High Performance Reversible Data Hiding for Mobile Applications and Human Interaction

Fong-Hao Liu, Department of Information Management, Management College, National Defense University, Taipei City, Taiwan
Hsiang-Fu Lo, Department of Electrical Engineering, TamKang University, New Taipei City, Taiwan
Chun-Te Su, Department of Information Management, Management College, National Defense University, Taipei City, Taiwan
Der-Chyuan Lou, Department of Computer Science and Information Engineering, Chang Gung University, Tao-Yuan City, Taiwan
Wei-Tsong Lee, Department of Electrical Engineering, TamKang University, New Taipei City, Taiwan

ABSTRACT

Reversible data hiding with predictive error-based difference expansion to conceal personal and sensitive information in mobile applications and human interaction activities through hand-held devices recently has drawn lots of interest. It can not only completely restore the original image after extraction, but also keep the protected privacy information imperceptible against the eavesdroppers. A reversible data hiding method based on prediction-error and pixel-value difference was proposed in this paper. The suitable situations for reversible algorithms and embedded value are selected depended on the differences between image regions and the characteristics of embedded data. Experimental results show that our proposed scheme provides a 57956 bits (0.24 ppb) hiding capacity and a 53.81dB PSNR on F16 image without generating noticeable visual artifacts. The proposed method is additionally applied with different predictors.

Keywords: Difference Expansion, Human Interaction, Predictive Decoding, Reversible Data Hiding, Steganography

DOI: 10.4018/ijthi.2013100103
INTRODUCTION

The mass adoption of social-networking websites leads to a larger movement, an evolution in human social interaction (Weaver & Morrison, 2008). The internet usage effects of social media as of 2012 are, according to Nielsen (NYSE: NLSN, 2012), that internet users continue to spend more time in social media than any other site. Social media network websites include peer-to-peer and media-based sites like Facebook, Twitter, Youtube, MySpace, etc. Many social media within social networks focuses around the core purpose of connecting people online and enabling them to interact. Each social network gives tools that let users express themselves and interact with others in different ways, choosing to focus on different areas of social interaction. Although each site expresses sociality in a different way, they all are built around the core idea of connecting people.

Human social interactions and relationships can also be improved by the popularity of mobile devices such as smartphones and tablets and ubiquitous wireless access technology. Meanwhile, many kinds of personal information under official personal data protection act will be exchanged and exposed in wireless radio signals when people participating various interaction activities through hand-held devices. Several encryption methods based on IEEE 802.11i standards (IEEE, 2004) including Wi-Fi Protected Access (WPA) and WPA2 are used to improve wireless network security because of the open-air nature of wireless communications. However, the eavesdroppers will easily find the unusual and encoded traffics which are prone to be the targets of attacks.

Information-hiding technology is used to imperceptibly embed the secret data into a cover media to produce a stego media for concealing the existence of the hiding message. It was originally applied for military purpose; however, it has recently become the glittering palace in multidisciplinary fields, including cryptography, image and signal processing, compression, communication and coding theory and so forth (Cox, Miller & Bloom, 2002; Khosrow-Pour, M, 2006, pp.480-487). Petitcolas, Anderson & Kuhn (1999) accordingly classified information-hiding techniques into four categories including covert channel, steganography, anonymity and copyright based on the subjects and purposes of them.

Covert channel is a technique used to transmit secret data; Steganography means to embed data into a cover media and create a stego media so there’s no one else can see the content except for the sender and receiver; Anonymity is to hide the senders or receivers of the message; Copyright marking is to embed a watermark for protecting the content. The most significant difference between steganography and watermarking is that the former focuses on imperceptibility of secret message, while the latter emphasizes the robustness of hidden message(Alattar, 2004; Zhang & Wang, 2008; Coltuc, 2011).

The requirements and characteristics of information-hiding technologies will be altered with different application areas. The performance of an information-hiding technique is generally depended on some quality attributes such as visual imperceptibility and payload capacity.

Reversible data-hiding technique is a variation of information-hiding technologies, which also called lossless data hiding. The key concept is to recover the host image without losing any information when the secret data is extracted. This technique is mainly utilized in some application areas (e.g., medical image, astronomical research, digital copyright) that the judgments are based the contrast of original contents (Tseng & Hsieh, 2009). Increasing attention from the research community and from industry is therefore collected by the lossless data hiding technique (Chang, Hsieh & Lin, 2007; Lin, Yang & Hsueh, 2008; Chen, Pan & Zeng, 2009; Krishna, Abdul Rahim, Shaik & Rajan, 2010; Zhang, 2012). Honsinger, Jones, Rabbani & Stoffel (2001) proposed a lossless data hiding technique that utilize modulo operation and it has been viewed as the first reversible data hiding technique in 2001; however, this method had...
Related Content

Voice Priority Queue Scheduling System Models for VoIP over WLANs
[www.igi-global.com/article/voice-priority-queue-scheduling-system/76320?camid=4v1a](www.igi-global.com/article/voice-priority-queue-scheduling-system/76320?camid=4v1a)

Services Rendered By Computers and Their Explications
[www.igi-global.com/chapter/services-rendered-computers-their-explications/45297?camid=4v1a](www.igi-global.com/chapter/services-rendered-computers-their-explications/45297?camid=4v1a)
Mobile Applications Used for Human Rights: A Review
www.igi-global.com/chapter/mobile-applications-used-for-human-rights/214099?camid=4v1a

Incorporating Simulated Animal Attacks in Human Technology Interaction Interfaces: The Predictive Power of Biosemiotics and Evolutionary Psychology
www.igi-global.com/article/incorporating-simulated-animal-attacks-human/2932?camid=4v1a