CAPSTONE PROJECT

SECURE DATA HIDING IN IMAGES USING STEGANOGRAPHY

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OUTLINE

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PROBLEM STATEMENT

- The need for secure communication has grown, especially for confidential data.
- This project aims to address the challenge of hiding sensitive information (e.g., messages) inside images, making it difficult to detect the hidden data.

TECHNOLOGY USED

- Libraries:
  - Python 3.x
  - OpenCV (cv2) for image processing
  - hashlib for password hashing

- Approach:
  - The message is hidden by modifying the pixel values of an image, using the least significant bit (LSB) technique.
  - A passcode is used to secure the message, stored in hashed format (MD5).

WOW FACTORS

- **Unique Features:**
  - Encryption with password protection.
  - Secure passcode-based decryption mechanism.
  - MD5 hashing for authentication.
  - Seamless integration with image files.
  - Secure and lightweight method for covert communication.
  - Real-time hiding and retrieval of secret messages without altering the appearance of the image.

END USERS

- **Individuals** who require secure communication for personal or professional purposes.

- **Organizations** needing a secure way to transmit sensitive information without drawing attention.

RESULTS

- Screenshots of the outcome

Encryption Phase

Plain raw Image

```
PS C:\Users\SACHI\Downloads\IBM CS Intern\Stenography-main\Stenography-main>
python .\stego_encrypt.py
Enter secret message:hello Mr. ROBOT
Enter a passcode:pass123!
```

Steganography encryption

Steganography Image (no significant quality loss)

Decryption Phase

Steganography Image

```
PS C:\Users\SACHI\Downloads\IBM CS Intern\Stenography-main\Stenography-main> &
 C:/Users/SACHI/AppData/Local/Microsoft/WindowsApps/python3.13.exe "c:/Users/S
ACHI/Downloads/IBM CS Intern/Stenography-main/Stenography-main/stego_decrypt.p
y"
Enter passcode for Decryption:pass123!
Secret Message: hello Mr. ROBOT
```

Decrypt the image and retrieve the secret message

CONCLUSION

- The project successfully demonstrates how steganography can be used for secure data transmission, using image manipulation and encryption techniques. The solution is both effective and easy to implement.

GITHUB LINK

- https://github.com/SachinMore/cs-steganography

FUTURE SCOPE(OPTIONAL)

- Potential Improvements:
  - Integration with advanced encryption algorithms to further secure the data.
  - Extending the tool to support video or audio files for more robust steganographic techniques.
  - Using machine learning techniques to automatically detect and hide messages more efficiently.

THANK YOU

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