Algorithms in Multimedia and Machine Learning using Python

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Image Steganography

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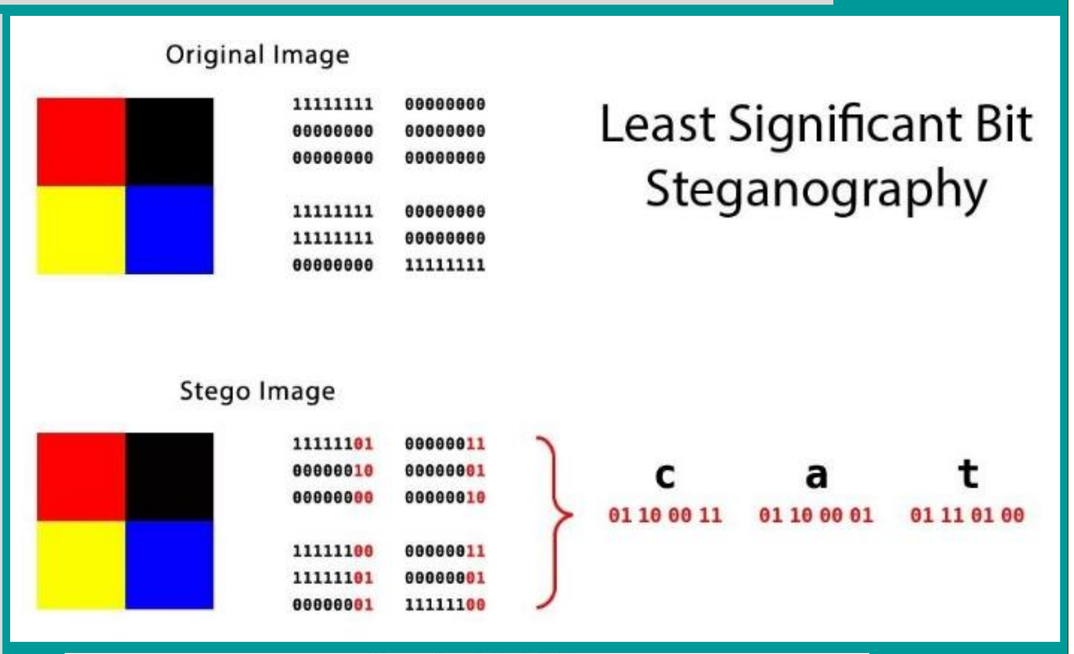
Introduction - Steganography is the practice of concealing a file, message, image, or video within another file, message, image, or video. The word steganography combines the Greek words steganos, meaning "covered or concealed", and graphe meaning "writing".

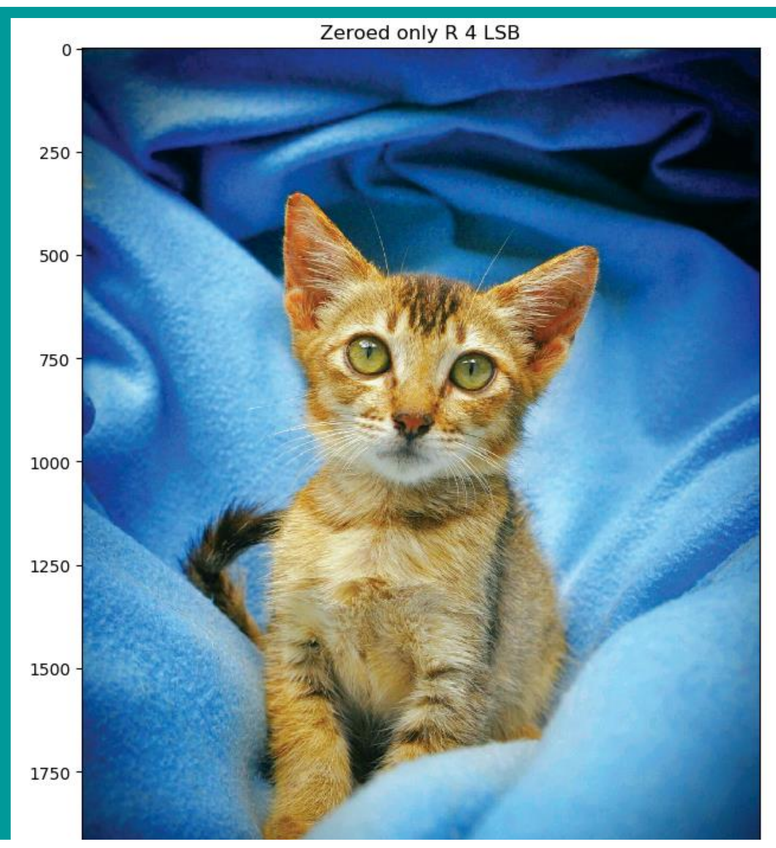
Motivation – Considering the fact the human eye cannot process all the information of an image; It is possible to exploit this disadvantage.
Therefore our motivation is to hide a text inside an image without noticing, visually, any changes in the image. Obviously, if one will run tools which detected anomalies in an image, one could detect an image which has been changed by the algorithm I have implemented.

Methods – After conducting a research, I have encountered a simple method for encoding data inside an image.
Simply, encode two bits of a character, at a time, in 2 of the LSBs in each pixel, on each layer, Red, Green and Blue.

Findings – At first, I wanted to know which effect 2 of the LSBs has on the entire image.
So I zeroed all of image's 2 LSBs, as I expected, there were no visible changes to the image.
Only when you zero 4 LSBs or more, the image starts to get darker.
Another result I've encountered in is the fact the MSB holds most of the image data.
Which means, when I tried to zero only the first MSB, the whole image have been distorted.



Conclusions – I have found that the important data of the image is held mainly in the MSBs.
This fact allows me to change 2 of the LSBs without concerning the image would look any different to the human eye.
Interesting fact*, if you zero only one layer's 4 LSBs, the image stays visibly intact.
Which shows us that when most of the image's data is whole, the human eye won't see any changes



***Original Image looks the same**

Further Research – One interesting form of Steganography could be hiding an image within another image. You would have to zero one of the images to reveal the other.