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**DESIGN OF EVALUATION PROCEDURES FOR LETTER-
BASED TECHNIQUES IN TEXT STE GANOGRAPHY METHOD**

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UUM
Universiti Utara Malaysia

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)
UNIVERSITI UTARA MALAYSIA
2017**



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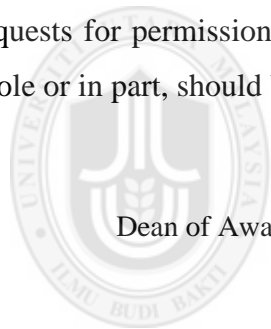
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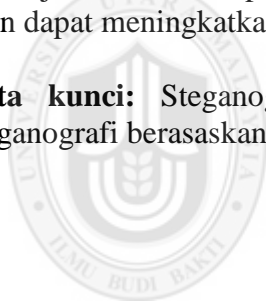
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Abstrak

Steganografi adalah salah satu maklumat kawasan bersembunyi yang meliputi maklumat dalam mana-mana domain sederhana seperti teks, imej, audio dan video. Salah satu kategori steganografi dalam medium teks dipanggil steganografi teks. Ia menyembunyikan mesej tersembunyi dengan menerapkan teks melalui pelbagai kaedah yang digunakan boleh menjadi mendatar beralih, menegak beralih, atau berdasarkan surat struktur teks. Ramai penyelidik menggunakan teknik berdasarkan ciri-untuk menampung mesej tersembunyi berdasarkan keunikan huruf. Oleh itu, kajian ini bertujuan untuk memberi tumpuan kepada jenis tertentu teknik berdasarkan ciri yang merupakan steganografi teks berasaskan huruf. Walau bagaimanapun, masih terdapat isu yang berkaitan dengan kaedah ini yang tentang kewujudan teknik dalam teks ini mudah ditemui oleh pihak luar. Kajian ini menunjukkan bahawa isu ini mungkin berakar dari ketiadaan pengesahan dan pengesahan prosedur semasa pembangunan kaedah steganografi itu. Kajian ini bertujuan untuk mengenal pasti parameter yang sesuai untuk proses pengesahan dan kesahan. Di samping itu, pelbagai parameter yang ada akan digunakan dalam menjalankan penilaian terhadap steganografi teks berasaskan huruf. Hasil kajian menunjukkan bahawa parameter yang terlibat dalam proses pengesahan dan kesahan akan dapat meningkatkan prestasi dan keselamatan teknik.

Kata kunci: Steganografi, Teks steganografi, Steganografi berasaskan Ciri, Steganografi berasaskan huruf, Pengesahan, dan Kesahan

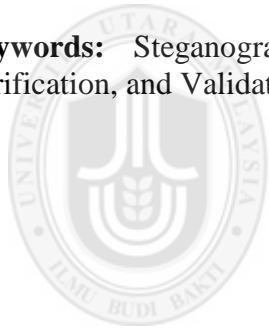


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Abstract

Steganography is one of information hiding area that covers the information in any medium domain such as text, image, audio and video. One of steganography categories in the medium of text is called text steganography. It conceals hidden message with embedding the text via various methods such as horizontally shifting, vertically shifting or based on the letter of text structures. Many researchers utilize the feature-based technique to cover hidden message based on uniqueness of letter. Therefore, this study intends to focus on specific type of feature-based technique which is the letter-based text steganography. However, there is still issue relating to this method which the existence of the technique in the text is easily discoverable by attackers. Literature indicated that this issue is probably rooted from the lack of verification and validation procedures during the development of the steganography method. This study aims to identify the suitable parameters for verification and validation process. In addition, the parameters will then be used in conducting evaluation on the letter-based text steganography. The outcome of this study showed that the parameters which involved in verification and validation process will be able to improve the performance and security of the technique.

Keywords: Steganography, Text steganography, Feature-based, Letter-based Verification, and Validation



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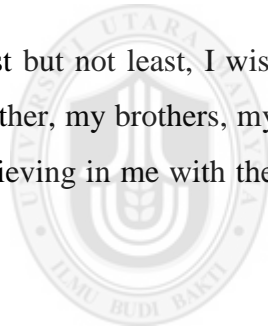
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List of Abbreviations

AES	Advanced Encryption Standard
ASCI	American Standard Code for Information Inter-exchange
BMT	Burrows Wheeler Transform
CALP	Chang Alphabet Letter Pattern
CCM	Characteristic Code Mapping
CURVE	Curve Character Subheading
CSS	Cascading Style Sheets
DNA	Deoxyribo-Nucleic Acid
ECR	Encryption with Cover Text and Reordering
FN	False Negative
FP	False Positive
FSM	Finite State Machine
HESM	High Efficient Substitution Method
HTML	Hypertext Markup Language
IM	Instant Message
MTZ	Move to Front
OST	Ontological Semantic Technology
PCFG	Probabilistic Context-Free Grammar
QUAD	Quadruple Categorization
RASAM	Rapid Action Surface to Air Missile
SKT	Secret Key Table
SSCE	Secret Steganography Code for Embedding
SSM	Simple Substitution Method
TN	True Negative
TP	True Positive
VERT	Vertical Straight Line
WSD	Word Sense Disambiguation
XML	Extensible Markup Language

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

The text document has become one of the important medium information until the present time even there are a lot of other medium that had been established. The needs of text documents are still high especially in the domain of business and academic. It is because a lot of important documentation such as appointment letter, certification, report, confidential document and many any other documents are available in text. Therefore, text documents should be a concern for most people due to them are exposed to a lot of risks. For example, the intruders can occasionally temper with information in these documents for their own interests. The text document which is commonly contains confidential information becomes their target in order to discover the secret information which could be used for illegal purposes. Hence, a special technique named steganography is introduced to overcome this problem.

Steganography is best known as an associated knowledge of hiding the messages via medium of data to become invisible and undetectable for human sense. Secure private information is critical point of steganography in applying performance as part of information hiding. The practical idea of steganography has been used since the ancient times (Iyer & Lakhtaria, 2016). The implementation of steganography itself is divided into two categories. The following Figure 1.1 illustrates various categories of steganography and the focus path of this study.

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Appendix A

Result Experiment CALP Scheme

1. CALP_Cover Text -1

No.	Cover Text		Hidden Message		Stego Text				
	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1254440	2508.88	62	0.126	1254440	2509.58	8.67	353	1254087
2	1254440	2508.88	100	0.202	1254440	2510.10	6.02	611	1253829
3	1254440	2508.88	139	0.280	1254440	2510.62	6.77	870	1253570
4	1254440	2508.88	177	0.356	1254440	2511.14	10.86	1128	1253312
5	1254440	2508.88	214	0.430	1254440	2511.63	9.75	1376	1253064
6	1254440	2508.88	251	0.504	1254440	2512.13	13.60	1672	1252813
7	1254440	2508.88	287	0.576	1254440	2512.62	16.23	1868	1252572
8	1254440	2508.88	324	0.650	1254440	2513.11	17.97	2116	1252324
9	1254440	2508.88	362	0.726	1254440	2513.63	17.12	2374	1252066
10	1254440	2508.88	401	0.804	1254440	2514.16	20.97	2639	1251801
11	1254440	2508.88	440	0.882	1254440	2514.46	20.20	2901	1251539
12	1254440	2508.88	480	0.962	1254440	2515.22	27.34	3170	1251270
13	1254440	2508.88	518	1.038	1254440	2515.73	26.02	3425	1251015
14	1254440	2508.88	556	1.114	1254440	2516.25	32.24	3683	1250757
15	1254440	2508.88	593	1.188	1254440	2516.74	34.09	3931	1250509

2. CALP_Cover Text 2

No.	Cover Text		Hidden Message		Stego Text				
	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1217495	2434.99	62	0.126	1217495	2435.70	8.74	353	1217142
2	1217495	2434.99	100	0.202	1217495	2436.21	5.59	611	1216884
3	1217495	2434.99	139	0.280	1217495	2436.73	8.03	870	1216625
4	1217495	2434.99	177	0.356	1217495	2437.25	9.11	1128	1216367
5	1217495	2434.99	214	0.430	1217495	2437.74	10.34	1376	1216119
6	1217495	2434.99	251	0.504	1217495	2438.25	11.62	1672	1215868
7	1217495	2434.99	287	0.576	1217495	2438.73	14.77	1868	1215627

8	1217495	2434.99	324	0.650	1217495	2439.22	14.88	2116	1215379
9	1217495	2434.99	362	0.726	1217495	2439.74	15.81	2374	1215121
10	1217495	2434.99	401	0.804	1217495	2440.27	17.52	2639	1214856
11	1217495	2434.99	440	0.882	1217495	2440.79	19.10	2901	1214594
12	1217495	2434.99	480	0.962	1217495	2441.33	22.23	3170	1214325
13	1217495	2434.99	518	1.038	1217495	2441.84	27.08	3425	1214070
14	1217495	2434.99	556	1.114	1217495	2442.36	26.84	3683	1213812
15	1217495	2434.99	593	1.188	1217495	2442.85	34.32	3931	1213564

3. CALP_Cover text 3

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1298721	2597.44	62	0.126	1298721	2598.15	10.50	353	1298368
2	1298721	2597.44	100	0.202	1298721	2598.67	6.06	611	1298110
3	1298721	2597.44	139	0.280	1298721	2599.18	7.09	870	1297851
4	1298721	2597.44	177	0.356	1298721	2599.70	9.82	1128	1287593
5	1298721	2597.44	214	0.430	1298721	2600.19	10.50	1376	1297345
6	1298721	2597.44	251	0.504	1298721	2600.69	11.80	1672	1297094
7	1298721	2597.44	287	0.576	1298721	2601.18	14.40	1868	1296853
8	1298721	2597.44	324	0.650	1298721	2601.68	17.34	2116	1296605
9	1298721	2597.44	362	0.726	1298721	2602.19	19.69	2374	1296347
10	1298721	2597.44	401	0.804	1298721	2602.67	20.14	2639	1296082
11	1298721	2597.44	440	0.882	1298721	2603.24	22.42	2901	1295820
12	1298721	2597.44	480	0.962	1298721	2603.78	24.20	3170	1295551
13	1298721	2597.44	518	1.038	1298721	2604.29	28.46	3425	1295296
14	1298721	2597.44	556	1.114	1298721	2604.81	26.68	3683	1295038
15	1298721	2597.44	593	1.188	1298721	2605.31	32.20	3931	1294790

4. CALP_Cover text 4

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1321623	2643.24	62	0.126	1321623	2643.95	9.81	353	1321270
2	1321623	2643.24	100	0.202	1321623	2644.47	5.51	611	1321012
3	1321623	2643.24	139	0.280	1321623	2644.99	6.57	870	1320753

4	1321623	2643.24	177	0.356	1321623	2645.50	8.01	1128	1320495
5	1321623	2643.24	214	0.430	1321623	2646.00	12.67	1376	1320247
16	1321623	2643.24	251	0.504	1321623	2646.50	14.14	1672	1319996
7	1321623	2643.24	287	0.576	1321623	2646.98	13.60	1868	1319755
8	1321623	2643.24	324	0.650	1321623	2647.48	14.88	2116	1319507
9	1321623	2643.24	362	0.726	1321623	2647.99	21.92	2374	1319249
10	1321623	2643.24	401	0.804	1321623	2648.52	24.50	2639	1318984
11	1321623	2643.24	440	0.882	1321623	2649.05	20.89	2901	1318722
12	1321623	2643.24	480	0.962	1321623	2649.58	28.28	3170	1318453
13	1321623	2643.24	518	1.038	1321623	2650.09	30.77	3425	1318198
14	1321623	2643.24	556	1.114	1321623	2650.61	33.37	3683	1317940
15	1321623	2643.24	593	1.188	1298721	2651.11	32.19	3931	1317692

