



A new robust lossless data hiding scheme and its application to color medical images

Rasha Thabit, Bee Ee Khoo  

Show more 

 Outline |  Share  Cite

<https://doi.org/10.1016/j.dsp.2014.12.005>

[Get rights and content](#)

Highlights

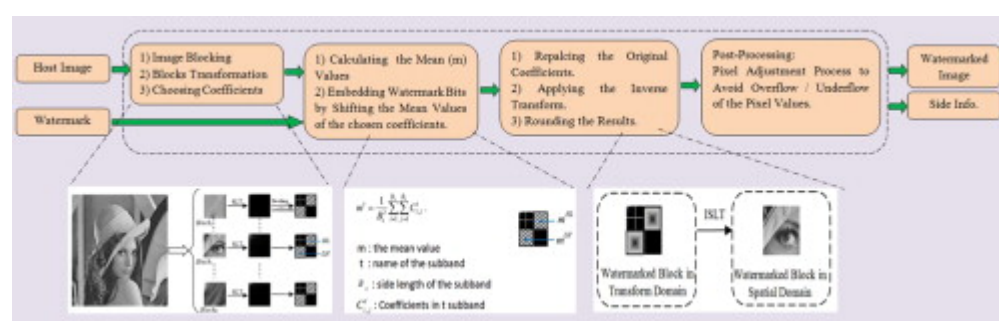
- A new robust lossless data hiding scheme in the transform domain is proposed.
- The Slantlet transform (SLT) has been calculated using matrix multiplication.
- The method provides complete reversibility after watermark extraction.
- Robustness against different attacks has been obtained.
- The proposed scheme has been successfully applied to color medical images.

Abstract

The last few years witnessed an increased interest in the robust lossless data hiding schemes because they can verify the main requirements of the lossless data hiding (i.e., reversibility, capacity, and invisibility) and at the same time provide robustness against attacks. The reversibility is one of the important requirements of those methods. Another important requirement is the improvement of the robustness against attacks. The methods that improve the

robustness are at the cost of reducing capacity and invisibility. Taking into consideration the need for improving the four requirements that have been mentioned above, this paper presents a novel robust lossless data hiding method in the transform domain. The proposed algorithm depends on transforming non-overlapping blocks of the host image using Slantlet transform (SLT) matrix and embedding data bits by modifying the difference between the mean values of the SLT coefficients in the high frequency subbands. As a practical application, the proposed algorithm has been adjusted in order to be applied to the color medical images. The data bits can be embedded not only in a single channel but also in the three channels of the RGB color image and thus further improving the embedding capacity. The results of the experiments that were conducted and the comparisons with the previous robust lossless data hiding (i.e., robust reversible watermarking) methods prove the effectiveness of the proposed algorithm.

Graphical abstract



[Download : Download full-size image](#)

[Previous](#)

[Next](#)

Keywords

Robust lossless data hiding; Robust reversible watermarking; Slantlet Transform (SLT) Matrix; Reversibility; Robustness

[Recommended articles](#)

[Citing articles \(44\)](#)

Rasha Thabit received her B.Sc. degree in Electronics and Communications Engineering from University of Baghdad, Iraq, in 2006, and M.Sc. degree in Electrical Engineering from University of Baghdad, Iraq, in 2008. She is currently a

Ph.D. student in the School of Electrical & Electronic Engineering at Universiti Sains Malaysia (University of Science, Malaysia). Her research interest is in the area of digital image watermarking and signal processing.

Bee Ee Khoo received the B.Tech. degree in Quality Control and Instrumentation from Universiti Sains Malaysia, in 1993, and Ph.D. degree in Electrical Engineering from University of Wales, Swansea, in 1998. She is currently a senior lecturer with School of Electrical and Electronic Engineering, Universiti Sains Malaysia. Her current research interests include digital watermarking, computer vision and multimedia forensics.

[View full text](#)

Copyright © 2014 Elsevier Inc. All rights reserved.



Copyright © 2022 Elsevier B.V. or its licensors or contributors.
ScienceDirect® is a registered trademark of Elsevier B.V.

