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Title

Combining Superresolution and Fusion Methods for Sharpening Misrsat-1 Data

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Abstract:

This paper presents an efficient technique for sharpening of Misrsat-1 data using superresolution (SR) methods and fusion methods. Due to the difference in spectral characteristics between bands 1 and 3 and the panchromatic (PAN) band of Misrsat-1, we implement SR on high details of these bands and use the resulting image to sharpen the bands of the multispectral (MS) image. Several SR methods are tested and compared in this paper for this purpose. The first class ofmethods uses spatial-domain SR, in which SR is performed on the high-pass details extracted from bands 1 and 3 and the PAN band. The superresolved high-pass details are used after that to enhance the spatial resolution of the MS data using the high-pass filter fusion method. The second class of methods depends on the interpolation of coefficients in the high-frequency subbands of a multiscale representation of bands 1 and 3 and the PAN band and an additive fusion method to add the high-frequency subband coefficients to different bands of theMS image. A comparison study between different SR methods belonging to the aforementioned classes such as nonuniform interpolation (NUI), projection onto convex sets (POCS), iterative back projection (IBP), structure-adaptive normalized convolution (SANC), and adaptive steering kernel regression (ASKR) is presented. The simulation results show that iterative SR methods such as IBP and POCS produce more noise than interpolation methods such as NUI, SANC, and ASKR. The results also reveal that combining the ASKR with a multiscale decomposition enhances the signalto- noise ratio.

Index Terms:

Fusion, Misrsat-1, superresolution (SR).

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S. El-Rabaie (SM'92) was born in Sires Elian, Egypt, in 1953. He received the B.Sc. degree (with honors) in radio communications from Tanta University, Tanta, Egypt, in 1976, the M.Sc. degree in communication systems from Menoufia University, Menouf, Egypt, in 1981, and the Ph.D. degree in microwave engineering from Queen's University of Belfast, Belfast, U.K., in 1986. In his doctoral research, he constructed a computer-aided design (CAD) package used in nonlinear circuit simulations based on the harmonic balance techniques. Up to February 1989, he was a Postdoctoral Fellow with the Department of Electronic Engineering, Queen's University of Belfast. He was invited as a Research Fellow in the College of Engineering and Technology, Northern Arizona University, Flagstaff, in 1992 and as a Visiting Professor at Ecole Polytechnique de Montreal, Montreal, QC, Canada, in 1994. He is currently a Professor of electronics and communications engineering with the Faculty of Electronic Engineering, Menoufia University. He has authored and coauthored more than 120 papers and technical reports and 15 books under the titles Computer Aided Simulation and Optimization of Nonlinear Active Microwave Circuits, The Whole Dictionary for the Computer and the Internet Terminologies, Basics and Technologies of Data Communications in Computer Networks, Technologies and Internet Programming, The Distance Learning and Its Technologies on the Third Millennium, Computer Principles and Their Applications in Education, Software Engineering (Volume 1), Management of Computer Networks (Volumes 1 and 2), Advanced Internet Programming, Data-Base Principles, Building of Compilers,

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Title

Efficient video watermarking based on singular value decomposition in the discrete wavelet transform domain

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DWT Digital watermarking SVD Spatial and temporal redundancy
Multi-resolution Wavelet decomposition Attacks resilience

abstract

This paper presents an efficient, robust, and imperceptible video watermarking technique based on singular value decomposition (SVD) performed in the Discrete Wavelet Transform (DWT) domain. In the proposed DWT-based SVD video watermarking method, the video frames are transformed with the DWT using two resolution levels. The high frequency band HH and the middle frequency bands LH and HL are SVD transformed and the watermark is hidden in them. The proposed DWT-based SVD video watermarking method is characterized by two improvements: (1) a cascade of two powerful mathe-matical transforms; the Discrete Wavelet Transform (DWT)-based SVD using additive method, and (2) an error correction code is applied and embeds the watermark with spatial and temporal redundancy. The

aim of these improvements is to increase robustness against attacks based on video characteristics and the robustness against image processing attacks, realize high security level, protect the watermark against bit errors and obtain good perceptual quality. The proposed DWT-based SVD video watermarking method has been tested in the presence of video and image processing attacks and experimental results proved that the proposed DWT-based SVD video watermarking method survives attacks based on video characteristics and image processing techniques.