5. CALP_Cover text 5

No.		Cover Text		Hidden Message			Stego Text		
HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1388644	2777.29	62	0.126	1388644	2777.99	4.38	353	1388291
2	1388644	2777.29	100	0.202	1388644	2778.51	5.42	611	1388083
3	1388644	2777.29	139	0.280	1388644	2779.03	7.83	870	1387774
4	1388644	2777.29	177	0.356	1388644	2779.54	12.43	1128	1387516
5	1388644	2777.29	214	0.430	1388644	2780.04	12.76	1376	1387268
6	1388644	2777.29	251	0.504	1388644	2780.54	16.53	1672	1387017
7	1388644	2777.29	287	0.576	1388644	2781.02	17.72	1868	1386776
8	1388644	2777.29	324	0.650	1388644	2781.52	22.30	2116	1386528
9	1388644	2777.29	362	0.726	1388644	2782.03	23.42	2374	1386270
10	1388644	2777.29	401	0.804	1388644	2782.56	24.16	2639	1386005
11	1388644	2777.29	440	0.882	1388644	2783.09	27.67	2901	1385743
12	1388644	2777.29	480	0.962	1388644	2783.63	31.25	3170	1385474
13	1388644	2777.29	518	1.038	1388644	2784.14	28.83	3425	1386942
14	1388644	2777.29	556	1.114	1388644	2784.66	31.97	3683	1384961
15	1388644	2777.29	593	1.188	1388644	2785.15	37.66	3931	1384713

6. CALP_Cover text 6

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1254765	2509.53	62	0.126	1254765	2510.24	9.39	353	1254412
2	1254765	2509.53	100	0.202	1254765	2510.75	7.32	611	1254154
3	1254765	2509.53	139	0.280	1254765	2511.27	10.83	870	1253895
4	1254765	2509.53	177	0.356	1254765	2511.79	14.06	1128	1253637
5	1254765	2509.53	214	0.430	1254765	2512.28	15.70	1376	1253389
6	1254765	2509.53	251	0.504	1254765	2512.78	18.32	1672	1253138
7	1254765	2509.53	287	0.576	1254765	2513.27	21.18	1868	1252897
8	1254765	2509.53	324	0.650	1254765	2513.76	24.26	2116	1252649
9	1254765	2509.53	362	0.726	1254765	2514.28	27.24	2374	1252391
10	1254765	2509.53	401	0.804	1254765	2514.81	28.69	2639	1252126
11	1254765	2509.53	440	0.882	1254765	2515.33	33.19	2901	1251864
12	1254765	2509.53	480	0.962	1254765	2515.87	31.18	3170	1251595
13	1254765	2509.53	518	1.038	1254765	2516.38	39.07	3425	1251340
14	1254765	2509.53	556	1.114	1254765	2516.89	38.93	3683	1251082
15	1254765	2509.53	593	1.188	1254765	2517.39	41.47	3931	1250834

7. CALP_Cover text 7

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1256772	2513.55	62	0.126	125772	2514.25	4.23	353	1256419
2	1256772	2513.55	100	0.202	125772	2514.77	6.47	611	1256161
3	1256772	2513.55	139	0.280	125772	2515.53	8.28	870	1255902
4	1256772	2513.55	177	0.356	125772	2515.80	9.37	1128	1255644
5	1256772	2513.55	214	0.430	125772	2516.30	11.89	1376	1255396
6	1256772	2513.55	251	0.504	125772	2516.88	15.07	1672	1255145
7	1256772	2513.55	287	0.576	125772	2517.28	17.78	1868	1254904
8	1256772	2513.55	324	0.650	125772	2517.78	19.19	2116	1254656
9	1256772	2513.55	362	0.726	125772	2518.29	22.15	2374	1254398
10	1256772	2513.55	401	0.804	125772	2518.82	20.92	2639	1254133
11	1256772	2513.55	440	0.882	125772	2519.34	24.84	2901	1253871
12	1256772	2513.55	480	0.962	125772	2519.88	28.34	3170	1253602
13	1256772	2513.55	518	1.038	125772	2520.40	30.87	3425	1253347

14	1256772	2513.55	556	1.114	125772	2520.91	33.29	3683	1253089
15	1256772	2513.55	593	1.188	125772	2521.41	38.20	3931	1252841

8. CALP_Cover text 8

No.	Cover Text		Hidden Message		Stego Text				
	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1338903	2677.80	62	0.126	1338903	2678.51	4.88	353	1338550
2	1338903	2677.80	100	0.202	1338903	2679.03	6.65	611	1338292
3	1338903	2677.80	139	0.280	1338903	2679.55	8.65	870	1338033
4	1338903	2677.80	177	0.356	1338903	2680.06	11.42	1128	1337775
5	1338903	2677.80	214	0.430	1338903	2680.56	14.16	1376	1337527
6	1338903	2677.80	251	0.504	1338903	2681.06	16.86	1672	1337278
7	1338903	2677.80	287	0.576	1338903	2681.54	16.23	1868	1337035
8	1338903	2677.80	324	0.650	1338903	2682.04	19.36	2116	1336787
9	1338903	2677.80	362	0.726	1338903	2682.56	20.74	2374	1336529
10	1338903	2677.80	401	0.804	1338903	2683.09	26.18	2639	1336264
11	1338903	2677.80	440	0.882	1338903	2683.61	27.15	2901	1336002
12	1338903	2677.80	480	0.962	1338903	2684.14	29.82	3170	1335733
13	1338903	2677.80	518	1.038	1338903	2684.65	34.19	3425	1335478
14	1338903	2677.80	556	1.114	1338903	2685.17	35.36	3683	1335220
15	1338903	2677.80	593	1.188	1338903	2685.67	36.07	3931	1334972

9. CALP_Cover Text 9

No.	Cover Text		Hidden Message		Stego Text				
	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1410117	2820.23	62	0.126	1410117	2820.94	10.89	353	1409764
2	1410117	2820.23	100	0.202	1410117	2821.45	6.08	611	1409506
3	1410117	2820.23	139	0.280	1410117	2821.98	8.68	870	1409247
4	1410117	2820.23	177	0.356	1410117	2822.49	10.91	1128	1408989
5	1410117	2820.23	214	0.430	1410117	2822.98	11.45	1376	1408741
6	1410117	2820.23	251	0.504	1410117	2823.49	14.17	1672	1408490
7	1410117	2820.23	287	0.576	1410117	2823.97	19.53	1868	1408249
8	1410117	2820.23	324	0.650	1410117	2824.47	21.56	2116	1408001
9	1410117	2820.23	362	0.726	1410117	2824.98	18.86	2374	1407743

10	1410117	2820.23	401	0.804	1410117	2825.51	25.95	2639	1407478
11	1410117	2820.23	440	0.882	1410117	2826.03	28.99	2901	1407216
12	1410117	2820.23	480	0.962	1410117	2826.58	33.05	3170	1406947
13	1410117	2820.23	518	1.038	1410117	2827.08	33.75	3425	1406692
14	1410117	2820.23	556	1.114	1410117	2827.60	39.14	3683	1406434
15	1410117	2820.23	593	1.188	1410117	2828.09	41.38	3931	1406186

10. CALP_Cover Text 10

No.	Cover Text		Hidden Message		Stego Text				
	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1371071	2742.14	62	0.126	1371071	2742.85	4.72	353	1370718
2	1371071	2742.14	100	0.202	1371071	2743.37	7.05	611	1370460
3	1371071	2742.14	139	0.280	1371071	2743.88	9.84	870	1370201
4	1371071	2742.14	177	0.356	1371071	2744.40	11.21	1128	1369943
5	1371071	2742.14	214	0.430	1371071	2744.90	14.78	1376	1369956
6	1371071	2742.14	251	0.504	1371071	2745.40	16.70	1672	1369444
7	1371071	2742.14	287	0.576	1371071	2745.88	20.06	1868	1369203
8	1371071	2742.14	324	0.650	1371071	2746.38	22.27	2116	1368955
9	1371071	2742.14	362	0.726	1371071	2746.89	22.25	2374	1368697
10	1371071	2742.14	401	0.804	1371071	2747.42	25.27	2639	1368432
11	1371071	2742.14	440	0.882	1371071	2747.95	30.63	2901	1368170
12	1371071	2742.14	480	0.962	1371071	2748.48	32.76	3170	1367901
13	1371071	2742.14	518	1.038	1371071	2749.00	34.98	3425	1367646
14	1371071	2742.14	556	1.114	1371071	2749.51	35.43	3683	1367388
15	1371071	2742.14	593	1.188	1371071	2750.00	39.09	3931	1367140

11. CALP_Cover Text 11

No.	Cover Text		Hidden Message		Stego Text				
	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1304117	2608.24	62	0.126	1304117	2608.94	9.05	353	1303764
2	1304117	2608.24	100	0.202	1304117	2609.47	6.49	611	1303506
3	1304117	2608.24	139	0.280	1304117	2609.98	8.27	870	1303257
4	1304117	2608.24	177	0.356	1304117	2610.49	11.10	1128	1302989
5	1304117	2608.24	214	0.430	1304117	2610.99	13.45	1376	1302741

6	1304117	2608.24	251	0.504	1304117	2611.49	13.26	1672	1302490
7	1304117	2608.24	287	0.576	1304117	2611.97	16.76	1868	1302249
8	1304117	2608.24	324	0.650	1304117	2612.47	18.64	2116	1302001
9	1304117	2608.24	362	0.726	1304117	2612.98	20.42	2374	1301743
10	1304117	2608.24	401	0.804	1304117	2613.51	20.71	2639	1301478
11	1304117	2608.24	440	0.882	1304117	2614.04	26.03	2901	1301216
12	1304117	2608.24	480	0.962	1304117	2614.58	28.28	3170	1300947
13	1304117	2608.24	518	1.038	1304117	2615.09	29.10	3425	1300692
14	1304117	2608.24	556	1.114	1304117	2615.50	31.31	3683	1300434
15	1304117	2608.24	593	1.188	1304117	2616.10	32.15	3931	1300186

12. CALP_Cover Text 12

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1323584	2647.17	62	0.126	1323584	2647.88	8.42	353	1323231
2	1323584	2647.17	100	0.202	1323584	2648.39	7.44	611	1322973
3	1323584	2647.17	139	0.280	1323584	2648.91	7.29	870	1322714
4	1323584	2647.17	177	0.356	1323584	2649.42	10.65	1128	1322456
5	1323584	2647.17	214	0.430	1323584	2649.92	12.98	1376	1322208
6	1323584	2647.17	251	0.504	1323584	2650.42	13.22	1672	1321957
7	1323584	2647.17	287	0.576	1323584	2650.91	18.86	1868	1321716
8	1323584	2647.17	324	0.650	1323584	2651.40	17.44	2116	1321468
9	1323584	2647.17	362	0.726	1323584	2651.92	17.32	2374	1321210
10	1323584	2647.17	401	0.804	1323584	2652.45	20.51	2639	1320945
11	1323584	2647.17	440	0.882	1323584	2652.97	21.99	2901	1320683
12	1323584	2647.17	480	0.962	1323584	2653.51	23.67	3170	1320414
13	1323584	2647.17	518	1.038	1323584	2654.02	28.09	3425	1320159
14	1323584	2647.17	556	1.114	1323584	2654.54	24.86	3683	1319901
15	1323584	2647.17	593	1.188	1323584	2655.03	32.14	3931	1319653

13. CALP_Cover Text 13

No.	Cover Text		Hidden Message		Stego Text					
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1		1129687	2259.38	62	0.126	1129687	2260.08	3.34	353	1129334
2		1129687	2259.38	100	0.202	1129687	2260.59	5.38	611	1129076
3		1129687	2259.38	139	0.280	1129687	2261.11	7.16	870	1128817
4		1129687	2259.38	177	0.356	1129687	2261.63	9.05	1128	1128559
5		1129687	2259.38	214	0.430	1129687	2262.21	10.66	1376	1128311
6		1129687	2259.38	251	0.504	1129687	2262.63	12.06	1672	1128060
7		1129687	2259.38	287	0.576	1129687	2263.11	14.20	1868	1127819
8		1129687	2259.38	324	0.650	1129687	2263.61	13.67	2116	1127571
9		1129687	2259.38	362	0.726	1129687	2264.12	17.10	2374	1127313
10		1129687	2259.38	401	0.804	1129687	2264.65	18.84	2639	1127048
11		1129687	2259.38	440	0.882	1129687	2265.18	20.23	2901	1126786
12		1129687	2259.38	480	0.962	1129687	2265.72	24.99	3170	1126517
13		1129687	2259.38	518	1.038	1129687	2266.23	25.38	3425	1126262
14		1129687	2259.38	556	1.114	1129687	2266.74	28.69	3683	1126004
15		1129687	2259.38	593	1.188	1129687	2267.24	23.85	3931	1125756

