

# Stenography Assignment

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## 1 Assignment Description

In order to look at self reflection and to judge your assessment of information, you should solve the programming exercise below.

However - the important thing in this exercise is how you solved it, not the end result.

At the end of the programming exercise you should have:

- A list of all search queries you made to solve it, and timestamps (just copy it from the browser history)
- A list all pages you visited to solve it (just copy it from the browser history)
- A list of the 3 biggest stumbling blocks you came across and your reflection on why they were problematic (did you misunderstand something, was some of the info you found wrong, did you miss a detail, . . .)
- A brief "every 30 min" diary as explained in the slides (this is more frequent than one would normally do, and is just meant as part of the exercise)

## 1.1 Hand-in

You should hand in the material listed above, and a brief summary of which aspect of the exercise was taking you the longest time to solve, which part of the exercise was side tracking you the most (which dead-ends did you pursue), and what was the most helpful information you came across (it could be someone else helping you). How can you avoid those problems in the future, and how can the helpful resources help you in the future?

Hand-in should be done on Peergrade in self picked groups of size 1-3.

## 1.2 Review

- Look at the google queries used by the group you review, and try to compare with your own. In particular, try to find cases where you and your review group was trying to find an answer to the same issue, but where you asked differently. Which queries leads to the best result?
- Examine the pages visited by the review group. Find two sites you find trustworthy, and two which you do not find trustworthy. Explain why.
- Try to come up with a strategy for the review group which would have overcome their largest stumbling block.

## 1.3 Question to be Investigated

Steganography is the idea of hiding a message in something. For example, to hide a message in an image, you can do the following:

- The message  $M$ , is converted to a sequence of bits (often from String, to bytes, to bits).
- The image is manipulated in such a manner that the least significant bit of the blue values is substituted with a bit from the message.

For example, this small image contains a message:



Figure 1: Hidden Message

It is an ascii message, and the bits of the message are stored starting in pixel (0,0), next in (1,0) etc. It is stored as little-endian, i.e. the least

significant bits come first. The message is terminated with a null byte.

What is the message?

## 2 Log

- I have never heard of the term before. I need to get familiar with it. I usually work best with youtube videos and/or simple articles. I'll start there, then look at the wiki page.
- A video from Computerphile on youtube explained the concept well. It gave an overview over the situation. I have now learned, however, that images using Steganography utilizes various algorithms. Will it have to be trial and error from here on out?

I chose Python as the language I'd like to use. This is because of it's speed when it comes to getting fast results, as well as it's large amount of libraries.

- I am making a CLI tool for future usage.
- CLI tool is functional, but I'm not getting any results with the functions from the websites at this point. It's sort of frustrating to figure out which algorithms the teachers wanted us to use. There are so many ways of doing this. Will try a "jsteg" algorithm which got introduced in the Computerphile video next.
- Website lukeslytalker contains various decoding methods. No hits....
- Reading the assignment again. Seems like they might have utilized some custom method. The image can use CMYK or RGB. Each has 4\*1 byte of information (RGB and hue). As per the video from Computerphile, you should be able to strip the 6 first bits of those to get bits of the message. These bits concatenated would give its own byte of information, which could then become a letter. No idea whether that's understood correctly.
- I have created a function which extracts RGB and hue from each pixel into a tuple. Turns out the hue is always 255. Not every value in the tuple has been pilfered with.
- It's hard to determine which pixels have been edited. I have found the original picture. I will try to compare the two.
- Strangely enough only 12/9240 pixels remained the same across the two images. I'm not exactly where to go from here, so I might call it.

### 3 Pages Visited

- <https://www.youtube.com/watch?v=TWEXCYQKyDc>
- <https://www.tutorialspoint.com/image-based-steganography-using-python>
- <https://www.geeksforgeeks.org/image-based-steganography-using-python/>
- <https://domnit.org/stepic/doc/pydoc/stepic.html>
- <https://github.com/seanreconnery/steg0saurus>
- <https://lukeslytalker.pythonanywhere.com/stegdetect>
- <http://ijcee.org/papers/533-P0025.pdf>
- <http://www.eiron.net/thesis/>
- <http://www.ifs.schaathun.net/pysteg/>
- <https://www.geeksforgeeks.org/python-pil-getpixel-method/>
- <https://predictivehacks.com/iterate-over-image-pixels/>
- <https://www.cphbusiness.dk/media/77379/lyngby.jpg>
- <https://pythonexamples.org/python-pillow-get-image-size/>
- <https://click.palletsprojects.com/en/7.x/options/>

### 4 Stumbling Blocks

This section describes various issues which appeared during the assignment

- 1 - I didn't know the concept. Had to learn what it was.
- 2 - Didn't know which algorithm to use.
- 3 - Had to make the program itself.

### 5 Search Queries

- youtube - "steganography" - 10:02
- duckduckgo - "python steganography" - 10:29
- duckduckgo - "stepic documentation" - 11:10
- duckduckgo - "python jsteg" - 11:20

- duckduckgo - "null byte" - 11:45
- duckduckgo - "pillow get pixel" - 11:55
- duckduckgo(images) - "cphbusiness" - 12:12
- duckduckgo - "pillow scale image" - 12:13
- duckduckgo - "pillow get image dimensions" - 12:15
- duckduckgo - "click args" - 12:20