出國報告（出國類別：其他\國際會議）

出席 2017 International Conference on Business and Information 國際學術會議

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摘要

The 2017 International Conference on Business and Information 國際會議於 7 月 4 日至 7 月 6 日在 International Conference Center Hiroshima, Japan 舉行，本屆大會宗旨是提供機會給來自世界各地的學者分享 business, management, information 三大領域的想法及研究成果。本人很榮幸能在 2017International Conference on Business and Information 的國際會議發表論文, 發表論文的題目為”A high capacity data hiding scheme with (4, 3) matrix”。

目次

一、 目的

本次出國之主要目的是要在 The 2017 International Conference on Business and Information 國際會議發表論文, 本篇論文的共同作者有雲林科技大學資工系郭文中教授及本人之碩士班學生柯東昇, 發表論文的題目為”A high capacity data hiding scheme with (4, 3) matrix” , 本屆大會的發表論文摘要如五、(附錄)，本次出國並攜回 2017 International Conference on Business and Information 大會議程暨大會論文集。

二、 過程

在 BAI2017 會議舉辦的同時還有 2017 International Symposium on Teaching, Education, and Learning (ISTEL 2017)會議的進行，7 月 4 日大會在 9:00-10:30 安排 Pre-Conference Tour: Hiroshima Peace Memorial Park。當日下午則安排 Opening ceremony, welcome remarks, Keynote speech, Distinguished paper awards…等活動。在 7 月 5 日至 7 月 6 日兩天則在 International Conference Center Hiroshima 借用 5 個會議廳完成大會所安排的 45 個 parallel sessions 及 5 個 poster section 的論文發表。

本人之論文發表時間被安排在 7 月 5 日的上午時段,與會者對於用簡單的演算法((4, 3)matrix multiplication and XOR operation)即可在圖片插入秘密訊息且不改變圖片外觀表現濃厚興趣及討論,此論文針對運用(4 ,3)矩陣資料隱藏技術之安全性做改進，主要整合了 IEMD 技術，藉由調整其關係順序就可視為在隱藏資料時多增加了一把私密金鑰，沒有此金鑰的非法參與者將無法正確取出密密資訊,以提升安全性;之後本人也參加多場的會議論文發表,印象最深刻的為”A Highway Driving Safety VR Training Framework Based on Scaffolding Theory”為台灣國立台中科技大學,國立彰化師範大學及日本大阪大學共同合作產生的論文,發表者用他流利的英文及精彩的動畫呈現他們計畫的重點:要利用 3D 虛擬實境(VR)技術來訓練汽車駕駛人當在高速公路上碰到一些意外事件該如何反應的情景模擬,目前發表的只是雛形,設計的場景也不足,未來若能發展成功,應可應用至許多領域。

三、 心得

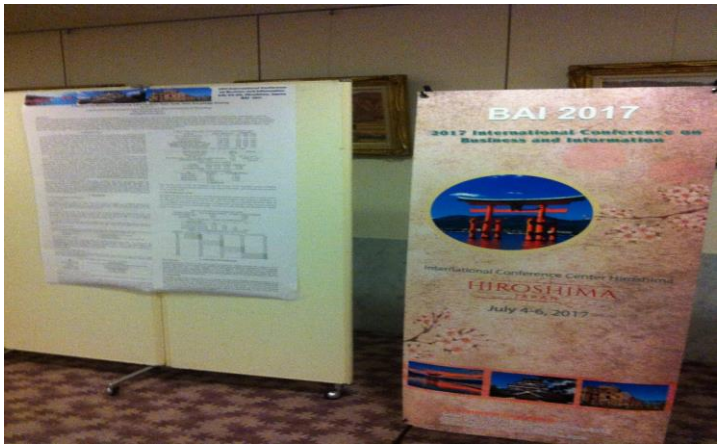
The 2017 International Conference on Business and Information 國際會議於 7 月 4 日至 7 月 6 日在 International Conference Center Hiroshima, Japan 舉行，本屆大會宗旨是提供機會給來自世界各地的學者分享 business, management, information 三大領域的想法及研究成果，本人很榮幸能跟來自世界各地的學者分享最新的想法及研究成果。