14. CALP_Cover Text 14

No.	Cover Text		Hidden Message		Stego Text					
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1		1128671	2257.34	62	0.126	1128671	2258.05	3.70	353	1128318
2		1128671	2257.34	100	0.202	1128671	2258.57	5.02	611	1128060
3		1128671	2257.34	139	0.280	1128671	2259.08	7.34	870	1127801
4		1128671	2257.34	177	0.356	1128671	2259.60	8.18	1128	1127543
5		1128671	2257.34	214	0.430	1128671	2260.10	11.10	1376	1127295
6		1128671	2257.34	251	0.504	1128671	2260.60	13.00	1672	1127044
7		1128671	2257.34	287	0.576	1128671	2261.08	15.43	1868	1126803
8		1128671	2257.34	324	0.650	1128671	2261.58	17.04	2116	1126555
9		1128671	2257.34	362	0.726	1128671	2262.09	18.77	2374	1126297
10		1128671	2257.34	401	0.804	1128671	2262.62	18.90	2639	1126032
11		1128671	2257.34	440	0.882	1128671	2263.15	20.90	2901	1125770
12		1128671	2257.34	480	0.962	1128671	2263.68	27.39	3170	1125501
13		1128671	2257.34	518	1.038	1128671	2264.19	24.17	3425	1125246

14	1128671	2257.34	556	1.114	1128671	2264.71	26.88	3683	1124988
15	1128671	2257.34	593	1.188	1128671	2265.21	29.35	3931	1124740

15. CALP_Cover Text 15

No.	Cover Text		Hidden Message		Stego Text					
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1		1258665	2517.33	62	0.126	1258665	2518.04	8.69	353	1258312
2		1258665	2517.33	100	0.202	1258665	2518.54	6.82	611	1258054
3		1258665	2517.33	139	0.280	1258665	2519.07	7.65	870	1257795
4		1258665	2517.33	177	0.356	1258665	2519.59	9.45	1128	1257537
5		1258665	2517.33	214	0.430	1258665	2520.08	11.16	1376	1257289
6		1258665	2517.33	251	0.504	1258665	2520.58	13.30	1672	1257038
7		1258665	2517.33	287	0.576	1258665	2521.07	14.11	1868	1256797
8		1258665	2517.33	324	0.650	1258665	2521.64	15.95	2116	1256549
9		1258665	2517.33	362	0.726	1258665	2522.08	18.27	2374	1256291
10		1258665	2517.33	401	0.804	1258665	2522.61	19.48	2639	1256026
11		1258665	2517.33	440	0.882	1258665	2523.13	21.49	2901	1255764
12		1258665	2517.33	480	0.962	1258665	2523.67	23.72	3170	1255495
13		1258665	2517.33	518	1.038	1258665	2524.18	25.49	3425	1255240
14		1258665	2517.33	556	1.114	1258665	2524.70	28.20	3683	1254982
15		1258665	2517.33	593	1.188	1258665	2525.19	29.09	3931	1254734

16. CALP_Cover Text 16

No.	Cover Text		Hidden Message		Stego Text					
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1		1316417	2632.83	62	0.126	1316417	2633.54	3.53	353	1316064
2		1316417	2632.83	100	0.202	1316417	2634.06	6.04	611	1315806
3		1316417	2632.83	139	0.280	1316417	2634.58	7.92	870	1315547
4		1316417	2632.83	177	0.356	1316417	2635.09	10.09	1128	1315289
5		1316417	2632.83	214	0.430	1316417	2635.59	11.14	1376	1315041
6		1316417	2632.83	251	0.504	1316417	2636.09	13.15	1672	1314790
7		1316417	2632.83	287	0.576	1316417	2636.57	15.65	1868	1314549
8		1316417	2632.83	324	0.650	1316417	2637.07	15.44	2116	1314301
9		1316417	2632.83	362	0.726	1316417	2637.58	17.66	2374	1314043

10	1316417	2632.83	401	0.804	1316417	2638.11	19.61	2639	1312778
11	1316417	2632.83	440	0.882	1316417	2638.64	21.58	2901	1313416
12	1316417	2632.83	480	0.962	1316417	2639.18	23.19	3170	1313247
13	1316417	2632.83	518	1.038	1316417	2639.68	25.16	3425	1312992
14	1316417	2632.83	556	1.114	1316417	2640.20	26.78	3683	1312734
15	1316417	2632.83	593	1.188	1316417	2640.69	28.78	3931	1312486

17. CALP_Cover Text 17

No.	Cover Text		Hidden Message			Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1		1546911	3093.82	62	0.126	1546911	3094.53	4.05	353	1546558
2		1546911	3093.82	100	0.202	1546911	3095.05	6.62	611	1546300
3		1546911	3093.82	139	0.280	1546911	3095.56	8.44	870	1546041
4		1546911	3093.82	177	0.356	1546911	3096.08	10.17	1128	1545783
5		1546911	3093.82	214	0.430	1546911	3096.58	12.30	1376	1545535
6		1546911	3093.82	251	0.504	1546911	3097.08	13.97	1672	1545284
7		1546911	3093.82	287	0.576	1546911	3097.56	16.21	1868	1545043
8		1546911	3093.82	324	0.650	1546911	3098.06	18.27	2116	1544795
9		1546911	3093.82	362	0.726	1546911	3098.57	24.55	2374	1544537
10		1546911	3093.82	401	0.804	1546911	3099.10	22.13	2639	1544272
11		1546911	3093.82	440	0.882	1546911	3099.63	25.07	2901	1544010
12		1546911	3093.82	480	0.962	1546911	3100.16	27.36	3170	1543741
13		1546911	3093.82	518	1.038	1546911	3100.84	32.11	3425	1543486
14		1546911	3093.82	556	1.114	1546911	3101.19	36.28	3683	1543228
15		1546911	3093.82	593	1.188	1546911	3101.68	36.65	3931	1542980

18. CALP_Cover Text 18

No.	Cover Text		Hidden Message			Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1		1258819	2517.64	62	0.126	1258819	2518.35	4.56	353	1248466
2		1258819	2517.64	100	0.202	1258819	2518.86	6.97	611	1258208
3		1258819	2517.64	139	0.280	1258819	2519.38	8.60	870	1257949
4		1258819	2517.64	177	0.356	1258819	2519.89	10.22	1128	1257691

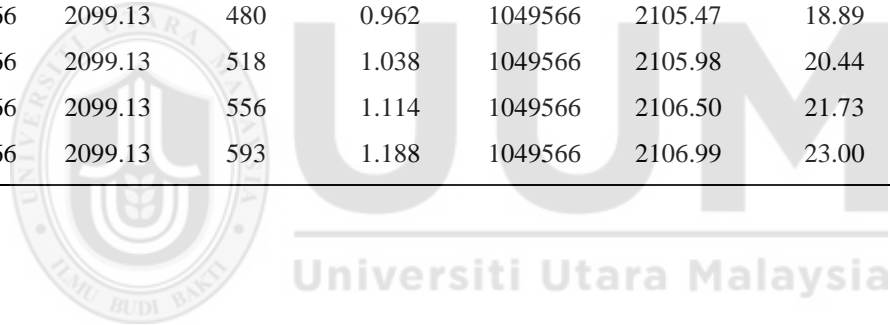
5	1258819	2517.64	214	0.430	1258819	2520.39	12.10	1376	1257443
6	1258819	2517.64	251	0.504	1258819	2520.89	13.61	1672	1257192
7	1258819	2517.64	287	0.576	1258819	2521.38	14.28	1868	1256951
8	1258819	2517.64	324	0.650	1258819	2521.87	18.02	2116	1256703
9	1258819	2517.64	362	0.726	1258819	2522.38	16.90	2374	1256445
10	1258819	2517.64	401	0.804	1258819	2522.92	19.08	2639	1256180
11	1258819	2517.64	440	0.882	1258819	2523.44	22.99	2901	1255918
12	1258819	2517.64	480	0.962	1258819	2523.98	25.04	3170	1255649
13	1258819	2517.64	518	1.038	1258819	2524.49	27.35	3425	1255539
14	1258819	2517.64	556	1.114	1258819	2525.01	29.60	3683	1255136
15	1258819	2517.64	593	1.188	1258819	2525.50	33.66	3931	1254888

19. CALP_Cover Text 19

No.	Cover Text		Hidden Message		Stego Text					
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1		1261780	2523.56	62	0.126	1261780	2524.29	3.59	353	1261427
2		1261780	2523.56	100	0.202	1261780	2524.78	4.82	611	1261169
3		1261780	2523.56	139	0.280	1261780	2525.30	7.09	870	1260910
4		1261780	2523.56	177	0.356	1261780	2525.82	8.99	1128	1260652
5		1261780	2523.56	214	0.430	1261780	2526.31	11.54	1376	1260404
6		1261780	2523.56	251	0.504	1261780	2526.82	12.60	1672	1260153
7		1261780	2523.56	287	0.576	1261780	2527.30	15.84	1868	1259912
8		1261780	2523.56	324	0.650	1261780	2527.79	18.53	2116	1259664
9		1261780	2523.56	362	0.726	1261780	2528.31	18.77	2374	1259406
10		1261780	2523.56	401	0.804	1261780	2528.84	22.28	2639	1259141
11		1261780	2523.56	440	0.882	1261780	2529.36	21.63	2901	1259364
12		1261780	2523.56	480	0.962	1261780	2529.90	23.39	3170	1258610
13		1261780	2523.56	518	1.038	1261780	2530.41	23.93	3425	1258355
14		1261780	2523.56	556	1.114	1261780	2530.93	26.14	3683	1258097
15		1261780	2523.56	593	1.188	1261780	2531.42	27.11	3931	1257849

20. CALP_Cover Text 20

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1049566	2099.13	62	0.126	1049566	2099.87	3.38	353	1049213
2	1049566	2099.13	100	0.202	1049566	2100.35	4.32	611	1048955
3	1049566	2099.13	139	0.280	1049566	2100.87	5.75	870	1048696
4	1049566	2099.13	177	0.356	1049566	2101.39	7.09	1128	1048438
5	1049566	2099.13	214	0.430	1049566	2101.89	8.53	1376	1048190
6	1049566	2099.13	251	0.504	1049566	2102.39	9.97	1672	1047939
7	1049566	2099.13	287	0.576	1049566	2102.87	11.46	1868	1047698
8	1049566	2099.13	324	0.650	1049566	2103.37	12.70	2116	1047450
9	1049566	2099.13	362	0.726	1049566	2103.88	13.85	2374	1047192
10	1049566	2099.13	401	0.804	1049566	2104.41	15.51	2639	1046927
11	1049566	2099.13	440	0.882	1049566	2104.94	16.94	2901	1046665
12	1049566	2099.13	480	0.962	1049566	2105.47	18.89	3170	1046396
13	1049566	2099.13	518	1.038	1049566	2105.98	20.44	3425	1046141
14	1049566	2099.13	556	1.114	1049566	2106.50	21.73	3683	1045883
15	1049566	2099.13	593	1.188	1049566	2106.99	23.00	3931	1045635



Appendix B

Result Experiment CURVE Scheme

CURVE Technique

1. CURVE_Cover Text -1

No.	Cover Text		Hidden Message		Stego Text				
	Hm	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1254440	2508.88	62	0.126	1254440	2509.28	4.41	353	1254087
2	1254440	2508.88	100	0.202	1254440	2509.61	6.70	611	1253829
3	1254440	2508.88	139	0.280	1254440	2509.96	7.73	870	1253570
4	1254440	2508.88	177	0.356	1254440	2510.25	10.20	1128	1253312
5	1254440	2508.88	214	0.430	1254440	2510.55	9.98	1376	1253064
6	1254440	2508.88	251	0.504	1254440	2510.86	12.76	1672	1252813
7	1254440	2508.88	287	0.576	1254440	2511.12	13.84	1868	1252572
8	1254440	2508.88	324	0.650	1254440	2511.47	15.70	2116	1252324
9	1254440	2508.88	362	0.726	1254440	2511.81	16.11	2374	1252066
10	1254440	2508.88	401	0.804	1254440	2512.12	19.38	2639	1251801
11	1254440	2508.88	440	0.882	1254440	2512.41	23.91	2901	1251539
12	1254440	2508.88	480	0.962	1254440	2512.71	23.60	3170	1251270
13	1254440	2508.88	518	1.038	1254440	2513.30	24.01	3425	1251015
14	1254440	2508.88	556	1.114	1254440	2513.35	26.45	3683	1250757
15	1254440	2508.88	593	1.188	1254440	2513.36	27.55	3931	1250509

