COGNIZANCE TASK 1-CYBER SECURITY

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ALGORITHM USED:

LSB –Least Significant Bit Steganography

### **How LSB Works in Image Steganography:**

1. **Understanding Image Representation**:
   1. Images are typically stored in formats like BMP, JPEG, PNG, etc., where each pixel is represented by a combination of color values.
   2. For example, in an RGB image, each pixel is represented by three values: Red (R), Green (G), and Blue (B), each usually occupying 8 bits (1 byte), allowing a range of 0-255 for each color.
2. **Bitwise Manipulation**:
   1. The LSB technique works by modifying the least significant bit of the pixel values.
   2. In an 8-bit color channel, the least significant bit is the last bit in the binary representation. For example:
      1. Pixel value: 10110101 (binary representation of 181).
      2. The LSB would be the last bit (in this case, 1).
      3. If we want to hide data, we can change the LSB to a desired value.
3. **Inserting Data**:
   1. Secret data, typically in binary form, is hidden by replacing the least significant bit of the color channels of the image.
   2. For example, if we want to hide the bit "1" in a pixel, we change the least significant bit of that pixel from whatever it was to "1".
   3. The secret message could be embedded bit by bit into each pixel, and the image can still appear visually identical to the original.
4. **Process of Hiding Information**:
   1. Convert the secret data into binary form.
   2. Traverse the image pixel by pixel.
   3. Replace the least significant bit of each pixel with a bit from the secret data.
   4. Repeat the process for each bit of the secret message, spreading it across multiple pixels until the entire message is hidden.
5. **Extracting Hidden Data**:
   1. To retrieve the hidden data, the process involves extracting the least significant bits from the pixels of the image.
   2. By collecting these bits, we can reconstruct the secret message.

Libraries used from python:

**Tkinter**: A standard GUI library for Python. It can be used to create a user interface for your steganography project

**Pillow(PIL):** Pillow is a powerful library for image processing in Python

**Stegano:** Stegano is a lightweight Python library specifically designed for steganography. It provides a simple and intuitive interface for hiding and revealing messages within images.

Modules used:

1.OS module

The os module provides a way of using operating system-dependent functionality like reading or writing to the file system

2. lsb module:

The lsb module from the Stegano library is used for hiding and revealing messages in images using the Least Significant Bit technique.

3.\* (wildcard):

Using from module import \* imports all public names from the module.

Images used are uploded in github.