National College of Ireland

Configuration Manual

MSc Research Project
Cyber Security

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MSc Project Submission Sheet

School of Computing

Student Name:	Pooja Vinod Paniker
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Programme:	MSc Cyber Security **Year:** 2021-2022
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Lecturer:	Dr. Vanessa Ayala-Rivera
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Configuration Manual

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1 Introduction

This configuration handbook is made up of different sections describing the entire suggested prototype that was built with various tools and apps. The proposed technique and methods followed in order to implement the proposed concept of securely hiding a secret text using the combination of AES algorithm and the LSB algorithm is described in detail in this configuration manual. Python is used as the programming language as it had many useful library files that supported the encryption and decryption of the text and embedding and retrieval of the data from image and audio.

2 System Configuration

2.1 Hardware Configuration

Below mentions hardware configuration are the specification of the devices the proposed system was built on. The undermentioned are not the limited to the next user's configuration. (Recommended to implement this on OS windows)

Hardware	Configuration
Processor	AMD Ryzen 5 3550H
Operating System	Windows
RAM	16.0 GB
Hard Disk	512 GB
Graphic Card	NVIDIA GeForce GTX 1650 Ti

Table 1: Hardware Specifications

2.2 Software Configuration

Software	Configuration
Operating System	Windows
Programming Language	Python
Version of Programming Language	3.8

Table 1: Software Specifications

3 Configuration

This section provides comprehensive data on the numerous processes employed in this research project, as well as their step-by-step installation procedures depending on the research project's requirements.

3.1 Installation

Using the below link the latest version of python 3.8 can be downloaded:

https://www.python.org/downloads/release/python-3810/

Version	Operating System	Description	MD5 Sum	File Size	GPG
Gzipped source tarball	Source release		83d71c304acab6c678e86e239b42fa7e	24720640	SIG
XZ compressed source tarball	Source release		d9eee4b20155553830a2025e4dcaa7b3	18433456	SIG
macOS 64-bit Intel installer	macOS	for macOS 10.9 and later	690ddb1be403a7efb202e93f3a994a49	29896827	SIG
macOS 64-bit universal2 installer	macOS	experimental, for macOS 11 Big Sur and later; recommended on Apple Silicon	ae8a1ae082074b260381c058d0336d05	37300939	SIG
Windows embeddable package (32-bit)	Windows		659adf421e90fba0f56a9631f79e70fb	7348969	SIG
Windows embeddable package (64-bit)	Windows		3acb1d7d9bde5a79f840167b166bb633	8211403	SIG
Windows help file	Windows		a06af1ff933a13f6901a75e59247cf95	8597086	SIG
Windows installer (32-bit)	Windows		b355cfc84b681ace8908ae50908e8761	27204536	SIG
Windows installer (64-bit)	Windows	Recommended	62cf1a12a5276b0259e8761d4cf4fe42	28296784	SIG

Figure 1: Downloading Links

3.2 Working

Various libraries were installed in order to execute the Python software. These libraries are required for the code to work since they give a way to various modules that may be inherited and run in Python.

3.3 Libraries Needed and their installation

3.3.1 NumPy

The NumPy library includes data structures such as multidimensional arrays and matrices . In the proposed prototype, numpy plays an important role of creating the graphs for the original image and the stego-image and also useful for creating the spectrograph for the original audio and the stego-audio. NumPy also helps in the simplicity with which mathematical formulae can be implemented [(NumPy: the absolute basics for beginners, 2021)].

```
def PSNR(original, compressed):
    mse = np.mean((original - compressed) ** 2)
    if(mse == 0):  # MSE is zero means no noise is present in the signal .
                   # Therefore PSNR have no importance.
        return 100
    max_pixel = 255.0
    psnr = 20 * log10(max_pixel / sqrt(mse))
    return psnr

def MSE(original, compressed):
    mse = np.mean((original - compressed) ** 2)
    return mse
```

Figure 2: Use of NymPy

To install nympy in windows, use the following command:

pip install numpy

```
C:\Users\ACER>pip install numpy
Requirement already satisfied: numpy in c:\users\acer\appdata\local\programs\python\python38\lib\site-packages (1.21.4)
```

Figure 3: NumPy installation

To import numpy with its functions use the following code:

import numpy **as** np

```
import tkinter as tk
import numpy as np
from tkinter import filedialog as fd
```

Figure 4: Importing NumPy

3.3.2 PyCryptodome

The Crypto.Cipher package includes methods for data secrecy protection [(Crypto.Cipher package, n.d.)].