2. CURVE_Cover Text 2

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1217495	2434.99	62	0.126	1217495	2435.40	3.77	353	1217142
2	1217495	2434.99	100	0.202	1217495	2435.77	5.12	611	1216884
3	1217495	2434.99	139	0.280	1217495	2436.11	9.26	870	1216625
4	1217495	2434.99	177	0.356	1217495	2436.38	7.96	1128	1216367
5	1217495	2434.99	214	0.430	1217495	2436.70	12.41	1376	1216119
6	1217495	2434.99	251	0.504	1217495	2436.98	10.12	1672	1215868
7	1217495	2434.99	287	0.576	1217495	2437.25	13.01	1868	1215627

8	1217495	2434.99	324	0.650	1217495	2437.59	15.13	2116	1215379
9	1217495	2434.99	362	0.726	1217495	2437.90	18.51	2374	1215121
10	1217495	2434.99	401	0.804	1217495	2438.21	20.18	2639	1214856
11	1217495	2434.99	440	0.882	1217495	2438.53	21.69	2901	1214594
12	1217495	2434.99	480	0.962	1217495	2438.89	25.83	3170	1214325
13	1217495	2434.99	518	1.038	1217495	2439.23	27.14	3425	1214070
14	1217495	2434.99	556	1.114	1217495	2439.54	24.96	3683	1213812
15	1217495	2434.99	593	1.188	1217495	2439.88	26.97	3931	1213564

3. CURVE_Cover text 3

No.	Cover Text		Hidden Message		Stego Text				
	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1298721	2597.44	62	0.126	1298721	2597.83	4.08	353	1298368
2	1298721	2597.44	100	0.202	1298721	2598.23	9.99	611	1298110
3	1298721	2597.44	139	0.280	1298721	2598.44	6.89	870	1297851
4	1298721	2597.44	177	0.356	1298721	2598.75	9.25	1128	1297593
5	1298721	2597.44	214	0.430	1298721	2599.09	11.65	1376	1297345
6	1298721	2597.44	251	0.504	1298721	2599.41	14.50	1672	1297094
7	1298721	2597.44	287	0.576	1298721	2599.69	16.50	1868	1296853
8	1298721	2597.44	324	0.650	1298721	2599.96	21.94	2116	1296605
9	1298721	2597.44	362	0.726	1298721	2600.29	21.02	2374	1296347
10	1298721	2597.44	401	0.804	1298721	2600.58	24.50	2639	1296082
11	1298721	2597.44	440	0.882	1298721	2600.87	26.48	2901	1295820
12	1298721	2597.44	480	0.962	1298721	2601.19	31.49	3170	1295551
13	1298721	2597.44	518	1.038	1298721	2601.55	30.05	3425	1295296
14	1298721	2597.44	556	1.114	1298721	2601.86	36.95	3683	1295038
15	1298721	2597.44	593	1.188	1298721	2602.19	34.02	3931	1294790

4. CURVE_Cover text 4

No.	Cover Text		Hidden Message		Stego Text				
	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1321623	2643.24	62	0.126	1321623	2643.68	4.57	353	1321270
2	1321623	2643.24	100	0.202	1321623	2644.05	5.71	611	1321012
3	1321623	2643.24	139	0.280	1321623	2644.36	8.23	870	1320753

4	1321623	2643.24	177	0.356	1321623	2644.69	11.28	1128	1320495
5	1321623	2643.24	214	0.430	1321623	2645.02	11.22	1376	1320247
6	1321623	2643.24	251	0.504	1321623	2645.36	13.39	1672	1319996
7	1321623	2643.24	287	0.576	1321623	2645.69	16.34	1868	1319755
8	1321623	2643.24	324	0.650	1321623	2646.02	16.32	2116	1319507
9	1321623	2643.24	362	0.726	1321623	2646.36	19.63	2374	1319249
10	1321623	2643.24	401	0.804	1321623	2646.67	21.93	2639	1318984
11	1321623	2643.24	440	0.882	1321623	2647.10	21.41	2901	1318722
12	1321623	2643.24	480	0.962	1321623	2647.49	23.01	3170	1318453
13	1321623	2643.24	518	1.038	1321623	2647.85	27.24	3425	1318198
14	1321623	2643.24	556	1.114	1321623	2648.16	31.58	3683	1317940
15	1321623	2643.24	593	1.188	1298721	2648.52	34.62	3931	1317692

5. CURVE_Cover text 5

No.	Cover Text		Hidden Message		Stego Text				
	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1388644	2777.29	62	0.126	1388644	2777.67	4.59	353	1388291
2	1388644	2777.29	100	0.202	1388644	2778.00	6.37	611	1388083
3	1388644	2777.29	139	0.280	1388644	2778.32	8.55	870	1387774
4	1388644	2777.29	177	0.356	1388644	2778.69	9.92	1128	1387516
5	1388644	2777.29	214	0.430	1388644	2779.03	11.64	1376	1387268
6	1388644	2777.29	251	0.504	1388644	2779.03	13.98	1672	1387017
7	1388644	2777.29	287	0.576	1388644	2779.63	15.69	1868	1386776
8	1388644	2777.29	324	0.650	1388644	2779.94	17.69	2116	1386528
9	1388644	2777.29	362	0.726	1388644	2780.31	20.89	2374	1386270
10	1388644	2777.29	401	0.804	1388644	2780.71	21.51	2639	1386005
11	1388644	2777.29	440	0.882	1388644	2781.06	23.67	2901	1385743
12	1388644	2777.29	480	0.962	1388644	2781.42	27.25	3170	1385474
13	1388644	2777.29	518	1.038	1388644	2781.76	29.57	3425	1386942
14	1388644	2777.29	556	1.114	1388644	2782.07	30.64	3683	1384961
15	1388644	2777.29	593	1.188	1388644	2782.43	32.58	3931	1384713

6. CURVE_Cover text 6

No.	Cover Text		Hidden Message		Stego Text				
	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1254765	2509.53	62	0.126	1254765	2509.92	4.07	353	1254412
2	1254765	2509.53	100	0.202	1254765	2510.22	5.55	611	1254154
3	1254765	2509.53	139	0.280	1254765	2510.50	8.70	870	1253895
4	1254765	2509.53	177	0.356	1254765	2510.78	9.97	1128	1253637
5	1254765	2509.53	214	0.430	1254765	2511.08	11.12	1376	1253389
6	1254765	2509.53	251	0.504	1254765	2511.36	12.92	1672	1253138
7	1254765	2509.53	287	0.576	1254765	2511.68	14.31	1868	1252897
8	1254765	2509.53	324	0.650	1254765	2512.00	17.14	2116	1252649
9	1254765	2509.53	362	0.726	1254765	2512.32	18.30	2374	1252391
10	1254765	2509.53	401	0.804	1254765	2512.63	21.86	2639	1252126
11	1254765	2509.53	440	0.882	1254765	2512.94	21.23	2901	1251864
12	1254765	2509.53	480	0.962	1254765	2513.23	23.48	3170	1251595
13	1254765	2509.53	518	1.038	1254765	2513.52	26.35	3425	1251340
14	1254765	2509.53	556	1.114	1254765	2513.80	26.94	3683	1251082
15	1254765	2509.53	593	1.188	1254765	2514.10	29.97	3931	1250834

7. CURVE_Cover text 7

No.	Cover Text		Hidden Message		Stego Text				
	Hm Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1256772	2513.55	62	0.126	125772	2513.96	4.52	353	1256419
2	1256772	2513.55	100	0.202	125772	2514.28	7.85	611	1256161
3	1256772	2513.55	139	0.280	125772	2514.62	8.26	870	1255902
4	1256772	2513.55	177	0.356	125772	2514.95	12.79	1128	1255644
5	1256772	2513.55	214	0.430	125772	2515.24	14.83	1376	1255396
6	1256772	2513.55	251	0.504	125772	2515.56	17.54	1672	1255145
7	1256772	2513.55	287	0.576	125772	2515.82	19.87	1868	1254904
8	1256772	2513.55	324	0.650	125772	2516.08	21.33	2116	1254656
9	1256772	2513.55	362	0.726	125772	2516.36	25.27	2374	1254398
10	1256772	2513.55	401	0.804	125772	2516.68	27.67	2639	1254133
11	1256772	2513.55	440	0.882	125772	2516.96	30.03	2901	1253871
12	1256772	2513.55	480	0.962	125772	2517.29	30.76	3170	1253602
13	1256772	2513.55	518	1.038	125772	2517.65	33.60	3425	1253347

14	1256772	2513.55	556	1.114	125772	2517.98	37.22	3683	1253089
15	1256772	2513.55	593	1.188	125772	2518.29	40.23	3931	1252841

8. CURVE_Cover text 8

No.	Cover Text		Hidden Message		Stego Text				
	Hm	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1338903	2677.80	62	0.126	1338903	2678.23	4.14	353	1338550
2	1338903	2677.80	100	0.202	1338903	2678.54	6.76	611	1338292
3	1338903	2677.80	139	0.280	1338903	2678.91	10.38	870	1338033
4	1338903	2677.80	177	0.356	1338903	2679.21	12.60	1128	1337775
5	1338903	2677.80	214	0.430	1338903	2679.47	14.57	1376	1337527
6	1338903	2677.80	251	0.504	1338903	2679.77	16.02	1672	1337278
7	1338903	2677.80	287	0.576	1338903	2680.08	24.76	1868	1337035
8	1338903	2677.80	324	0.650	1338903	2680.44	22.86	2116	1336787
9	1338903	2677.80	362	0.726	1338903	2680.76	24.37	2374	1336529
10	1338903	2677.80	401	0.804	1338903	2681.06	30.23	2639	1336264
11	1338903	2677.80	440	0.882	1338903	2681.41	31.89	2901	1336002
12	1338903	2677.80	480	0.962	1338903	2681.70	27.29	3170	1335733
13	1338903	2677.80	518	1.038	1338903	2682.21	32.77	3425	1335478
14	1338903	2677.80	556	1.114	1338903	2682.41	35.30	3683	1335220
15	1338903	2677.80	593	1.188	1338903	2682.70	36.42	3931	1334972

9. CURVE_Cover Text 9

No.	Cover Text		Hidden Message		Stego Text				
	Hm	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1410117	2820.23	62	0.126	1410117	2820.60	4.91	353	1409764
2	1410117	2820.23	100	0.202	1410117	2820.92	9.08	611	1409506
3	1410117	2820.23	139	0.280	1410117	2821.25	10.70	870	1409247
4	1410117	2820.23	177	0.356	1410117	2821.55	13.62	1128	1408989
5	1410117	2820.23	214	0.430	1410117	2821.87	17.82	1376	1408741
6	1410117	2820.23	251	0.504	1410117	2822.23	20.66	1672	1408490
7	1410117	2820.23	287	0.576	1410117	2822.55	22.09	1868	1408249
8	1410117	2820.23	324	0.650	1410117	2822.88	24.23	2116	1408001
9	1410117	2820.23	362	0.726	1410117	2823.23	27.33	2374	1407743

10	1410117	2820.23	401	0.804	1410117	2823.52	29.53	2639	1407478
11	1410117	2820.23	440	0.882	1410117	2823.85	33.54	2901	1407216
12	1410117	2820.23	480	0.962	1410117	2824.17	34.89	3170	1406947
13	1410117	2820.23	518	1.038	1410117	2824.46	40.08	3425	1406692
14	1410117	2820.23	556	1.114	1410117	2824.83	40.91	3683	1406434
15	1410117	2820.23	593	1.188	1410117	2825.15	49.92	3931	1406186

10. CURVE_Cover 10

No.	Cover Text		Hidden Message		Stego Text				
Hm	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1371071	2742.14	62	0.126	1371071	2742.52	8.27	353	1370718
2	1371071	2742.14	100	0.202	1371071	2742.81	8.26	611	1370460
3	1371071	2742.14	139	0.280	1371071	2743.14	8.01	870	1370201
4	1371071	2742.14	177	0.356	1371071	2743.50	10.96	1128	1369943
5	1371071	2742.14	214	0.430	1371071	2743.85	13.31	1376	1369956
6	1371071	2742.14	251	0.504	1371071	2744.16	16.15	1672	1369444
7	1371071	2742.14	287	0.576	1371071	2744.52	15.73	1868	1369203
8	1371071	2742.14	324	0.650	1371071	2744.82	20.00	2116	1368955
9	1371071	2742.14	362	0.726	1371071	2745.18	21.26	2374	1368697
10	1371071	2742.14	401	0.804	1371071	2745.53	25.75	2639	1368432
11	1371071	2742.14	440	0.882	1371071	2745.84	25.36	2901	1368170
12	1371071	2742.14	480	0.962	1371071	2746.17	28.62	3170	1367901
13	1371071	2742.14	518	1.038	1371071	2746.49	28.45	3425	1367646
14	1371071	2742.14	556	1.114	1371071	2746.82	33.89	3683	1367388
15	1371071	2742.14	593	1.188	1371071	2747.10	32.85	3931	1367140

