StegoScope - Short Report

1. Project overview-

A Universal Steganography CLI tool, which can detect the type of the input file and embeds or extracts the hidden data from the given file as per the user's choice by handling the LSB of the file.

2. Work completed so far-

- Completed file detection, using file signatures/magic numbers, and redirected the identified file to respective steganography program using the OS module.
- Written the code, completely on my own, to extract and embed into image files, by opening an image file using Pillow from PIL, converted its pixels into a NumPy array and considered 3 pixels at a time, i.e., 3 R, G, B values each. The first 8 for changing the LSB and the last to check if the data is ended or not. And written a complete reverse code to extract this hidden data.
- Programmed for custom image steganography, using the same logic but the EOF flag for data is the first value and the LSB is changed in the opposite way (i.e., 0 if required bit is 1and vice versa).
- Written a rough skeleton program for audio steganography, to open a .wav file using wave module, and converting its frames into sample depending on the sample width.

3. Challenges faced-

- Learning the concept of changing the LSB and the libraries to open the files and learning NumPy.
- The file signatures were easy to understand, but writing them into the program took a lot of time.

- Understanding the difference between frames and samples in audio files felt a bit difficult.
- Still, I couldn't understand how to save the output image file in any other format other than .png and why the embedded data gets lost/corrupted if I do so.

4. Research/ Concepts learned

- Revised the concepts of ArgParse, OS and sys module from python scripting.
- Learnt the concepts and working with NumPy.
- Completed the required concepts in Pillow from PIL to handle images.
- Learnt about the wave module to open and handle .wav audio file.
- Concepts about file signatures/magic numbers.
- Studied and implemented the arguments of verbose/quiet output.
- The Major Learning- Converting the data into bits and changing the LSB (least significant bit) as per the required bit value of the data, which doesn't much alter the file, making it untraceable for human eye.

5. Future Scope

- Improvising the image steganography programs by applying other useful user selective arguments.
- Completing the program for the audio steganography, by changing the LSB of the sample.
- Learning about the concepts required to convert the video files to frames and handling them.