FORMULATING IMAGE STEGANOGRAPHY TO IMPROVE SECURITY OF THE HIDDEN IMAGE

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This report is submitted in partial fulfillment of the requirement for the Bachelor of Computer Science (Computer Networking)

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2015

DECLARATION

I hereby declare that this project entitled

FORMULATING IMAGE STEGANOGRAPHY TO IMPROVE SECURITY OF THE HIDDEN IMAGE

is written by me and is my own effort and that no part has been plagiarized without citations

STUDENT: _____ DATE: _____
(SIM FU CHENG)

SUPERVISOR: _____ DATE: _____
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DEDICATION

Dear Parents

Thank you for your giving me the big support and encouragement. Your biggestsupport and care have helped me to achieve the final task in my university life.

Dear Lecturer, Supervisors and Evaluator

Thank you for your guidance, encouragement and knowledge.

Dear BITC Friends, Friends

Thank you for your sharing information, supporting and encouragement when facing difficulties.

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ABSTRACT

Image steganography is atechnique that canhide the secret message into the image without being notice by eyes of the human. In order to ensure the security of the contents for the sensitive message, technique steganography is being implemented.Thisproject is focuses on the least-significant bit (LSB) image steganography techniques and enhancing the security of the hiding image. Thus the project is necessary to know the howthe image techniques work and which of the techniques can produce the better output on the aspect of security. Besides, theproject will provides thecomparison between different types ofimage steganography techniques and identify theeffectivetechnique among all of the types of the image steganography. Furthermore, the project will develop a security tool for the image steganography and determine an encryption and decryption method in the hiding process using Microsoft Visual Studio 2010. At the end of this project, the image produced by theLSB technique is enhanced with the cryptography technique and message digest algorithm in order to ensure the security and integrity of the secret message.In the future, a complete application can be developed by enhancing the current script developed in this project that able to defend against all kind of intrusion.

ABSTRAK

Imej steganografi merupakan teknik yang dapat menyembunyikan mesej rahsia ke dalam imej tanpa dikesan oleh mata manusia. Dalam usaha untuk memastikan keselamatan kandungan mesej yang sensitif, teknik steganografi telah dilaksanakan. Projek ini tertumpu kepada teknik *Least-Significant Bits(LSB)*imej steganografi dan meningkatkan keselamatan imej yang dihasilkan oleh teknik ini.Oleh itu projek ini adalah perlu untuk mengetahui bagaimana teknik imej berfungsi dan yang mana satu teknik boleh menghasilkan output yang lebih baik dalam aspek keselamatan. Selain itu, projek ini akan menyediakan perbandingan antara pelbagai jenis teknik imej steganografi dan mengenalpasti teknik yang efektif di antara semua jenis imej steganografi. Tambahan pula, projek ini akan membangunkan alat keselamatan untuk steganografi imej dan menentukan kaedah penyulitan dan penyahsulitan dalam proses persembunyian menggunakan Microsoft Visual Studio 2010. Pada akhir projek ini, imej yang dihasilkan oleh teknik steganografi akan dipertingkatkan dengan teknik kriptografi dan juga mesej mencerna algoritma untuk memastikan keselamatan dan integriti mesej rahsia.Pada masa yang akan datang , satu aplikasi lengkap akan dibangunkan dengan menambahbaik skrip yang dibangunkan dalam projek ini di mana aplikasi ini dapat mempertahankan sistem terhadap semua jenis pencerobohan.

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LIST OF ABBREVIATIONS

ALPHABET	WORD	EXPLANATION
B	bmp	bitmap image file
L	LSB	Least-significant bits
R	RP	Research Problem
R	RQ	Research Question
R	RO	Research Objective

CHAPTER I

INTRODUCTION

1.1 Project Background

Steganography come from a Greek word *steganos*, which indicate as masked or secret, and graphy which mean by drawing or writing.Basically, steganography can defined as anact of hiding secret message into a file that hard or difficult by the eyes of human.

The evolution on the Internet technologyis became one of the most crucial factors of information technology and communication and this caused the issue on security information. In order to ensure the security of the contents for the sensitive message, technique steganography is being implemented. This can be achieve by hiding the secret information in other file, thus conceal the existence of the information from other party. In the aspect of image steganography, the secret message is hidden in

image files. The practice of conceal the sensitive message is came from the Greek historian Herodotus has write a nobleman which is needed to communicate with his son-in-law. As solution, he has razor the head of the slaves and tattooed the secret message onto the slave's scalp. By waiting the slave's hair grew back,the head of slave will dispatched with the conceal message. Other than that, invisible ink was used to write secret message on a pieces of paper and the paper appeared as a blank pieces of paper from the human's eyes during World War II. Liquids like vinegar, milkare used to recover the hidden message, andthe message on the paper will become darken and visible to the others when these substance is heated. Nowadays,most of the steganography are used on computers wherethe digital data act as the carriers and transfer through the high speed transfer networks channels.As contrast cryptography keeping the contents of secret message whereas steganography keeping the existence of a sensitive information from the human's eyes. Both technology are purpose to protect message from unauthorized party.The intensity of steganography can be enhanced with cryptography technology.