11. CURVE_Cover Text 11

No.	Cover Text		Hidden Message		Stego Text				
Hm	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1304117	2608.24	62	0.126	1304117	2608.63	4.91	353	1303764
2	1304117	2608.24	100	0.202	1304117	2608.95	6.93	611	1303506
3	1304117	2608.24	139	0.280	1304117	2609.27	8.44	870	1303257

4	1304117	2608.24	177	0.356	1304117	2609.59	11.17	1128	1302989
5	1304117	2608.24	214	0.430	1304117	2609.88	12.37	1376	1302741
6	1304117	2608.24	251	0.504	1304117	2610.17	14.20	1672	1302490
7	1304117	2608.24	287	0.576	1304117	2610.44	15.26	1868	1302249
8	1304117	2608.24	324	0.650	1304117	2610.76	18.36	2116	1302001
9	1304117	2608.24	362	0.726	1304117	2611.13	20.94	2374	1301743
10	1304117	2608.24	401	0.804	1304117	2611.52	24.75	2639	1301478
11	1304117	2608.24	440	0.882	1304117	2611.84	27.94	2901	1301216
12	1304117	2608.24	480	0.962	1304117	2612.17	29.55	3170	1300947
13	1304117	2608.24	518	1.038	1304117	2612.46	29.72	3425	1300692
14	1304117	2608.24	556	1.114	1304117	2612.79	33.99	3683	1300434
15	1304117	2608.24	593	1.188	1304117	2613.08	36.93	3931	1300186

12. CURVE_Cover Text 12

No.	Cover Text		Hidden Message		Stego Text				
	Hm	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1323584	2647.17	62	0.126	1323584	2647.54	5.40	353	1323231
2	1323584	2647.17	100	0.202	1323584	2647.88	8.47	611	1322973
3	1323584	2647.17	139	0.280	1323584	2648.24	7.98	870	1322714
4	1323584	2647.17	177	0.356	1323584	2648.56	11.80	1128	1322456
5	1323584	2647.17	214	0.430	1323584	2648.89	12.07	1376	1322208
6	1323584	2647.17	251	0.504	1323584	2649.24	16.20	1672	1321957
7	1323584	2647.17	287	0.576	1323584	2649.56	16.39	1868	1321716
8	1323584	2647.17	324	0.650	1323584	2649.88	17.25	2116	1321468
9	1323584	2647.17	362	0.726	1323584	2650.18	18.21	2374	1321210
10	1323584	2647.17	401	0.804	1323584	2650.59	18.55	2639	1320945
11	1323584	2647.17	440	0.882	1323584	2650.78	25.81	2901	1320683
12	1323584	2647.17	480	0.962	1323584	2651.13	28.69	3170	1320414
13	1323584	2647.17	518	1.038	1323584	2651.42	30.14	3425	1320159
14	1323584	2647.17	556	1.114	1323584	2651.71	33.32	3683	1319901
15	1323584	2647.17	593	1.188	1323584	2652.04	30.45	3931	1319653

13. CURVE_Cover Text 13

No.	Cover Text		Hidden Message		Stego Text				
	Hm	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used

1	1129687	2259.38	62	0.126	1129687	2259.77	7.43	353	1129334
2	1129687	2259.38	100	0.202	1129687	2260.10	5.53	611	1129076
3	1129687	2259.38	139	0.280	1129687	2260.45	7.66	870	1128817
4	1129687	2259.38	177	0.356	1129687	2260.80	8.62	1128	1128559
5	1129687	2259.38	214	0.430	1129687	2261.10	8.53	1376	1128311
6	1129687	2259.38	251	0.504	1129687	2261.42	11.67	1672	1128060
7	1129687	2259.38	287	0.576	1129687	2261.71	13.64	1868	1127819
8	1129687	2259.38	324	0.650	1129687	2262.01	13.55	2116	1127571
9	1129687	2259.38	362	0.726	1129687	2262.37	16.37	2374	1127313
10	1129687	2259.38	401	0.804	1129687	2262.66	15.90	2639	1127048
11	1129687	2259.38	440	0.882	1129687	2262.98	17.43	2901	1126786
12	1129687	2259.38	480	0.962	1129687	2263.34	18.51	3170	1126517
13	1129687	2259.38	518	1.038	1129687	2263.63	21.12	3425	1126262
14	1129687	2259.38	556	1.114	1129687	2263.95	22.17	3683	1126004
15	1129687	2259.38	593	1.188	1129687	2264.23	30.31	3931	1125756

14. CURVE_Cover Text 14

No.	Cover Text		Hidden Message		Stego Text				
	Hm	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1128671	2257.34	62	0.126	1128671	2257.76	3.94	353	1128318
2	1128671	2257.34	100	0.202	1128671	2258.05	5.00	611	1128060
3	1128671	2257.34	139	0.280	1128671	2258.32	8.04	870	1127801
4	1128671	2257.34	177	0.356	1128671	2258.65	9.67	1128	1127543
5	1128671	2257.34	214	0.430	1128671	2258.95	11.98	1376	1127295
6	1128671	2257.34	251	0.504	1128671	2259.21	12.93	1672	1127044
7	1128671	2257.34	287	0.576	1128671	2259.52	14.34	1868	1126803
8	1128671	2257.34	324	0.650	1128671	2259.79	16.66	2116	1126555
9	1128671	2257.34	362	0.726	1128671	2260.11	17.04	2374	1126297
10	1128671	2257.34	401	0.804	1128671	2260.43	21.23	2639	1126032
11	1128671	2257.34	440	0.882	1128671	2260.76	17.63	2901	1125770
12	1128671	2257.34	480	0.962	1128671	2261.04	25.92	3170	1125501
13	1128671	2257.34	518	1.038	1128671	2261.36	24.54	3425	1125246
14	1128671	2257.34	556	1.114	1128671	2261.63	27.22	3683	1124988
15	1128671	2257.34	593	1.188	1128671	2261.89	29.72	3931	1124740

15. CURVE_Cover Text 15

No.	Cover Text		Hidden Message		Stego Text				
	Hm	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1258665	2517.33	62	0.126	1258665	2517.72	4.48	353	1258312
2	1258665	2517.33	100	0.202	1258665	2518.01	6.94	611	1258054
3	1258665	2517.33	139	0.280	1258665	2518.32	8.71	870	1257795
4	1258665	2517.33	177	0.356	1258665	2518.62	8.14	1128	1257537
5	1258665	2517.33	214	0.430	1258665	2518.93	11.38	1376	1257289
6	1258665	2517.33	251	0.504	1258665	2519.21	10.87	1672	1257038
7	1258665	2517.33	287	0.576	1258665	2519.50	13.93	1868	1256797
8	1258665	2517.33	324	0.650	1258665	2519.80	16.94	2116	1256549
9	1258665	2517.33	362	0.726	1258665	2520.12	18.83	2374	1256291
10	1258665	2517.33	401	0.804	1258665	2520.47	21.39	2639	1256026
11	1258665	2517.33	440	0.882	1258665	2520.75	23.56	2901	1255764
12	1258665	2517.33	480	0.962	1258665	2521.10	27.37	3170	1255495
13	1258665	2517.33	518	1.038	1258665	2521.44	29.13	3425	1255240
14	1258665	2517.33	556	1.114	1258665	2521.76	30.22	3683	1254982
15	1258665	2517.33	593	1.188	1258665	2522.10	33.48	3931	1254734

16. CURVER_Cover Text 16

No.	Cover Text		Hidden Message		Stego Text				
	Hm	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1316417	2632.83	62	0.126	1316417	2633.21	4.09	353	1316064
2	1316417	2632.83	100	0.202	1316417	2633.48	6.74	611	1315806
3	1316417	2632.83	139	0.280	1316417	2633.78	7.58	870	1315547
4	1316417	2632.83	177	0.356	1316417	2634.16	11.72	1128	1315289
5	1316417	2632.83	214	0.430	1316417	2634.51	10.70	1376	1315041
6	1316417	2632.83	251	0.504	1316417	2634.82	15.08	1672	1314790
7	1316417	2632.83	287	0.576	1316417	2635.13	17.83	1868	1314549
8	1316417	2632.83	324	0.650	1316417	2635.46	19.42	2116	1314301
9	1316417	2632.83	362	0.726	1316417	2635.85	20.47	2374	1314043
10	1316417	2632.83	401	0.804	1316417	2636.19	24.63	2639	1312778
11	1316417	2632.83	440	0.882	1316417	2636.51	23.36	2901	1313416
12	1316417	2632.83	480	0.962	1316417	2636.82	22.33	3170	1313247
13	1316417	2632.83	518	1.038	1316417	2637.13	29.16	3425	1312992

14	1316417	2632.83	556	1.114	1316417	2637.45	29.57	3683	1312734
15	1316417	2632.83	593	1.188	1316417	2637.78	27.47	3931	1312486

17. CURVE_Cover Text 17

No.	Cover Text		Hidden Message		Stego Text				
	Hm	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1546911	3093.82	62	0.126	1546911	3094.24	6.28	353	1546558
2	1546911	3093.82	100	0.202	1546911	3094.56	6.78	611	1546300
3	1546911	3093.82	139	0.280	1546911	3094.86	8.32	870	1546041
4	1546911	3093.82	177	0.356	1546911	3095.16	13.08	1128	1545783
5	1546911	3093.82	214	0.430	1546911	3095.47	15.56	1376	1545535
6	1546911	3093.82	251	0.504	1546911	3095.80	17.26	1672	1545284
7	1546911	3093.82	287	0.576	1546911	3096.13	18.51	1868	1545043
8	1546911	3093.82	324	0.650	1546911	3096.43	22.35	2116	1544795
9	1546911	3093.82	362	0.726	1546911	3096.74	25.07	2374	1544537
10	1546911	3093.82	401	0.804	1546911	3097.04	27.31	2639	1544272
11	1546911	3093.82	440	0.882	1546911	3097.39	28.82	2901	1544010
12	1546911	3093.82	480	0.962	1546911	3097.78	34.62	3170	1543741
13	1546911	3093.82	518	1.038	1546911	3098.11	36.05	3425	1543486
14	1546911	3093.82	556	1.114	1546911	3098.43	40.99	3683	1543228
15	1546911	3093.82	593	1.188	1546911	3098.71	43.51	3931	1542980

18 CURVE_Cover Text 18

No.	Cover Text		Hidden Message		Stego Text				
	Hm	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1258819	2517.64	62	0.126	1258819	2517.80	4.14	353	1248466
2	1258819	2517.64	100	0.202	1258819	2518.38	6.39	611	1258208
3	1258819	2517.64	139	0.280	1258819	2518.73	8.77	870	1257949
4	1258819	2517.64	177	0.356	1258819	2518.91	9.83	1128	1257691
5	1258819	2517.64	214	0.430	1258819	2519.33	12.13	1376	1257443
6	1258819	2517.64	251	0.504	1258819	2519.69	14.67	1672	1257192
7	1258819	2517.64	287	0.576	1258819	2520.04	15.99	1868	1256951
8	1258819	2517.64	324	0.650	1258819	2520.37	18.89	2116	1256703
9	1258819	2517.64	362	0.726	1258819	2520.75	19.13	2374	1256445

10	1258819	2517.64	401	0.804	1258819	2521.08	24.30	2639	1256180
11	1258819	2517.64	440	0.882	1258819	2521.41	23.13	2901	1255918
12	1258819	2517.64	480	0.962	1258819	2521.70	29.13	3170	1255649
13	1258819	2517.64	518	1.038	1258819	2522.01	30.61	3425	1255539
14	1258819	2517.64	556	1.114	1258819	2522.36	31.51	3683	1255136
15	1258819	2517.64	593	1.188	1258819	2522.68	34.90	3931	1254888