To install pycryptodome in windows, use the following command:

-m pip install pycryptodome

```
C:\Users\ACER>python -m pip install pycryptodome
Collecting pycryptodome
  Using cached pycryptodome-3.12.0-cp35-abi3-win_amd64.whl (1.8 MB)
Installing collected packages: pycryptodome
Successfully installed pycryptodome-3.12.0
```

Figure 5: Pycryptodome installation

3.3.3 SciPy

To install scipy in windows, use the following command:

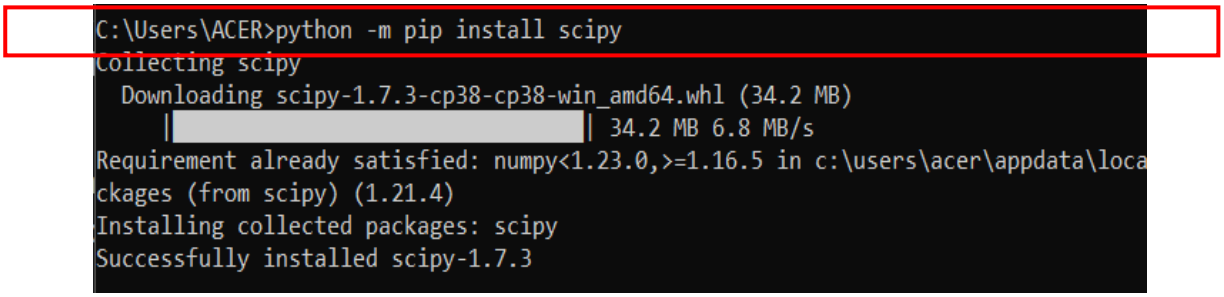

Figure 6: SciPy installation

3.3.4 Docopt

To install docopt in windows, use the following command:

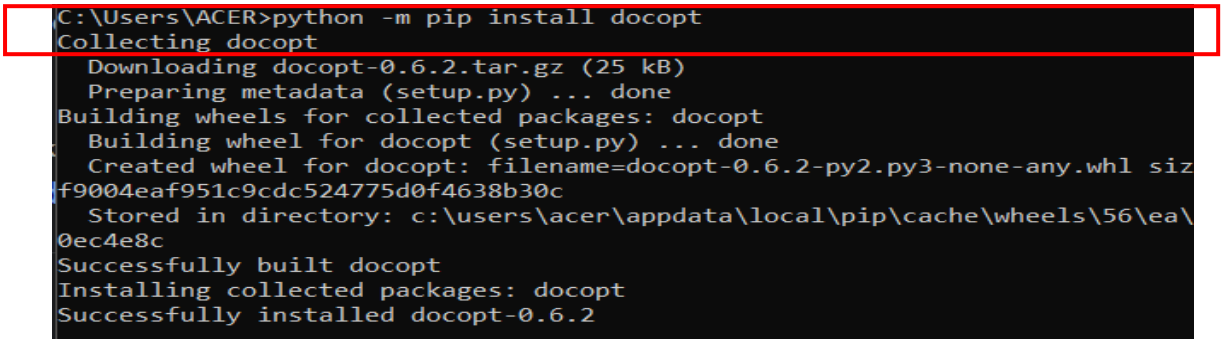

Figure 7: Docopt installation

3.3.5 Matplotlib

To install matplotlib in windows, use the following command:

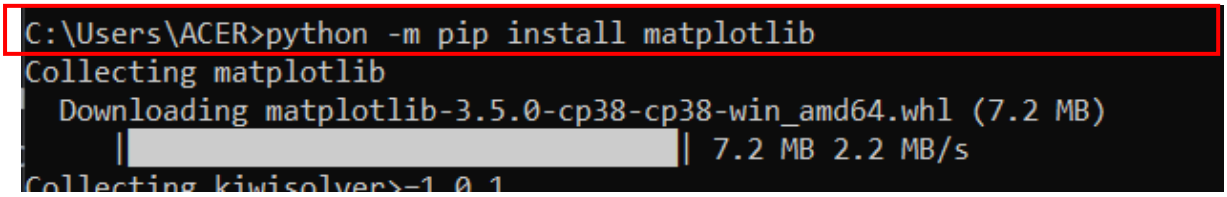

Figure 8: Matplotlib installation

3.3.6 OpenCV-Python

To install matplotlib in windows, use the following command:

