Steganography with QR Code – Final Project Report

Abstract

This project presents a simple and efficient implementation of steganography by hiding a QR code inside an image using LSB (Least Significant Bit) technique. The QR code encodes a user-provided secret message, which is optionally encrypted using XOR encryption for enhanced security. The aim of this tool is to provide a lightweight method for secure data concealment in digital media.

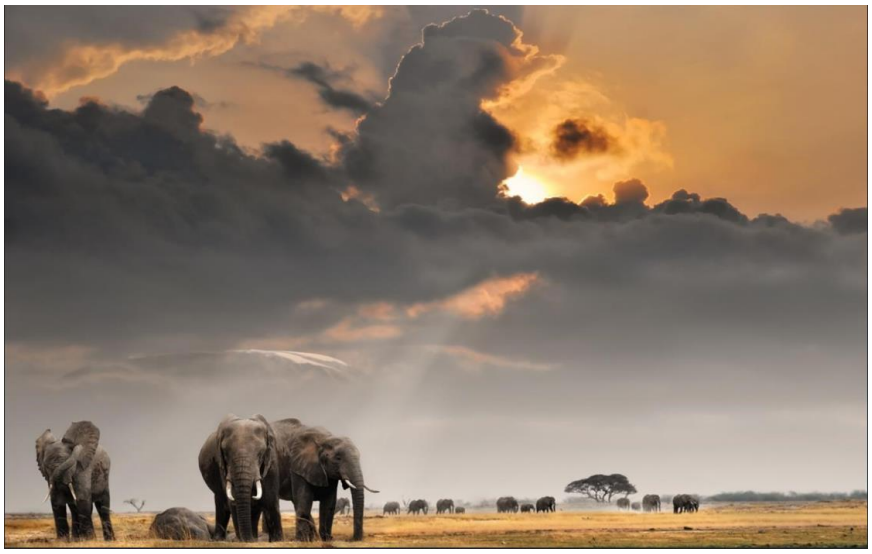
Tools Used

- Python 3.10
- Tkinter (for GUI)
- PIL (Pillow) for image processing
- OpenCV (for QR decoding)
- qrcode (for QR code generation)

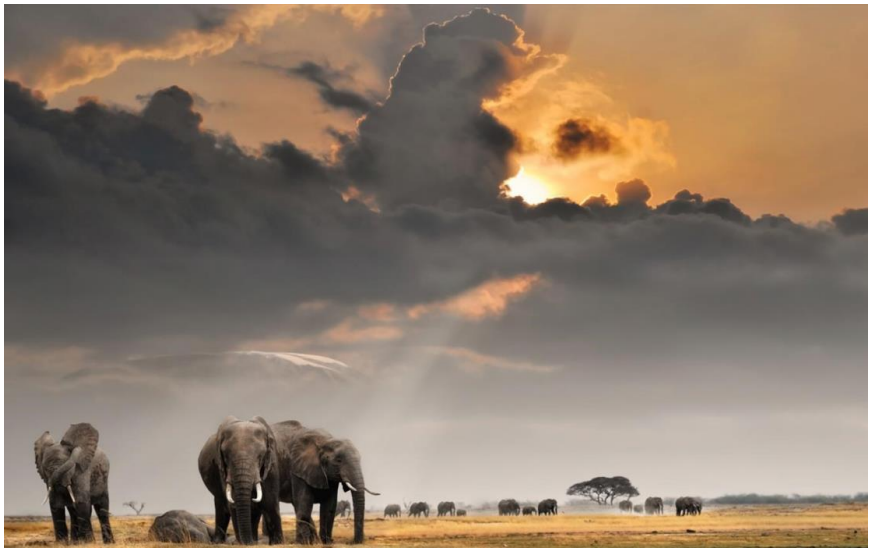
Steps Involved in Building the Project

1. **QR Generation**: Converts input text to a QR image.
2. **QR + Image Steganography**: The generated QR is hidden inside a cover image using LSB manipulation.
3. **Encryption (Optional)**: Messages can be XOR encrypted before QR generation.
4. **Extraction**: The QR image is extracted and decoded to retrieve the original message.
5. **GUI Interface**: Users interact via a simple graphical interface built with Tkinter.

Original Image (Before Hiding)



Stego Image (After Hiding QR + Message)



QR Code Image (Hidden inside Image)

Conclusion

This project demonstrates how steganography and QR encoding can be combined to ensure secure message transmission in digital images. The GUI interface makes it user-friendly and suitable for educational and light security use cases.