19. CURVE_Cover Text 19

No.	Cover Text		Hidden Message		Stego Text				
	Hm	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1261780	2523.56	62	0.126	1261780	2523.96	4.28	353	1261427
2	1261780	2523.56	100	0.202	1261780	2524.23	6.57	611	1261169
3	1261780	2523.56	139	0.280	1261780	2524.62	7.78	870	1260910
4	1261780	2523.56	177	0.356	1261780	2524.94	11.18	1128	1260652
5	1261780	2523.56	214	0.430	1261780	2525.22	13.56	1376	1260404
6	1261780	2523.56	251	0.504	1261780	2525.54	15.04	1672	1260153
7	1261780	2523.56	287	0.576	1261780	2525.84	17.28	1868	1259912
8	1261780	2523.56	324	0.650	1261780	2526.15	18.41	2116	1259664
9	1261780	2523.56	362	0.726	1261780	2526.51	20.55	2374	1259406
10	1261780	2523.56	401	0.804	1261780	2526.86	23.72	2639	1259141
11	1261780	2523.56	440	0.882	1261780	2527.20	26.47	2901	1259364
12	1261780	2523.56	480	0.962	1261780	2527.56	27.94	3170	1258610
13	1261780	2523.56	518	1.038	1261780	2527.88	30.93	3425	1258355
14	1261780	2523.56	556	1.114	1261780	2528.18	32.94	3683	1258097
15	1261780	2523.56	593	1.188	1261780	2528.54	35.18	3931	1257849

20. CURVE_Cover Text 20

No.	Cover Text		Hidden Message		Stego Text				
	Hm	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1049566	2099.13	62	0.126	1049566	2099.53	3.31	353	1049213
2	1049566	2099.13	100	0.202	1049566	2099.88	5.15	611	1048955
3	1049566	2099.13	139	0.280	1049566	2100.23	6.54	870	1048696
4	1049566	2099.13	177	0.356	1049566	2100.57	9.20	1128	1048438

5	1049566	2099.13	214	0.430	1049566	2100.88	11.38	1376	1048190
6	1049566	2099.13	251	0.504	1049566	2101.17	13.57	1672	1047939
7	1049566	2099.13	287	0.576	1049566	2101.48	13.43	1868	1047698
8	1049566	2099.13	324	0.650	1049566	2101.81	16.93	2116	1047450
9	1049566	2099.13	362	0.726	1049566	2102.17	18.62	2374	1047192
10	1049566	2099.13	401	0.804	1049566	2102.51	20.06	2639	1046927
11	1049566	2099.13	440	0.882	1049566	2102.85	18.14	2901	1046665
12	1049566	2099.13	480	0.962	1049566	2103.21	24.30	3170	1046396
13	1049566	2099.13	518	1.038	1049566	2103.56	26.53	3425	1046141
14	1049566	2099.13	556	1.114	1049566	2103.90	29.22	3683	1045883
15	1049566	2099.13	593	1.188	1049566	2104.23	29.98	3931	1045635



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Appendix C

Result Experiment VERT Scheme

1. VERT_Cover Text 1

No.	Cover Text		Hidden Message			Stego Text			
	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1254440	2508.88	62	0.126	1254440	2508.97	3.86	345	1254095
2	1254440	2508.88	100	0.202	1254440	2509.06	6.38	598	1253842
3	1254440	2508.88	139	0.280	1254440	2509.09	8.53	853	1253587
4	1254440	2508.88	177	0.356	1254440	2509.16	9.80	1111	1253329
5	1254440	2508.88	214	0.430	1254440	2509.23	12.17	1367	1253085
6	1254440	2508.88	251	0.504	1254440	2509.30	15.17	1672	1252813
7	1254440	2508.88	287	0.576	1254440	2509.31	16.24	1868	1252572
8	1254440	2508.88	324	0.650	1254440	2509.34	17.65	2084	1252356
9	1254440	2508.88	362	0.726	1254440	2509.40	20.05	2338	1252066
10	1254440	2508.88	401	0.804	1254440	2509.47	21.47	2597	1251843
11	1254440	2508.88	440	0.882	1254440	2509.54	24.78	2895	1251581
12	1254440	2508.88	480	0.962	1254440	2509.63	25.33	3121	1251319
13	1254440	2508.88	518	1.038	1254440	2509.72	29.53	3373	1251067
14	1254440	2508.88	556	1.114	1254440	2509.78	29.81	3632	1250808
15	1254440	2508.88	593	1.188	1254440	2509.85	32.95	3879	1250561

2. VERT_Cover Text 2

No.	Cover Text		Hidden Message			Stego Text			
	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1217495	2434.99	62	0.126	1217495	2435.07	6.66	346	1217149
2	1217495	2434.99	100	0.202	1217495	2435.07	5.56	598	1216641
3	1217495	2434.99	139	0.280	1217495	2435.14	7.33	854	1216625
4	1217495	2434.99	177	0.356	1217495	2435.19	8.38	1107	1216388
5	1217495	2434.99	214	0.430	1217495	2435.23	9.60	1351	1216144
6	1217495	2434.99	251	0.504	1217495	2435.10	12.04	1599	1215896
7	1217495	2434.99	287	0.576	1217495	2435.37	13.84	1840	1215655
8	1217495	2434.99	324	0.650	1217495	2435.41	15.45	2088	1215407

9	1217495	2434.99	362	0.726	1217495	2435.54	21.26	2345	1215121
10	1217495	2434.99	401	0.804	1217495	2435.55	22.97	2605	1214856
11	1217495	2434.99	440	0.882	1217495	2435.59	25.38	2866	1214629
12	1217495	2434.99	480	0.962	1217495	2435.62	24.29	3132	1214363
13	1217495	2434.99	518	1.038	1217495	2435.63	24.73	3385	1214110
14	1217495	2434.99	556	1.114	1217495	2435.69	29.81	3638	1213857
15	1217495	2434.99	593	1.188	1217495	2435.72	31.24	3879	1213616

3. VERT_Cover text 3

No.	Cover Text		Hidden Message		Stego Text				
	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1298721	2597.44	62	0.126	1298721	2597.52	4.49	353	1298378
2	1298721	2597.44	100	0.202	1298721	2597.59	6.18	603	1298118
3	1298721	2597.44	139	0.280	1298721	2597.63	7.16	858	1297863
4	1298721	2597.44	177	0.356	1298721	2597.71	13.92	1109	1287612
5	1298721	2597.44	214	0.430	1298721	2597.78	13.97	1376	1297365
6	1298721	2597.44	251	0.504	1298721	2597.79	15.92	1601	1297120
7	1298721	2597.44	287	0.576	1298721	2597.86	17.97	1836	1296885
8	1298721	2597.44	324	0.650	1298721	2597.93	22.21	2080	1296641
9	1298721	2597.44	362	0.726	1298721	2598.06	22.67	2333	1296388
10	1298721	2597.44	401	0.804	1298721	2598.10	25.70	2593	1296128
11	1298721	2597.44	440	0.882	1298721	2598.20	22.51	2854	1295867
12	1298721	2597.44	480	0.962	1298721	2598.25	26.70	3118	1295603
13	1298721	2597.44	518	1.038	1298721	2598.32	26.34	3369	1295352
14	1298721	2597.44	556	1.114	1298721	2598.37	31.65	3623	1295098
15	1298721	2597.44	593	1.188	1298721	2598.45	28.35	3869	1294852

4. VERT_Cover text 4

No.	Cover Text		Hidden Message		Stego Text				
	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1	1321623	2643.24	62	0.126	1321623	2643.35	4.41	342	1321281
2	1321623	2643.24	100	0.202	1321623	2643.39	5.57	598	1321027
3	1321623	2643.24	139	0.280	1321623	2643.43	7.94	852	1320771

4	1321623	2643.24	177	0.356	1321623	2643.46	11.58	1108	1320515
5	1321623	2643.24	214	0.430	1321623	2643.51	13.87	1350	1320273
6	1321623	2643.24	251	0.504	1321623	2643.53	15.24	1601	1320002
7	1321623	2643.24	287	0.576	1321623	2643.58	16.20	1868	1319755
8	1321623	2643.24	324	0.650	1321623	2643.60	19.91	2083	1319540
9	1321623	2643.24	362	0.726	1321623	2643.63	21.55	2336	1319287
10	1321623	2643.24	401	0.804	1321623	2643.67	20.09	2600	1319023
11	1321623	2643.24	440	0.882	1321623	2643.68	25.44	2858	1318765
12	1321623	2643.24	480	0.962	1321623	2643.68	24.73	3125	1318498
13	1321623	2643.24	518	1.038	1321623	2643.69	29.13	3376	1318247
14	1321623	2643.24	556	1.114	1321623	2643.70	30.56	3633	1317990
15	1321623	2643.24	593	1.188	1298721	2643.76	33.11	3880	1317743

5. VERT_Cover text 5

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1388644	2777.29	62	0.126	1388644	2777.39	4.58	344	1388300
2	1388644	2777.29	100	0.202	1388644	2777.44	9.10	611	1388083
3	1388644	2777.29	139	0.280	1388644	2777.49	12.35	858	1387786
4	1388644	2777.29	177	0.356	1388644	2777.52	11.66	1113	1387531
5	1388644	2777.29	214	0.430	1388644	2777.60	14.31	1376	1387286
6	1388644	2777.29	251	0.504	1388644	2777.60	13.96	1603	1387041
7	1388644	2777.29	287	0.576	1388644	2777.62	16.67	1841	1386803
8	1388644	2777.29	324	0.650	1388644	2777.62	18.87	2085	1386550
9	1388644	2777.29	362	0.726	1388644	2777.63	18.35	2337	1386307
10	1388644	2777.29	401	0.804	1388644	2777.65	20.50	2599	1386045
11	1388644	2777.29	440	0.882	1388644	2777.66	23.00	2855	1385789
12	1388644	2777.29	480	0.962	1388644	2777.67	25.54	3170	1385474
13	1388644	2777.29	518	1.038	1388644	2777.68	27.99	3372	1385272
14	1388644	2777.29	556	1.114	1388644	2777.73	31.69	3683	1384961
15	1388644	2777.29	593	1.188	1388644	2777.74	32.86	3873	1384771

6. CURVE_Cover text 6

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1254765	2509.53	62	0.126	1254765	2509.62	4.24	349	1254416
2	1254765	2509.53	100	0.202	1254765	2509.70	5.52	611	1254154
3	1254765	2509.53	139	0.280	1254765	2509.75	7.50	870	1253895
4	1254765	2509.53	177	0.356	1254765	2509.82	10.33	1114	1253651
5	1254765	2509.53	214	0.430	1254765	2509.88	10.74	1376	1253389
6	1254765	2509.53	251	0.504	1254765	2509.92	17.17	1610	1253155
7	1254765	2509.53	287	0.576	1254765	2510.00	18.61	1868	1252897
8	1254765	2509.53	324	0.650	1254765	2510.02	15.03	2089	1252676
9	1254765	2509.53	362	0.726	1254765	2510.08	18.21	2345	1252420
10	1254765	2509.53	401	0.804	1254765	2510.14	19.05	2605	1252160
11	1254765	2509.53	440	0.882	1254765	2510.21	24.37	2861	1251904
12	1254765	2509.53	480	0.962	1254765	2510.29	27.25	3129	1251636
13	1254765	2509.53	518	1.038	1254765	2510.41	30.38	3382	1251383
14	1254765	2509.53	556	1.114	1254765	2510.49	31.84	3680	1251135
15	1254765	2509.53	593	1.188	1254765	2510.58	34.26	3881	1250884

7. VERT_Cover text 7

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1256772	2513.55	62	0.126	125772	2513.64	4.09	347	1256425
2	1256772	2513.55	100	0.202	125772	2513.64	6.38	603	1256169
3	1256772	2513.55	139	0.280	125772	2513.64	7.92	859	1255913
4	1256772	2513.55	177	0.356	125772	2513.72	8.88	1114	1255658
5	1256772	2513.55	214	0.430	125772	2513.79	9.78	1355	1255417
6	1256772	2513.55	251	0.504	125772	2513.82	10.87	1604	1255168
7	1256772	2513.55	287	0.576	125772	2513.89	15.46	1842	1254930
8	1256772	2513.55	324	0.650	125772	2514.00	15.35	2087	1254685
9	1256772	2513.55	362	0.726	125772	2514.09	17.17	2342	1254430
10	1256772	2513.55	401	0.804	125772	2514.12	21.52	2605	1254167
11	1256772	2513.55	440	0.882	125772	2514.25	23.67	2865	1253907
12	1256772	2513.55	480	0.962	125772	2514.32	26.09	3130	1253642

13	1256772	2513.55	518	1.038	125772	2514.34	27.14	3382	1253390
14	1256772	2513.55	556	1.114	125772	2514.34	26.75	3637	1253135
15	1256772	2513.55	593	1.188	125772	2514.39	32.11	3883	1252889

