CAPSTONE PROJECT

Steganography using Python

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Problem Statement

Hiding confidential messages inside an image to ensure secure communication.

- In today's digital world, data security is a major concern.
- Traditional encryption methods can be detected and intercepted.
- Steganography provides an alternative by concealing messages inside digital media.
- This project embeds a secret message within an image without noticeable changes.
- This project focuses on hiding text messages inside an image file and retrieving them using a password-protected decryption process.

Technology used

Programming Language & Libraries :

- Python 3.11 – Main programming language
- OpenCV (cv2) – Image processing library
- NumPy – Data handling and pixel manipulation
- OS Module – File handling

File Formats Supported :

- .bmp, .jpg, .png for images
- .txt for message input (future enhancement)

Wow factors

Why is this project innovative?

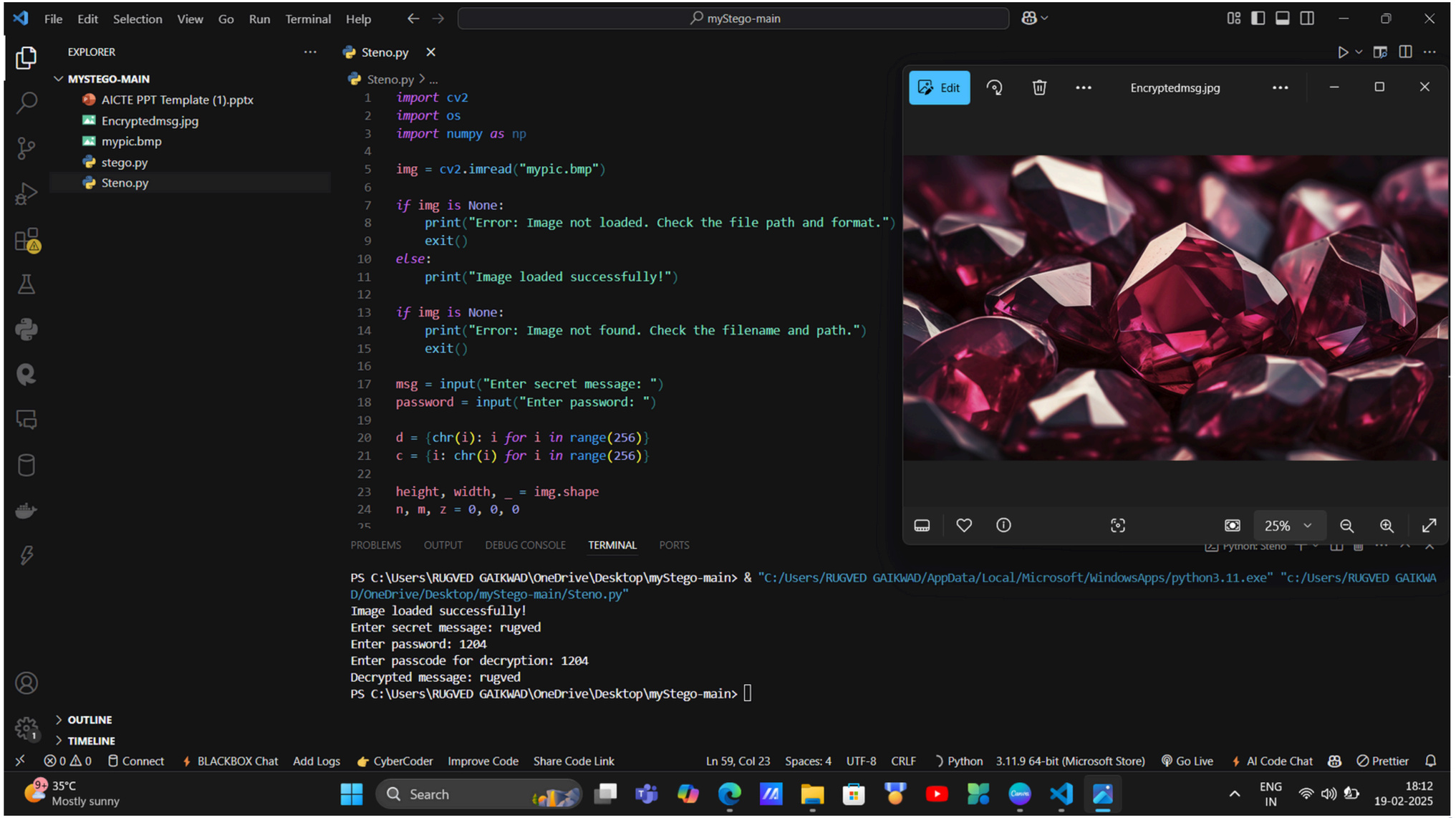
- Undetectable to the human eye – The image looks the same!
- Password protection – Only authorized users can decrypt the message.
- Minimal file size increase – Efficient data embedding technique.
- Customizable for different image formats (JPG, BMP, PNG).
- Future integration with AI-based steganalysis to detect hidden messages.