1.2 Problem Statements

Steganography can be applied differently in digital image, audio and video file. Basically, the problem facing by the steganography is stated below. The Problem Statement(PS) of the project are listed in the Table 1.1.

Table 1.1: Summary of the Problem Statement

No.	Problem Statement
PS1	Difficult to choose an effective techniques for image steganography.
PS2	Facing a challenge to retain the security of hidden image when the size of secret message increased providing that the quality of image is preserve.

1.3 Research Question

Based on the project study, the research question was determined based on the problem that has been determined in Table 1.1. The Research Questions(RQ)are listed in Table 1.2.

Table 1.2: Summary of the Research Questions

PP	RQ	Research Questions
PS1	RQ 1	What is the best algorithm for the image steganography technique?
PS2	RQ2	What is the suitable method to maintain the security of the hiding image?
	RQ3	What is the limit on the size of data hidden that user can embed inside an image without affecting the quality of image?

RQ1: What is the best algorithm for the image steganography technique?

This research question is to identify the best and suitable algorithm of the image steganography. The purpose of this research question is to limit the scope on the type of the image steganography.

RQ2: What is the suitable method to maintain the security of the hiding image?

Nowadays, we can facing a challenge to retain the security of hiding images with high rate of data hiding as the stego-image file size will increase after the hiding process. Therefore, this research question is to determine suitable method to maintain the security of the hiding image after embedded with image steganography algorithm.

RQ3: What is the limit on the size of data hidden that user can embed inside an image without affecting the quality of image?

This research question is to find out the limit on the size of data hidden that user can embed inside an image and help us identify the basic requirement and expectation of the user on the size of the data hidden.

1.4 Objective

The research objectives are listed in Table 1.3 based on the problem statement and research questions.

Table 1.3: Summary of Research Objectives

PP	RQ	RO	Objective
PS1	RQ1	RO1	To identify an effective algorithm for the image steganography technique that can make the message conceal with more easy and user friendly.
PS2	RQ2	RO2	To determine an encryption and decryption method in the hiding process.
	RQ3	RO3	To develop a security tool for the image steganography.

RO 1: To identify an effective algorithm for the image steganography technique that can make the message conceal with more easy and user friendly.

In order to improve the securityof the hiding image, the first step we must do is limiting the scope of the image steganography based on the research.

RO 2: To determine an encryption and decryption method on hiding process.

After that, we must determine the suitable method to maintain the security of the hiding image and explore the encryption and decryption module in order to improve the security of hiding image.

RO 3: To develop a security tool for the image steganography.

After determine the maximum size of data hidden that can embedded inside the image, then formulate an steganography algorithm and produce security tool based on image steganography technique.

1.5 Scopes

There are many types for the steganography which include audio steganography, image steganography and also text steganography.

In this project, we restrict the scope on the image steganography and find out the suitable technique to improve the security of the hidden image.

1.6 Project Contributions

By the end of this project, the project contributions that must be achieve in this project:

i. The effective steganography algorithm purpose for data hidden technique in the image success increase the security of hidden data providing that quality of hiding image is preserve.

ii. The security of the hidden image is still retain with the increasing of the data hidden size is successfully been conduct.

1.7 Project Significant

By formulating the image steganography algorithm, it can enhance the security of hiding image when the data hidden size is increase and maximize the data hiding rate can be use without affecting the quality of images where the third party would be completely ignorant about any hidden information.

1.8 Report Organization

In this report, there are consist of seven chapter which included Introduction, Literature Review, Methodology, Design, Implementation,Testing and Result Analysis and Conclusion.

Chapter 1 Introduction

In this chapter, introduction, project background, problem statement,research question, objective, scope, project significant and report organization are clearly stated.

Chapter 2 Literature Review

In this chapter, the related article of this project, such as algorithm used by the steganography, the process of the steganography are clearly stated.

Chapter 3 Methodology

In this chapter, the projectis start from study article about the related image steganography and analysis the problem and finally bring out the solution. All of these are clearly stated within chapter 3.

Chapter 4 Design

In this chapter, the design of coding and formulating steganography algorithm to improve the security of hiding image are clearly stated in the chapter 4.

Chapter 5 Implementation

In this chapter, the implementation of coding into the application where it will formulating steganography algorithm to improve the security of hiding image are clearly stated in this chapter.