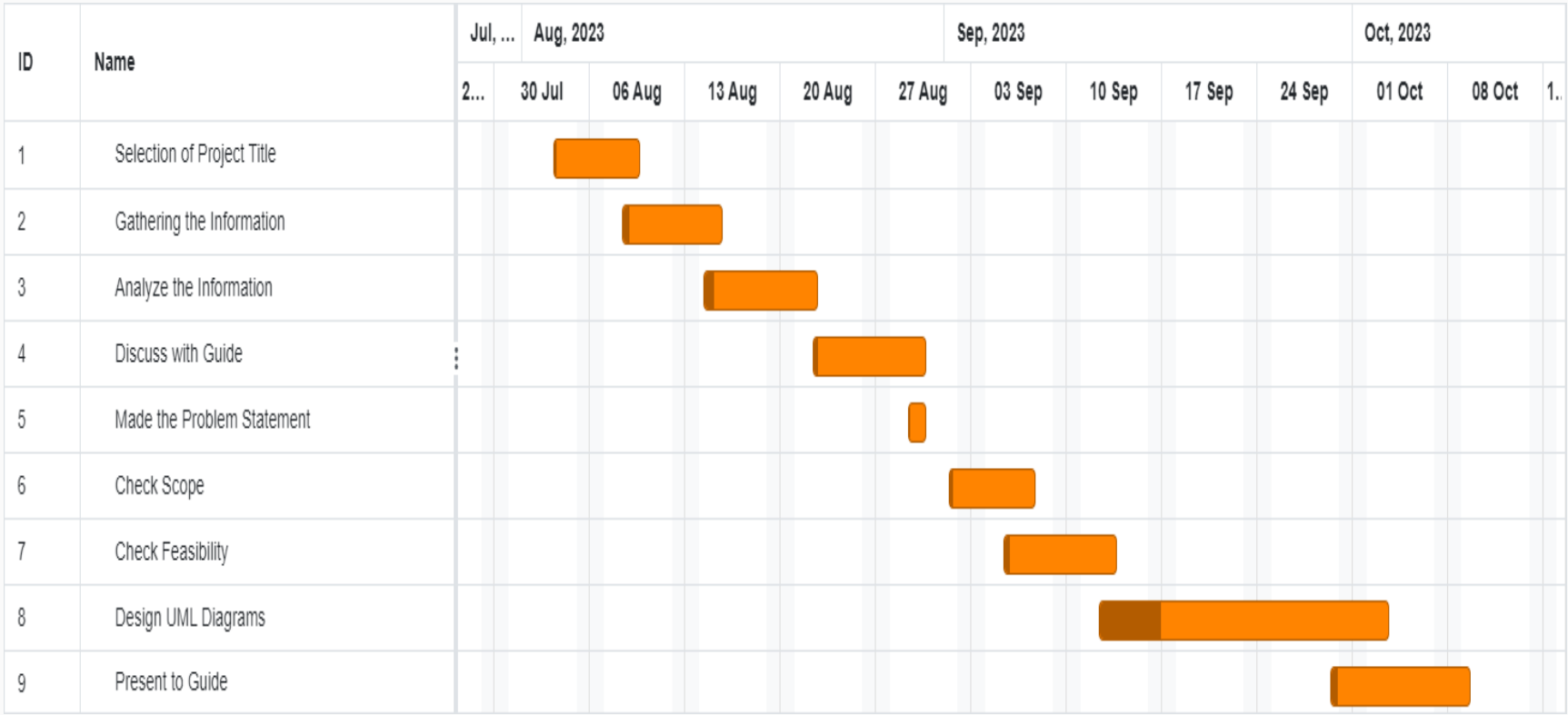
Non-functional Requirements

- Security
- Capacity
- speed
- compatibility
- legal and ethical considerations

Hardware and Software Requirements

1. **Hardware Requirement**
   - i3 microprocessor based computer or higher
   - memory
   - Input/Output Interfaces
2. **Software Requirement**
   - Python libraries: Tkinter, Pillow, and stegano
   - module: base64
   - File Compression Software
   - Version Control Software(Git)
   - Image Editing Software

Project scheduling



Conclusion

- In conclusion, reversible data hiding in image steganography is a valuable technique that allows for the concealment of data within images while maintaining the ability to fully recover the original image and hidden data.
- This approach finds applications in secure communication, watermarking, and information embedding, contributing to data security and privacy.

Bibliography

1. Zhaoxia Yin, "Reversible Data Hiding in Encrypted Images based on Pixel Prediction and Bit-plane Compression", IEEE August 2015
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3. R. Gurunath, "Social Media and Steganography: Use, Risks and Current Status", IEEE November 2021
4. Nandini Subramanyam, "Image Steganography: A Review of the Recent Advances", IEEE February 2021

Thank You!


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