CAPSTONE PROJECT

PYTHON PROGRAM IMPLEMENTING IMAGE STEGANOGRAPHY

Presented By:
Student Name : Tushar Dayatar
College Name & Department : Lok Jagruti University

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PROBLEM STATEMENT

- With increasing concerns over data security, users need a reliable method to hide sensitive messages within images. Traditional encryption methods can attract unwanted attention, whereas steganography offers a discreet way to embed secret data within digital media. This project implements **image-based steganography** to securely hide and retrieve messages from images.

TECHNOLOGY USED

- **Programming Language:** Python
- **Libraries:**
  - **PIL (Pillow)** - For image processing
  - **OpenCV** - For encoding/decoding messages
  - **NumPy** - For numerical operations
  - **argparse** - For command-line interaction

WOW FACTORS

- **LSB (Least Significant Bit) Encoding** ensures that image quality remains almost unchanged while storing the secret message.
- Supports **any text data** (messages, codes, passwords) to be hidden inside images.
- **Password-based authentication** for decryption to prevent unauthorized access.
- Works on multiple image formats (PNG, JPEG, BMP).

END USERS

- **Security professionals**: Hide confidential information in images.
- **Journalists & Activists**: Securely communicate in regions with surveillance.
- **Forensics & Law Enforcement**: Conceal data within images for investigative purposes.
- **General Users**: Personal use for discreet message hiding.

RESULTS

```
PS C:\Users\Tushar\desktop> python stentography.py
:: Welcome to Steganography ::
1. Encode
2. Decode
```

- The project successfully hides a secret message inside an image file and extracts it back when required. The output image looks identical to the original but contains the hidden data securely embedded.

CONCLUSION

- This project provides an effective way to hide sensitive data inside images using steganography. It enhances security and confidentiality without drawing attention to the hidden message. Future enhancements can include support for **audio/video steganography** and **AI-driven encryption techniques**.

GITHUB LINK

- https://github.com/TusharSinh96/stentography-project.git

FUTURE SCOPE(OPTIONAL)

- **Improved security**: Implementing stronger encryption techniques alongside steganography.
- **Larger message capacity**: Optimizing encoding techniques to store more data.
- **Cross-platform GUI**: Creating a user-friendly graphical interface for easy usage.
- **Multi-format support**: Extending support for GIF, TIFF, and RAW images.
- **Audio & Video Steganography**: Expanding the technique beyond images.

THANK YOU

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