A New Approach to SMS Text Steganography using Emoticons

Tatwadarshi P. Nagarhalli
Department of Computer Engineering
VIVA Institute of Technology, University of Mumbai
Mumbai, India

ABSTRACT
One of the widely used service provided by mobile phones is the Short Messaging Services. It enables the user to send short messages to the receiver he/she intends to communicate.

This paper proposes a new method at text steganography where the emoticons that are so generously and frequently used in SMS's are used to hide information, particularly an alphabet or a number.

Keywords
Short Message Service, Information Hiding, Text Steganography, SMS Text Steganography.

1. INTRODUCTION
Short message service is one of the most widely used services ever across the spectrum. There are approximately 17-18 billion SMS sent each day around the world [1]. Some might argue that instant messaging is overtaking Short Message Services but it has to be noted that there are 3.5 billion texters worldwide as compared to 586 million according to Informa's Pamele Clark-Dickson [1].

Just the sheer volume gives great opportunity in sending secret messages without arising any major suspicion. The only thing that has to be made sure is that the language that is sent in as a SMS has to be sync with the SMS lingos or emoticons that are widely used worldwide.

Steganography is the art and science of hiding secret data in another medium. The data that has to be hidden is called secret message and the medium in which this secret message is hidden is called cover document. The cover document containing hidden message is called stego-document. This stego-document is sent over the unsecured channel to the intended receiver [2].

Steganography is further classified into text, image, video and audio, depending upon the cover medium. Of the text, image, video and audio, text steganography is the most challenging because text documents contain very less redundant data as compared to image, video or audio [3].

Emoticons are widely used in SMS's. In this paper we propose a new approach to text steganography in SMS's by using emoticons as a cover document. Where each emoticons carry a specific hidden word.

2. RELATED WORK
Over the years with the changes in the technology many new methods have been researched in the field of text steganography. In this section we will look at some of these methods that relate to text steganography. Hiding of words in specific characters of words approach as put forward by Moreland [4]. Where a word is hidden character by character in a collection words of a paragraph. Example, third character of every paragraph.

In Text steganography by Line shifting method [5] [6] lines are shifted vertically by some degree. And degree of shifting is taken as 0 and 1.

The approach that generates random sequence of words or characters to hide the information is called Random character and word sequencing method [7].

The word shifting method [5] [8] are those where words are shifted horizontally and by changing the distance between the words the information is hidden.

One way of hiding the information in text steganography is by placing punctuation at preoper places, this approach is called syntactic method [7].

Hiding of the message by using synonyms of some particular words, mostly nouns, adjectives, verbs and adverbs is called semantic method techniques [9].

Text steganography by Feature coding technique [10] [11] changes the feature or structure of the text to hide the information.

Extra white spaces are added between words or at the end of the paragraphs according to the Open Spaces Method [12] of the text steganography.

In the field of text steganography in sms the abbreviations that generally used in the sms texting language for example gr8 for great has been used for hiding message. Where, the presence of abbreviation denotes bit 1 and the presence of the full form of the word denotes bit 0 [14].

This method has also been enhanced by EX-ORing the bits to hide the message [15].

A very similar method of using abbreviations and full forms has also been proposed for online chats [16]. Also emoticons have been used as cover documents for hiding of secret messages by dividing these emoticons in types of emotions, for example crying or laughing, etc. [17].

In this paper we propose a new technique for information hiding in SMS's with the help of emoticons.

3. PROPOSED METHOD
An emoticon is a pictorial representation of a facial expression which draws the attention of the receiver to the mood or the feeling of the sender. It does so usually by the means of punctuation marks. Emoticons are widely used in SMS's where generally there is very less liberty with the number of characters that is allowed in a single message.

These emoticons can be used to send some hidden message. The proposed method assigns one alphabet or number to each emoticons that are available to a general user using SMS services. The alphabets and numbers assigned are

Table1: Alphabets and Numbers assigned to each Emoticons

Emoticons	Alphabets/Numbers Assigned
:-)	A
:-(	B
;-)	C
:-P	D
=-O	E
:-*	F
:O	G
B-)	H
:-$	I
:-!	J
:-[	K
O:-)	L
:-\	M
:'(	N
:-X	O
:-D	P
o_O	Q
:-/	R
x-(	S
:-|	T
<3	U
:-V	V
XD	W
:-Q	X
:-@	Y
:-C	Z
:-O	1
:-S	2
:-B	3
:-#	4
X(	5
0:)	6
@-}--	7
:*)	8
-:)	9
>:)	0

These emoticons can be used in a single or multiple messages, so that no suspicion arises, to transmit a hidden message. In a very simple way it is possible to hide an alphabet or a number with the help of the emoticons, when used effectively. That is, 8 bits of data in a single emoticons.