8. VERT_Cover text 8

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1338903	2677.80	62	0.126	1338903	2677.90	4.60	347	1338556
2	1338903	2677.80	100	0.202	1338903	2677.95	6.40	603	1338300
3	1338903	2677.80	139	0.280	1338903	2677.96	9.76	857	1338046
4	1338903	2677.80	177	0.356	1338903	2678.04	11.11	1110	1337793
5	1338903	2677.80	214	0.430	1338903	2678.15	13.09	1356	1337547
6	1338903	2677.80	251	0.504	1338903	2678.23	16.24	1602	1337301
7	1338903	2677.80	287	0.576	1338903	2678.30	16.81	1839	1337064
8	1338903	2677.80	324	0.650	1338903	2678.31	19.35	2081	1336822
9	1338903	2677.80	362	0.726	1338903	2678.35	21.39	2334	1336569
10	1338903	2677.80	401	0.804	1338903	2678.42	23.69	2596	1336307
11	1338903	2677.80	440	0.882	1338903	2678.48	23.12	2855	1336048
12	1338903	2677.80	480	0.962	1338903	2678.58	29.24	3120	1335783
13	1338903	2677.80	518	1.038	1338903	2678.64	32.64	3373	1335530
14	1338903	2677.80	556	1.114	1338903	2678.64	35.70	3626	1335277
15	1338903	2677.80	593	1.188	1338903	2678.71	37.92	3872	1335031

9. VERT_Cover TEXT 9

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1410117	2820.23	62	0.126	2820.39	2820.39	5.89	347	1409770
2	1410117	2820.23	100	0.202	2820.47	2820.47	7.61	602	1409515
3	1410117	2820.23	139	0.280	2820.49	2820.49	8.65	855	1409262
4	1410117	2820.23	177	0.356	2820.49	2820.49	11.71	1108	1409009
5	1410117	2820.23	214	0.430	2820.59	2820.59	13.11	1354	1408763
6	1410117	2820.23	251	0.504	2820.59	2820.59	16.00	1600	1408517
7	1410117	2820.23	287	0.576	2820.60	2820.60	17.79	1837	1408280
8	1410117	2820.23	324	0.650	2820.60	2820.60	19.78	2082	1408045

9	1410117	2820.23	362	0.726	2820.60	2820.60	23.98	2336	1407781
10	1410117	2820.23	401	0.804	2820.63	2820.63	26.23	2597	1407520
11	1410117	2820.23	440	0.882	2820.72	2820.72	26.97	2857	1407260
12	1410117	2820.23	480	0.962	2820.77	2820.77	29.62	3119	1406998
13	1410117	2820.23	518	1.038	2820.87	2820.87	32.91	3371	1406746
14	1410117	2820.23	556	1.114	2820.91	2820.91	35.23	3630	1406487
15	1410117	2820.23	593	1.188	2820.91	2820.91	37.35	3873	1406244

10. VERT_Cover 10

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1371071	2742.14	62	0.126	1371071	2742.23	4.47	346	1370725
2	1371071	2742.14	100	0.202	1371071	2742.32	6.85	599	1370472
3	1371071	2742.14	139	0.280	1371071	2742.37	9.58	857	1370214
4	1371071	2742.14	177	0.356	1371071	2742.38	11.46	1113	1369958
5	1371071	2742.14	214	0.430	1371071	2742.40	13.35	1360	1369711
6	1371071	2742.14	251	0.504	1371071	2742.46	15.28	1605	1369466
7	1371071	2742.14	287	0.576	1371071	2742.47	18.17	1845	1369226
8	1371071	2742.14	324	0.650	1371071	2742.50	19.49	2087	1368984
9	1371071	2742.14	362	0.726	1371071	2742.59	22.98	2337	1368734
10	1371071	2742.14	401	0.804	1371071	2742.62	22.62	2596	1368475
11	1371071	2742.14	440	0.882	1371071	2742.67	25.81	2853	1368218
12	1371071	2742.14	480	0.962	1371071	2742.70	30.67	3119	1367952
13	1371071	2742.14	518	1.038	1371071	2742.77	30.47	3369	1367702
14	1371071	2742.14	556	1.114	1371071	2742.79	34.59	3626	1367445
15	1371071	2742.14	593	1.188	1371071	2742.87	36.17	3870	1367201

11. VERT_Cover Text 11

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1304117	2608.24	62	0.126	1304117	2608.32	8.59	347	1303770
2	1304117	2608.24	100	0.202	1304117	2608.35	6.57	602	1303515
3	1304117	2608.24	139	0.280	1304117	2608.41	8.77	858	1303259

4	1304117	2608.24	177	0.356	1304117	2608.50	8.87	1110	1303007
5	1304117	2608.24	214	0.430	1304117	2608.57	10.13	1354	1302763
6	1304117	2608.24	251	0.504	1304117	2608.66	11.52	1603	1302514
7	1304117	2608.24	287	0.576	1304117	2608.72	13.11	1839	1302278
8	1304117	2608.24	324	0.650	1304117	2608.83	15.50	2084	1302033
9	1304117	2608.24	362	0.726	1304117	2608.85	17.36	2337	1301780
10	1304117	2608.24	401	0.804	1304117	2608.86	18.42	2600	1301517
11	1304117	2608.24	440	0.882	1304117	2608.87	19.34	2860	1301257
12	1304117	2608.24	480	0.962	1304117	2608.93	21.36	3124	1300993
13	1304117	2608.24	518	1.038	1304117	2608.98	22.63	3374	1300743
14	1304117	2608.24	556	1.114	1304117	2609.02	23.79	3627	1300940
15	1304117	2608.24	593	1.188	1304117	2609.10	25.76	3931	1300186

12. VERT_Cover Text 12

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1323584	2647.17	62	0.126	1323584	2647.29	3.75	343	1323241
2	1323584	2647.17	100	0.202	1323584	2647.32	5.47	596	1322988
3	1323584	2647.17	139	0.280	1323584	2647.32	6.68	851	1322733
4	1323584	2647.17	177	0.356	1323584	2647.32	9.31	1101	1322483
5	1323584	2647.17	214	0.430	1323584	2647.32	10.27	1345	1322239
6	1323584	2647.17	251	0.504	1323584	2647.32	11.75	1593	1321991
7	1323584	2647.17	287	0.576	1323584	2647.32	13.51	1825	1321759
8	1323584	2647.17	324	0.650	1323584	2647.32	14.77	2071	1321513
9	1323584	2647.17	362	0.726	1323584	2647.41	18.17	2326	1321258
10	1323584	2647.17	401	0.804	1323584	2647.49	19.65	2586	1320998
11	1323584	2647.17	440	0.882	1323584	2647.58	19.92	2846	1320738
12	1323584	2647.17	480	0.962	1323584	2647.61	23.85	3110	1320474
13	1323584	2647.17	518	1.038	1323584	2647.69	24.42	3262	1320222
14	1323584	2647.17	556	1.114	1323584	2647.72	26.61	3617	1319967
15	1323584	2647.17	593	1.188	1323584	2647.83	29.10	3860	1319724

13. VERT_Cover Text 13

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1129687	2259.38	62	0.126	1129687	2259.48	3.98	346	1129341
2	1129687	2259.38	100	0.202	1129687	2259.52	5.17	603	1129084
3	1129687	2259.38	139	0.280	1129687	2259.53	6.85	857	1128830
4	1129687	2259.38	177	0.356	1129687	2259.56	8.05	1113	1128574
5	1129687	2259.38	214	0.430	1129687	2259.62	9.65	1357	1128330
6	1129687	2259.38	251	0.504	1129687	2259.64	10.90	1600	1128087
7	1129687	2259.38	287	0.576	1129687	2259.69	11.82	1840	1127847
8	1129687	2259.38	324	0.650	1129687	2259.76	13.25	2085	1127602
9	1129687	2259.38	362	0.726	1129687	2259.80	15.97	2339	1127348
10	1129687	2259.38	401	0.804	1129687	2259.90	20.11	2602	1127085
11	1129687	2259.38	440	0.882	1129687	2259.97	18.67	2860	1126827
12	1129687	2259.38	480	0.962	1129687	2260.03	19.80	3128	1126559
13	1129687	2259.38	518	1.038	1129687	2260.03	20.91	3380	1126307
14	1129687	2259.38	556	1.114	1129687	2260.09	23.07	3631	1126056
15	1129687	2259.38	593	1.188	1129687	2260.18	23.96	3877	1125810

14. VERT_Cover Text 14

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1128671	2257.34	62	0.126	1128671	2257.42	6.28	346	1128325
2	1128671	2257.34	100	0.202	1128671	2257.50	5.44	600	1128071
3	1128671	2257.34	139	0.280	1128671	2257.62	7.08	857	1127814
4	1128671	2257.34	177	0.356	1128671	2257.72	8.52	1112	1127559
5	1128671	2257.34	214	0.430	1128671	2257.78	10.23	1356	1127315
6	1128671	2257.34	251	0.504	1128671	2257.89	11.40	1601	1127070
7	1128671	2257.34	287	0.576	1128671	2257.97	12.87	1841	1126830
8	1128671	2257.34	324	0.650	1128671	2258.05	16.24	2086	1126585
9	1128671	2257.34	362	0.726	1128671	2258.09	18.22	2342	1126329
10	1128671	2257.34	401	0.804	1128671	2258.21	23.19	2605	1126066
11	1128671	2257.34	440	0.882	1128671	2258.26	24.38	2863	1125808
12	1128671	2257.34	480	0.962	1128671	2258.37	28.62	3128	1125543

13	1128671	2257.34	518	1.038	1128671	2258.48	28.02	3378	1125293
14	1128671	2257.34	556	1.114	1128671	2258.55	29.89	3634	1125037
15	1128671	2257.34	593	1.188	1128671	2258.67	28.77	3878	1124793

15. VERT_Cover Text 15

No.	Cover Text		Hidden Message		Stego Text					
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1		1258665	2517.33	62	0.126	1258665	2518.44	4.55	345	1258320
2		1258665	2517.33	100	0.202	1258665	2518.54	6.31	598	1258067
3		1258665	2517.33	139	0.280	1258665	2518.62	9.64	851	1257814
4		1258665	2517.33	177	0.356	1258665	2518.69	10.82	1106	1257559
5		1258665	2517.33	214	0.430	1258665	2518.74	14.58	1353	1257312
6		1258665	2517.33	251	0.504	1258665	2518.82	15.50	1601	1257064
7		1258665	2517.33	287	0.576	1258665	2518.87	19.29	1838	1256727
8		1258665	2517.33	324	0.650	1258665	2518.95	20.82	2084	1256581
9		1258665	2517.33	362	0.726	1258665	2519.07	23.71	2340	1256325
10		1258665	2517.33	401	0.804	1258665	2519.14	27.92	2603	1256062
11		1258665	2517.33	440	0.882	1258665	2519.23	25.13	2856	1255809
12		1258665	2517.33	480	0.962	1258665	2519.35	26.24	3121	1255544
13		1258665	2517.33	518	1.038	1258665	2519.37	30.65	3373	1255292
14		1258665	2517.33	556	1.114	1258665	2519.39	29.55	3630	1255035
15		1258665	2517.33	593	1.188	1258665	2519.54	32.11	3875	1254790

16. VERT_Cover Text 16

No.	Cover Text		Hidden Message		Stego Text					
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used	Letter Unused
1		1316417	2632.83	62	0.126	1316417	2633.00	4.61	344	1316073
2		1316417	2632.83	100	0.202	1316417	2633.10	6.60	601	1315816
3		1316417	2632.83	139	0.280	1316417	2633.19	9.28	859	1315558
4		1316417	2632.83	177	0.356	1316417	2633.19	13.13	1117	1315300
5		1316417	2632.83	214	0.430	1316417	2633.19	14.97	1361	1315056
6		1316417	2632.83	251	0.504	1316417	2633.27	16.57	1609	1314808
7		1316417	2632.83	287	0.576	1316417	2633.29	17.28	1849	1314568
8		1316417	2632.83	324	0.650	1316417	2633.30	19.00	2096	1314321

9	1316417	2632.83	362	0.726	1316417	2633.30	24.24	2351	1314066
10	1316417	2632.83	401	0.804	1316417	2633.31	24.45	2613	1312804
11	1316417	2632.83	440	0.882	1316417	2633.41	29.97	2871	1313546
12	1316417	2632.83	480	0.962	1316417	2633.43	28.54	3141	1313276
13	1316417	2632.83	518	1.038	1316417	2633.48	32.27	3495	1313022
14	1316417	2632.83	556	1.114	1316417	2633.57	33.05	3649	1312768
15	1316417	2632.83	593	1.188	1316417	2633.62	32.60	3894	1312523

