International Journal of Innovative Computing, Information and Control
Volume **6**, Number **7**, July **2010**

ICIC International ©2010 ISSN 1349-4198
pp. 3121–3130

AN INFORMATION HIDING SCHEME BASED ON (7,4) HAMMING CODE ORIENTED WET PAPER CODES

Zhaoxia Yin[1], Chinchen Chang[2] and Yanping Zhang[1]

[1]School of Computer Science and Technology
Anhui University
Hefei 230039, P. R. China
adyzx@qq.com; zhangyp@mail.hf.ah.cn

Department of Information Engineering and Computer Science
Feng Chia University
Taichung, Taiwan 40724
alan3c@gmail.com

Received January 2009; revised July 2009

Abstract. *Generally, the embedding quality and the embedding capacity are two important factors in evaluating the performance of information hiding schemes, but they are usually inversely proportional. Thus, to satisfy the different requirements, the users often make a tradeoff between good embedding quality and high embedding capacity. In this paper, a spatial domain technique, embedding binary message bits into a still image based on Hamming code oriented wet paper codes, is discussed and evaluated. We get inspiration from Chang, Chou and Lin's work and make a critical improvement. The significant difference between their scheme and ours is that we have no specific requirements imposed on the distribution of both the dry pixels and the wet pixels in cover images; wet pixels can be chosen completely in accordance with the characteristics of different cover images as well as the application's needs. The proposed scheme has been tested with nine commonly-used gray images. Subtle and radical variations to the existing scheme are suggested and proven to provide a significantly improved PSNR.*
Keywords: Information hiding, Steganography, Wet paper code, Run length encoding, Hamming code

1. **Introduction.** Wet paper codes (WPC) [7] proposed as a tool for construction of steganographic schemes with arbitrary (non-shared) selection channels, have attracted particular attention. The concept is similar to exposing a piece of paper to rain; only the dry area can be used to write messages. Basically, the WPC scheme randomly chooses pixels from a cover image to be the wet pixels. The pixels not selected become the dry pixels that may be modified to imply secret data. Note that only dry pixels can be modified and the recipient can extract the message without knowing the rate and distribution of wet pixels. Multifarious schemes based on WPC or inspired by WPC are proposed [3,10].

Chang, Chou and Lin have proposed a hiding scheme for grayscale images based on WPC recently [4]. Their method has a fatal drawback: the wet pixels must be uniformly distributed. This shortcoming is the bottleneck of its wide application. This article describes a critical improvement. In this paper, there are no specific requirements imposed on the distribution of both the dry pixels and the wet pixels in cover images. The wet pixels can be chosen completely in accordance with the characteristics of different cover images as well as the application's needs. The experimental results show that the proposed