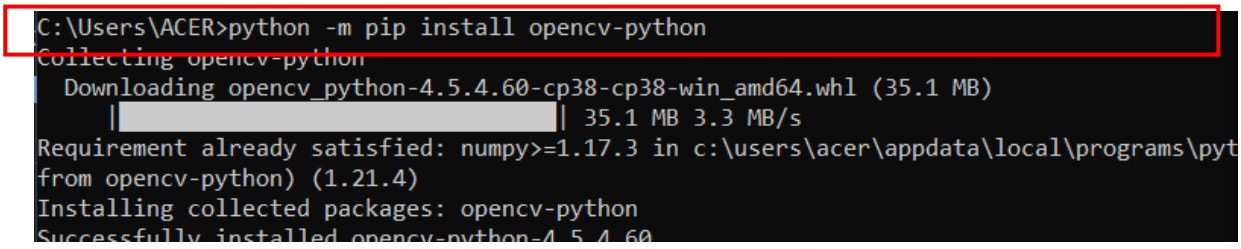

Figure 9: OpenCV-Python installation

Once all the above-mentioned library files are installed follow the below steps to run the project.
Step 1: Open the python file named **"guideimagestegno"** by right clicking on it and selecting edit with IDLE, and then selecting edit with IDLE 3.8.

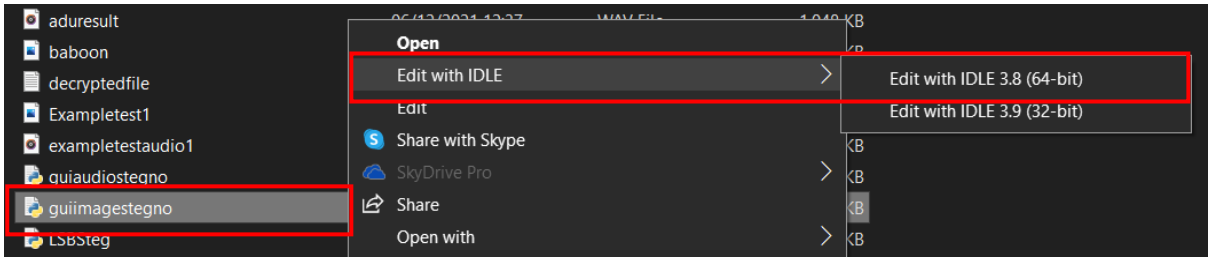

Figure 10: Opening Python code for Image Steganography

The above step will open a GUI in which the Encryption of text file and then embedding it inside an image can be performed.

Step 2: Same procedure as step 1 has to be followed for implementing the Audio steganography python code. Open the python file named **"guideaudiostegno"** by right clicking on it and selecting edit with IDLE, and then selecting edit with IDLE 3.8.

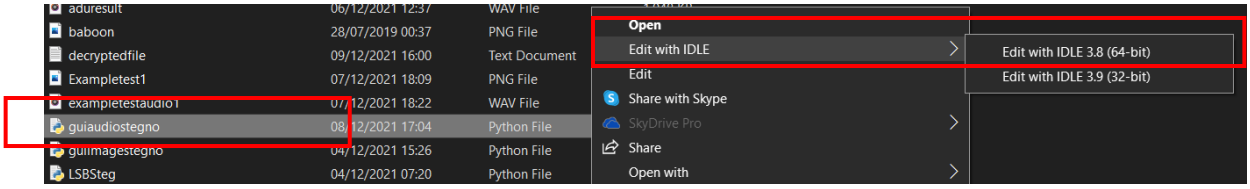

Figure 11: Opening Python code for Audio Steganography

3.4 Testing

The presented research strategy, namely estimates the ratios of PSNR and MSE, is put to the testing. PSNR stands for peak signal to noise ratio, while MSE stands for mean square error, which is determined by stego frame deterioration. For each frame utilized to embed the data, PSNR and MSE values are calculated.

4 References

Anon., 2021. NumPy: the absolute basics for beginners. [Online] Available at: https://numpy.org/doc/stable/user/absolute_beginners.html [Accessed 2 12 2021].

Anon., n.d. Crypto.Cipher package. [Online] Available at: https://pycryptodome.readthedocs.io/en/latest/src/cipher/cipher.html [Accessed 2 12 2021].