

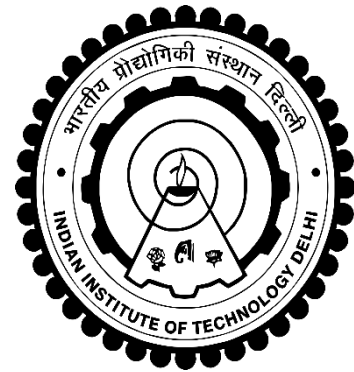
Summer Project Report (2017)

Project Title:

Digital Watermarking To Hide Text Messages

Under

Center of Excellence in Cyber Systems and Information Assurance (CoE-CSIA), IIT Delhi



Duration: 15th May, 2017 to 14th July, 2017

Team Members:

Name	Entry Number
Mayank Singh Chauhan	2016CS50394
Atishya Jain	2016CS50393
Soumya Sharma	2016CS10311

Supervisor: Prof. Ranjan Bos

Plan of action

- **Week 1 (15/5/17 - 19/5/17)** -
 - Research on cryptography, steganography and algorithms
 - Will decide what to build for a GUI
 - Decide what coding platform to use for backend and what software to use for image processing.
 - Decide if we would be building a web based GUI or an executable GUI for windows and ubuntu.
 - Will try to start building from scratch if possible.
- **Week 2 (22/5/17 - 26/5/17)** -
 - Continue our research and learning about different algorithms.
 - Will work on the backend code of Image processing using python.
 - Learning Tkinter for developing GUI.
 - Will test the backend code using command line until our GUI is developed.
- **Week 3 (29/5/17 - 2/6/17)** -
 - Continue to develop backend code using the researched algorithm.
 - Start developing GUI for encryptor.
 - Testing of the GUI's and our backend codes developed till now.
- **Week 4 (5/6/17 - 9/6/17)** -
 - Continue developing GUI for encryptor.
 - Finalise encryptor.
 - Start developing backend code for our decrypting process.
 - Start developing GUI for our decryptor.
 - Testing of our codes and GUI's developed.
- **Week 5 (12/6/17 - 16/6/17)** -
 - Continue developing decryptor.
 - Start Research about Audio encryption and how is an Audio file represented on Hard Disk.
 - Start developing code for audio encryption.
- **Week 6 (19/6/17 - 23/6/17)** -

- Continue developing code for audio encryption.
- Adding functionalities in GUI for audio encryption option.
- Also start research about one way encryption for copyrights.
- **Week 7 (26/6/17 - 30/6/17) -**
 - Now develop code for one way encryption for copyrights.
 - Add the functionalities for one way encryption in encryptor.
- **Week 8 (3/7/17 - 7/7/17) -**
 - Start and finish developing the comparison software for Checking copyrights of images.
 - Start testing and add encryption possibilities with other image formats if possible
- **Week 9 (10/7/17 - 14/7/17) -**
 - Finalising and testing

The plan of action is quite flexible after Week 5 depending on progress achieved upto that time.

Digital Watermarking to hide text messages

Abstract-

We wish to do a project on making a watermark with a new encoding protocol to hide data in plain sight as part of an image and/or sound clip. This data should be so encoded that it does not make a perceptible difference to the common observer. Also, the encoding should be resistant to corruption during transmission using a failsafe.

For this we will be developing an application that will allow us to encrypt or hide the message entered in the image/Audio chosen by the user. The manipulated image/sound will not appear as different when seen from a naked eye or listened normally and will also be resistant to detection by simple operations on the image.

Then we would be creating a decryptor that would decrypt the image/Audio to the legitimate person and give him the secret message.

Finally, this may have many applications from security point of view –

- To fight against music piracy and film piracy. Music/Film piracy is the copying and distributing of copies of an original piece of music/movie for which the copyright-holding record company did not give consent.
- Encryption of your private or confidential data in a way that no one would be able to detect easily.
- Safe way of data transfer as 3rd party won't be able to detect that there is something hidden inside the digital media and even if they know about the presence of data inside media it would not be easy for them to retrieve the data without the presence of appropriate key.

Things we are going to use –

- Python module Tkinter for the creation of GUI's
- Image processing code will be developed using python.
- We would be using Bit bucket to host a private repository and this will enable us to work together even from distant locations.

To be decided –

- Audio processing code will be developed using python or C++.

Digital Watermarking to hide text messages

1st Week Report (14/5/17-21/5/17)

- **Objectives –**

- Research on cryptography, steganography and algorithms
- Will decide what to build for a GUI
- Decide what coding platform to use for backend and what software to use for image processing.

- **Research -**

- Our first week was spent on research and studying about how will we proceed in our coming weeks. We studied about image processing, types of images and the kinds of images we will be working on. We realised that to encode data in images, we just need to alter the pixels.
- We also finalised what kind of interface we will be building as a GUI (graphical User Interface) for people to use it.
 - We decided that we would be using python module **Tkinter** to code GUI of our encryptor as well as decryptor.
 - Then we would be using py2exe module to create .exe files for windows.
 - We would also be creating executables for ubuntu or Linux environment.
- Then we also finalised that we would be using python to code the backend code of encryption and decryption process.

- **Algorithm –**

- Our current Algorithm is based upon the fact that manipulating the least significant bytes don't make any perceptible difference.
- We take the ASCII value of each alphabet of the text and take a 24 bit RGB image. Even if we take a 32 bit image we ignore the 4th byte and hence will work on both kinds of images.

- Now, each pixel has 3 Bytes and each alphabet has 8-bit representation. We start replacing each bit of alphabet with the last bit of R, G and B byte. So, we require 3 pixels for storing a letter with last byte as extra.
- We also decide a key which is essentially the position of starting the text in image. This key is made from the password which the user enters to decrypt the image.
- To decrypt the message, we just need the position of starting the text and then read the end bit of every byte continuously and then convert the binary to decimal and then find the corresponding alphabet.
- This is the algorithm which we have chosen now but we can change it a little to make it different from routine and difficult for someone to guess.

Digital Watermarking to hide text messages

2nd Week Report (22/5/17-28/5/17)

Objectives –

- Continue our research and learning about different algorithms.
- Will work on the backend code of Image processing using python.
- Learning Tkinter for developing GUI.

Image Processing -

- Our second week was spent on developing code for image processing. We worked on different types of images and worked on them.
- We used python to build our code. First, we used a module called stepic for our needs but after that we replaced the module by our own code which we thought of in the 1st week.
- The only concern left was the security of data hidden inside the image and how easily would one be able to retrieve the data from the image if he/she knows that data is hidden inside the image.
- We then researched and found a curve called Hilbert curve. We would be using the Hilbert curve to traverse the image.
- With the basic code of our image processing done according to first week we would be changing it using Hilbert curve algorithm in the 3rd week as we now know about its details.

Making of GUI –

- We finalised what kind of interface we will be building as a GUI (graphical User Interface) for people to use it.
- We learnt to use Tkinter and use it to build a suitable GUI for both user and testing purposes of our code.

- We also have started to build our GUI using python and then would export it using py2exe or pyinstaller which would create the executables for windows as well as ubuntu.
- We have almost completed the code for the encryptor but it still needs some debugging and has a basic structure just to suit our testing needs for now.

Team Members -

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