4. ANALYSIS AND ADVANTAGES

a. Very simple to understand.

b. The implementation of the system is hassle free compared to other sms text steganography systems.

c. This message can be used as a cover document to the abbreviation and/or enhanced abbreviation technique. Where instead of giving the abbreviation directly emoticons can be used to express the abbreviation. For example, for the above table instead of writing gr8 for great we can use the emoticons :O :-/ :*) in a sentence which does not arise any suspicion. This will further enhance the security of the abbreviation or the enhanced abbreviation technique.

d. As compared to system proposed in [13], where only one bit information is hidden, the proposed system helps in hiding 8 bits of information with a single emoticons.

e. To keep the method fresh the alphabets and numbers assigned to a particular emoticons can be changed from time to time without much of an effort.

f. This method can be easily be used and implemented for the fast growing instant messaging as well.

5. CONCLUSION

The paper proposes a very easy method of hiding information in a very widely used communication medium, the Short Messaging Service, with the help of emoticons. Each emoticons carry hidden alphabets with it, unknown to a person to whom the message is not intended.

This method can be easily coupled with other SMS or chat text steganography techniques that have been proposed enhancing the security of those techniques. Also, the proposed method can be used in instant messaging services as well.

6. REFERENCES

[1] Hillebrand, F. 2010. Short Message Service (SMS): The Creation of Personal Global text Messaging, Wiley.

[2] Garg, M. 2011. A novel text steganography technique based on html documents, International Journal of advanced Science and Technology, vol.35, pp. 129-138.

[3] Bender, W. Gruhl, D. Morimoto, N. and Lu, A. 1996 Techniques for data hiding, IBM Systems Journal, vol. 35, Issues 3&4, pp. 313-336.

[4] Changder, S. Debnath N.C. and Ghosh, D. A New Approach to Hindi Text Steganography by Shifting Matra, 2009 International Conference on Advances in Recent Technologies in Communication and Computing, pp. 199-202.

[5] Low, S.H. Maxemchuk, N.F. Brassil, J.T. and O'Gorman, L. 1995. Document Marking and Identification Using Both Line and Word Shifting, In 14th Annual Joint Conference of the IEEE Computer and Communications Societies (INFOCOM '95), vol.2, pp. 853-860.

[6] Alattar, A.M. and Alattar, O.M. 2004. Watermarking electronic Text Documents Containing Justified Paragraphs and Irregular Line Spacing, In SPIE, Security, Steganography, and Watermarking of Multimedia Contents VI, vol. 5306, pp. 685-695.

[7] Bennett, K. 2004. Linguistic Steganography: Survey, Analysis, and Robustness Concerns for Hiding Information in Text, Purdue University, CERIAS Tech.

[8] Kim, Y. Moon, K. and Oh, I. 2003. A Text Watermarking Algorithm based on Word Classification and Inter-word Space Statistics, In 7th International Conference on Document Analysis and Recognition (ICDAR03), pp. 775-779.

[9] Niimi, M. Minewaki, S. Noda, H. and Kawaguchi, E. 2003. A Framework of Text-based Steganography Using SD-Form Semantics Model, In Pacific Rim Workshop on Digital Steganography, Kyushu Institute of Technology, Kitakyushu, Japan, July 3-4.

[10] Rabah, K. 2004. Steganography-The Art of Hiding Data, Trans. Information Technology Journal, vol. 3, Issue 3, pp. 245-269.

[11] Shirali-Shahreza, M.H., Shirali-Shahreza, M. 2006 A New Approach to Persian/Arabic Text Steganography, In Computer and Information Science, ICIS-COMSAR 2006. 5th IEEE/ACIS International Conference, pp 310-315.

[12] Huang, D. and Yan, H. 2001. Interword Distance Changes Represented by Sine Waves for Watermarking Text Images, Trans Circuits and Systems for Video Technology, IEEE, vol. 11, no. 12, pp. 1237-1245.

[13] Shirali-Shahreza, M. 2008. Text Steganography by Changing Words Spelling, In 10th International Conference on Advanced Communication Technology, ICACT 08, vol. 3, pp. 1912-1913.

[14] Shirali-Shahreza, M.H., Shirali-Shahreza, M. 2007, Text Steganography in SMS, In International Conference on Convergence Information Technology, pp. 2260-2265.

[15] Khan, F. R. Enhanced Text Steganography in SMS.

[16] Shirali-Shahreza, M.H. Shirali-Shahreza, M. 2007 Text Steganography in Chat, In 3rd IEEE/IFIP International Conference in Central Asia, pp. 1-5.

[17] Wang, Z. et. Al, Emoticon-based Text Steganography in Chat, 2009 Second Asia-Pacific Conference on Computational Intelligence and Industrial Applications, pp. 457-460.