End users

Who can use this technology?

- Cybersecurity experts – Secure transmission of sensitive data.
- Military & Government – Covert intelligence and secret communication.
- Journalists & Activists – Prevent censorship by hiding sensitive reports.
- Corporate Companies – Protect confidential business data.
- Developers & Researchers – Learn about steganography techniques.

Results



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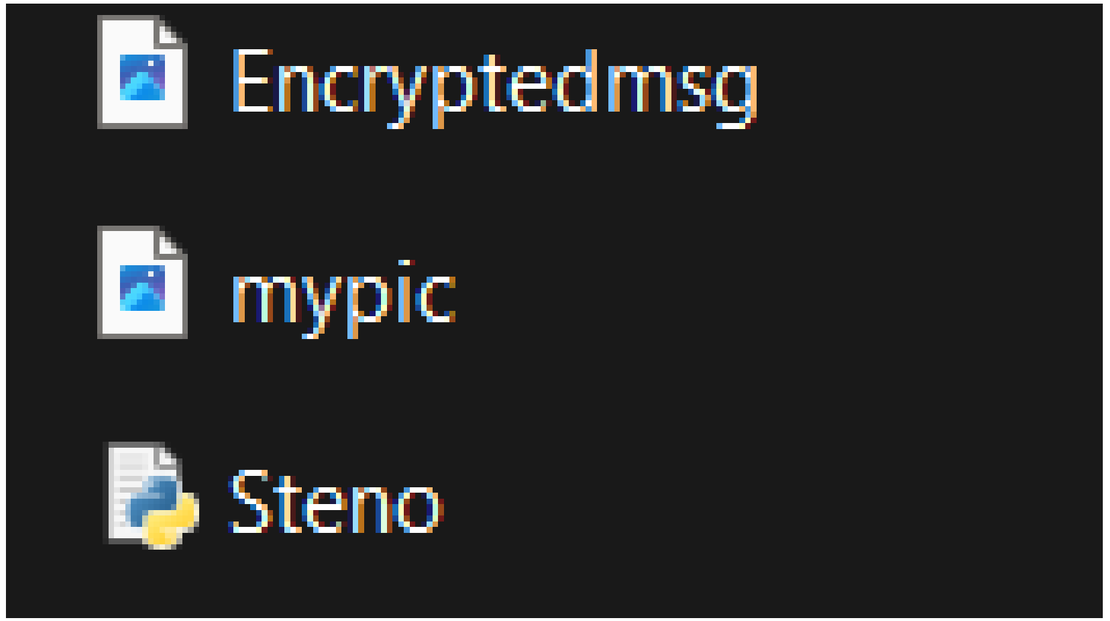
```
Image loaded successfully!
Enter secret message: rugved
Enter password: 1204
Enter passcode for decryption: 1204
Decrypted message: rugved
```



Conclusion

Key Takeaways

- Steganography is a powerful method for covert communication.
- This project successfully embeds text inside images without altering heir appearance.
- Password-protected decryption ensures only authorized access.
- Can be further enhanced with encryption techniques.
- Practical applications in cybersecurity, journalism, military, and more.

GitHub Link

Github Link : https://github.com/Rugved1204

Project Link : https://github.com/Rugved1204/Image-Steganography.git

Future scope(optional)

Possible Enhancements

- Support for larger text messages with better compression.
- Implement AES encryption for additional security.
- Develop a GUI-based tool for non-technical users.
- Extend the project to audio & video steganography.
- Advanced Encryption – Use AES-256 for enhanced security.
- Steganography in audio & video – Extend to hiding data in music & videos.

THANK YOU !

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