四、 建議事項

從與會的過程中，筆者深刻體會到目前各國對於 business, management, information 相關研究領域發展的重視和努力，建議政府可以考慮鼓勵國內學校去爭取未來的相關國際會議在臺灣主辦，除了提昇中華民國在國際間的學術地位外，並方便國內學者與業界可就近在台灣共同思考未來 business, management, information 可能發展的方向與突破。

五、 (附錄)

BAI 2017大會場景1



BAI 2017大會場景2

BAI 2017大會場景3

A high capacity data hiding scheme with (4, 3) matrix

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1. Background

Along with the growth of the network, all types of data are transmitted through the network with the risk to be wiretapped or tampered. Therefore, ensuring the security of data becomes an important issue. Steganography is a technique to hide secret data in cover images securely. It means that the secret in a stego image should not attract attention, called as imperceptibility. However, there is a trade-off between imperceptibility and the size of secret messages can be stored in a cover image, called as capacity.

The paper proposed a (4, 3) matrix data hiding scheme with matrix multiplication and XOR operation. In comparison with other schemes [1, 2], the (4, 3) matrix data hiding scheme has higher capacity (3.0 bpp) and keeps good quality and imperceptibility of stego images.

2. The Proposed Method

Embedding secret scheme

Input : Cover image I: $m \times n$ pixels, secret message W: $m \times n \times 3$ bits.

Output : Stego image I': $m \times n$ pixels.

Step1. Denote the lower nibble of a pixel i of I as str_i (4-bits).

Step2. $syn_i = str_i * H$

$$H = \begin{bmatrix} 0 & 1 & 1 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

Step3. Partition W into 3 bits blocks, and each block is denoted as sec_i

Step4. $str_i' = str_i \oplus (0 \parallel sec_i \oplus syn_i)$, and the replace str_i with str_i'.

Step5. do Step1 to Step4 until the secret W is embedding into each pixel of I.

Extracting secret scheme

Input : Stego image I': $m \times n$ pixels

Output :. Secret message W : $m \times n \times 3$ bits.

Step1. Denote the lower nibble of a pixel i of I' as str_i (4-bits).

Step2. 3-bits secrect $sec_i = str_i * H$.

Step3. do Step1 and Step2 until the secret W is extracted from I'.

3. Experimental result

PSNR (peak signal-to-noise ratio) is used to analyze the quality of the stego image *I*'. $PSNR = 10\log_{10}(\frac{255^2}{MSE})$ dB, where MSE is the mean squared error between the cover image *I* and the stego image *I'*, $MSE = \frac{1}{MN}\sum_{i=0}^{M-1}\sum_{j=0}^{N-1}\left[I(i,j) - I'(i,j)\right]^2$.

Table 1. PSNR and Capacity of the proposed method

Cover image	PSNR	Capacity
Baboon	37.89	3.0bpp
Lena	39.93	3.0bpp
Peppers	38.64	3.0bpp
Babara	40.72	3.0bpp
Average	39.28	3.0bpp

Table 2 In comparison with Papers [1-2]

	Paper [1]	**Paper[2]**	**Our scheme**
Cover image is divided into blocks	Yes	Yes	No
Extra information needed to be included	Matrix H of size 7*3 and a relation Table	Matrix H of size 5*3 and a relation Table1	Matrix H of size 4*3
Look up table	Yes	Yes	No
Capacity	0.499	0.599	3.0
Computation overhead	High	Middle	Low

Keywords: Data hiding, Steganography, Hamming code.

References

[1] W Zhang, S Wang, X Zhang : Improve embedding efficiency of covering codes for applications in steganography. IEEE Commun. Lett. 11(8), 680–682, 2007.

[2] C. Kim, C.N Yang : Steganography Based on Grayscale Images Using (5, 3) Hamming Code, Springer International Publishing Switzerland IWDW 2014, LNCS 9023, pp. 588–598, 2015.

[3] C.F Lee, Y.R Wang, C.C Chang: A Steganographic Method with High Embedding Capacity by Improving Exploiting Modification Direction, IEEE IIHMSP 26-28, Nov 2007.