17. VERT_Cover Text 17

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1546911	3093.82	62	0.126	1546911	3093.93	4.36	344	1546567
2	1546911	3093.82	100	0.202	1546911	3094.01	8.52	596	1546315
3	1546911	3093.82	139	0.280	1546911	3094.09	10.72	850	1546061
4	1546911	3093.82	177	0.356	1546911	3094.16	14.66	1105	1545806
5	1546911	3093.82	214	0.430	1546911	3094.23	17.29	1352	1545559
6	1546911	3093.82	251	0.504	1546911	3094.23	18.98	1600	1545311
7	1546911	3093.82	287	0.576	1546911	3094.23	17.28	1847	1545074
8	1546911	3093.82	324	0.650	1546911	3094.25	25.48	2083	1544828
9	1546911	3093.82	362	0.726	1546911	3094.33	28.01	2335	1544576
10	1546911	3093.82	401	0.804	1546911	3094.40	29.74	2600	1544311
11	1546911	3093.82	440	0.882	1546911	3094.46	37.51	2853	1544058
12	1546911	3093.82	480	0.962	1546911	3094.46	35.20	3115	1543796
13	1546911	3093.82	518	1.038	1546911	3094.46	39.64	3470	1543541
14	1546911	3093.82	556	1.114	1546911	3094.53	47.31	3626	1543285
15	1546911	3093.82	593	1.188	1546911	3094.61	40.95	3870	1543041

19 VERT_Cover Text 18

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1258819	2517.64	62	0.126	1258819	2517.72	5.06	342	1248477
2	1258819	2517.64	100	0.202	1258819	2517.84	7.39	595	1258224
3	1258819	2517.64	139	0.280	1258819	2517.89	9.03	852	1257967
4	1258819	2517.64	177	0.356	1258819	2517.92	11.63	1105	1257714

5	1258819	2517.64	214	0.430	1258819	2518.01	14.99	1346	1257473
6	1258819	2517.64	251	0.504	1258819	2518.05	17.49	1592	1257227
7	1258819	2517.64	287	0.576	1258819	2518.06	16.65	1830	1256989
8	1258819	2517.64	324	0.650	1258819	2518.06	20.73	2069	1256740
9	1258819	2517.64	362	0.726	1258819	2518.06	22.56	2324	1256495
10	1258819	2517.64	401	0.804	1258819	2518.08	25.93	2584	1256235
11	1258819	2517.64	440	0.882	1258819	2518.14	27.44	2846	1255973
12	1258819	2517.64	480	0.962	1258819	2518.18	30.59	3112	1255707
13	1258819	2517.64	518	1.038	1258819	2518.27	30.56	3362	1255457
14	1258819	2517.64	556	1.114	1258819	2518.34	33.72	3618	1255201
15	1258819	2517.64	593	1.188	1258819	2518.68	38.28	3863	1254956

18. VERT_Cover Text 19

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1261780	2523.56	62	0.126	1261780	2523.68	4.25	343	1261437
2	1261780	2523.56	100	0.202	1261780	2523.78	6.65	601	1261179
3	1261780	2523.56	139	0.280	1261780	2523.82	6.44	857	1260923
4	1261780	2523.56	177	0.356	1261780	2523.83	8.73	1112	1260668
5	1261780	2523.56	214	0.430	1261780	2523.89	10.75	1355	1260425
6	1261780	2523.56	251	0.504	1261780	2523.93	13.20	1603	1260177
7	1261780	2523.56	287	0.576	1261780	2523.94	14.00	1834	1259946
8	1261780	2523.56	324	0.650	1261780	2524.01	15.54	2078	1259702
9	1261780	2523.56	362	0.726	1261780	2524.04	19.69	2323	1259448
10	1261780	2523.56	401	0.804	1261780	2524.04	24.56	2592	1259188
11	1261780	2523.56	440	0.882	1261780	2524.04	25.24	2849	1258931
12	1261780	2523.56	480	0.962	1261780	2524.04	26.07	3113	1258667
13	1261780	2523.56	518	1.038	1261780	2524.11	35.67	3364	1258416
14	1261780	2523.56	556	1.114	1261780	2524.16	34.15	3619	1258161
15	1261780	2523.56	593	1.188	1261780	2524.21	38.70	3869	1257911

19. VERT_Cover Text 20

No.	Cover Text		Hidden Message		Stego Text				
	HM	Length (C)	Size (kb)	Length (C)	Size (Kb)	Length (C)	Size(kb)	Embedding Time (s)	Letter Used
1	1049566	2099.13	62	0.126	1049566	2099.22	4.64	344	1049222
2	1049566	2099.13	100	0.202	1049566	2099.24	7.00	599	1048967
3	1049566	2099.13	139	0.280	1049566	2099.25	7.30	854	1048712
4	1049566	2099.13	177	0.356	1049566	2099.25	9.96	1108	1048458
5	1049566	2099.13	214	0.430	1049566	2099.31	13.56	1352	1048214
6	1049566	2099.13	251	0.504	1049566	2099.38	15.02	1600	1047966
7	1049566	2099.13	287	0.576	1049566	2099.44	15.77	1837	1047729
8	1049566	2099.13	324	0.650	1049566	2099.50	20.79	2083	1047483
9	1049566	2099.13	362	0.726	1049566	2099.51	18.49	2336	1047230
10	1049566	2099.13	401	0.804	1049566	2099.51	19.98	2597	1046969
11	1049566	2099.13	440	0.882	1049566	2099.57	26.82	2854	1046712
12	1049566	2099.13	480	0.962	1049566	2099.62	27.81	3123	1046443
13	1049566	2099.13	518	1.038	1049566	2099.63	27.82	3377	1046189
14	1049566	2099.13	556	1.114	1049566	2099.64	31.99	3628	1045938
15	1049566	2099.13	593	1.188	1049566	2099.64	35.09	3876	1045690

Appendix D
Performance Evaluation on Analyzed Text

Letter-based Technique	True Positive (TP)	True Negative (TN)	False Negative (FN)	False Positive (FP)
CALP Scheme	185	100	15	0
CURVE Scheme	185	100	15	0
VERT Scheme	46	99	154	1



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Appendix E

Source Code the Experiment

- **Script of CALP Scheme**

```
String coverText = CoverText.getText();
int k = coverText.length();
int size = (int) coverText.length();
LengthStego.setText(" " + size + " characters");
String binary = BinaryText.getText();
int noOfElement = binary.length();
int j = 0;
int used = 0;
for (int i = 0; i < k; i++) {
char c = coverText.charAt(i);
if (c == 'a' || c == 'A' || c == 'c') {
System.out.println("sas" + j + ": " + binary.charAt(j));
stego += c;
coverText = coverText.substring(0, i) + a, A, c +
coverText.substring(i + 1);
used++;

else if (c == 'i' || c == 'j') {
if (binary.charAt(j) == '0') {
{coverText = coverText.substring(0, i) + i, j +
coverText.substring(i + 1);
used++;
arr.add(i);
j++;

StegoText.setText(coverText);
endtime = System.currentTimeMillis();
result = (endtime - starttime);
TimeField.setText("" + result + " ms");
Used.setText("Used character : " + used);
Unused.setText("Unused character : " + (size - used));
byte[] bytes = null;
try {
bytes = coverText.getBytes("UTF-16");
SizeStego.setText("size : " + bytes.length);}
catch (UnsupportedEncodingException ex) {
Logger.getLogger(Stegoform.class.getName()).log(Level.SEVERE, null, ex);
SizeStego.setText("size : " + bytes.length + " bytes");
```

- **Script of CURVE Scheme**

```

String coverText = CoverText.getText();
int k = coverText.length();
int size = (int) coverText.length();
LengthStego.setText(" " + size + " characters");
String binary = BinaryText.getText();
int noOfElement = binary.length();
int j = 0;
int used = 0;
for (int i = 0; i < k; i++) {
char c = coverText.charAt(i);
if (c == 'B' || c == 'b' || c == 'C' || c == 'c' || c
== 'D' || c == 'd' || c == 'G' || c == 'g' || c == 'J' ||
c == 'j' || c == 'O' || c == 'o' || c == 'P' || c == 'p'
|| c == 'Q' || c == 'q' || c == 'R' || c == 'r' || c ==
'S' || c == 's' || c == 'U' || c == 'u')
{System.out.println("sas" + j + ": " +
binary.charAt(j));
stego += c;
if (binary.charAt(j) == '0')
coverText = coverText.substring(0, i) + B, C, D, G,
J, O, P, Q, R, S, U + coverText.substring(i + 1);
used++;

else if (c == 'A' || c == 'a' || c == 'E' || c == 'e' ||
c == 'F' || c == 'f' || c == 'H' || c == 'h' || c == 'I'
|| c == 'J' || c == 'j' || c == 'K' || c == 'k' || c ==
'L' || c == 'l' || c == 'M' || c == 'm' || c == 'N' || c
== 'n' || c == 'T' || c == 't' || c == 'V' || c == 'v'
|| c == 'W' || c == 'w' || c == 'Y' || c == 'y' || c ==
'Z' || c == 'z') {
if (binary.charAt(j) == '1') {
{coverText = coverText.substring(0, i) + A, E, F, H,
I, K, L, M, N, T, V, W, X, Y, Z + coverText.substring(i +
1);
used++;
arr.add(i);
j++;

StegoText.setText(coverText);
endtime = System.currentTimeMillis();
result = (endtime - starttime);
TimeField.setText("" + result + " ms");
Used.setText("Used character : " + used);
Unused.setText("Unused character : " + (size - used));
byte[] bytes = null;

```

```

try {
bytes = coverText.getBytes("UTF-16");
SizeStego.setText("size : " + bytes.length);}
catch (UnsupportedEncodingException ex) {
Logger.getLogger(Stegoform.class.getName()).log(Level.SEVERE, null, ex);
SizeStego.setText("size : " + bytes.length + " bytes");

```

- **Script of VERT Scheme**

```

String coverText = CoverText.getText();
int k = coverText.length();
int size = (int) coverText.length();
LengthStego.setText(" " + size + " characters");
String binary = BinaryText.getText();
int noOfElement = binary.length();
int j = 0;
int used = 0;
for (int i = 0; i < k; i++) {
char c = coverText.charAt(i);
if ('A' || c == 'a' || c == 'C' || c == 'c' || c == 'G'
|| c == 'g' || c == 'H' || c == 'h' || c == 'M' || c ==
'm' || c == 'N' || c == 'n' || c == 'O' || c == 'o' || c
== 'S' || c == 's' || c == 'U' || c == 'u' || c == 'V' ||
c == 'v' || c == 'W' || c == 'w' || c == 'X' || c == 'x'
|| c == 'Y' || c == 'y' || c == 'Z' || c == 'z')
{System.out.println("sas" + j + ": " +
binary.charAt(j));
stego += c;
if (binary.charAt(j) == '0')
coverText = coverText.substring(0, i) + A, C, G, H, M,
N, O, Q, S, U, V, W, X, Y, Z + coverText.substring(i + 1);
used++;

else if (== 'B' || c == 'b' || c == 'D' || c == 'd' || c
== 'E' || c == 'e' || c == 'F' || c == 'f' || c == 'I' ||
c == 'i' || c == 'J' || c == 'j' || c == 'K' || c == 'k'
|| c == 'L' || c == 'l' || c == 'P' || c == 'p' || c ==
'R' || c == 'r' || c == 'T' || c == 't') {

if (binary.charAt(j) == '1') {
{coverText = coverText.substring(0, i) + B, D, E, F,
I, J, K, L, P, R, T + coverText.substring(i + 1);
used++;

```

```
arr.add(i);
j++;

StegoText.setText(coverText);
endtime = System.currentTimeMillis();
result = (endtime - starttime);
TimeField.setText("" + result + " ms");
Used.setText("Used character : " + used);
Unused.setText("Unused character : " + (size - used));
byte[] bytes = null;
try {
bytes = coverText.getBytes("UTF-16");
SizeStego.setText("size : " + bytes.length);}
catch (UnsupportedEncodingException ex) {
Logger.getLogger(Stegoform.class.getName()).log(Level.SEVERE, null, ex);
SizeStego.setText("size : " + bytes.length + " bytes");
```



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