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Title

Chaos-based hash function (CBHF) for cryptographic applications

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abstract:

As the core of cryptography, hash is the basic technique for information security. Many of the hash functions generate the message digest through a randomizing process of the original message. Subsequently, a chaos system also generates a random behavior, but at the same time a chaos system is completely deterministic. In this paper, an algorithm for oneway hash function construction based on chaos theory is introduced. Theoretical analysis and computer simulation indicate that the algorithm can satisfy all performance requirements of hash function in an efficient and flexible manner and secure against birthday attacks or meet-in-the-middle attacks, which is good choice for data integrity or authentication.

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Title

Encryption-based multilevel model for DBMS

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Abstract

In this paper, we propose an encryption-based multilevel model for database management systems. The proposed model is a combination of the Multilevel Relational (MLR) model and an encryption system. This encryption system encrypts each data in the tuple with different field-key according to a security class of the data element. Each field is decrypted
individually by the field-key of which security class is higher than or equal to that of the encrypted field-key. The proposed model is characterized by three achievements: (1) utilizing an encryption system as an additional security layer over the multilevel security layer for the database, (2) reducing the multilevel database size, and (3) improving the response time of the data retrieval from the multilevel database. Also this paper summarizes our efforts in implementing a working multilevel secure database prototype. This prototype is used as a research tool for studying principles and mechanisms of the encryption-based multilevel model and multilevel secure database (MLS/DBMS) models (SeaView, JajodiaeSandhu, SmitheWinslett, MLR, and Belief-Consistent Model). This prototype is implemented to be used to perform a series of experiments to measure the performance cost for applying encryption in multilevel database security.

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Zuo Xiao-Dong, Liu Feng-Mei, Ma Chao-Bin. A new approach to multilevel security based on trusted computing platform. In: Proceedings of the sixth international conference on machine learning and cybernetics, Hong Kong; 2007. p. 2158e63.

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technical reports, fifteen books under the titles (Computer aided simulation and optimization of nonlinear active microwave circuits, The whole dictionary for the computer and the Internet terminologies, Basics and technologies of data communications in computer networks, Technologies and Internet programming, The distance learning and its technologies on the third millennium, computer principles and their applications in education, software engineering (1), Management of computer networks (1,2), Advanced Internet programming, data-base principles, building of compilers, software engineering (2), Ethics of profession). In 1993, he was awarded the Egyptian Academic Scientific Research Award (Salah Amer Award of Electronics) and in 1995, he received the award of the best researcher on (CAD) from Menoufia University. He has shared in translating the first part of the Arabic Encyclopedia. Now he is the Vice Dean of Postgraduate Studies and Research, Faculty of Electronic Engineering, Menoufi University. Address: Faculty of Electronic Engineering, 32952 Menouf, Egypt. E-mail: srabie1@yahoo.com, srabie1@hotmail. com. Mobile: 0184985170 e 0198699975. List of published books in computer science and educational technology:

1) The whole dictionary for the computer and the Internet terminologies,
2) Basics and technologies of data communications in computer networks,
3) Technologies and Internet programming,
4) The distance learning and its technologies on the third millennium,
5) Computer principles and their applications in education,
6) Software engineering (1),
7) Management of computer networks (1),
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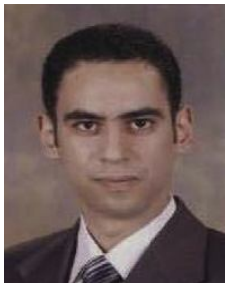

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البحث رقم (5)

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Title

A chaotic block cipher algorithm for image cryptosystems

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Recently, many scholars have proposed chaotic cryptosystems in order to promote communication security. However, there are a number of major problems detected in some of those schemes such as weakness against differential attack, slow performance speed, and unacceptable data expansion. In this paper, we introduce a new chaotic block cipher scheme for image cryptosystems that encrypts block of bits rather than block of pixels. It encrypts 256-bits of plainimage to 256-bits of cipherimage within eight 32-bit registers. The scheme employs the cryptographic primitive operations and a non-linear transformation function within encryption operation, and adopts round keys for encryption using a chaotic system. The new scheme is able to encrypt large size of images with superior performance speed than other schemes. The security analysis of the new scheme confirms a high security level and fairly uniform distribution.

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Table 8 Performance of our scheme and other schemes.
Image size (in pixels) Image size on disk Encryption time (s) Proposed RC5 RC6
512 _ 512 257 KB 0.007 0.046 0.031
1024 _ 1024 1.00 MB 0.015 0.054 0.047

2048 _ 2048 4.00 MB 0.093 0.281 0.171
4096 _ 4096 16.00 MB 0.500 1.054 0.703
8192 _ 8192 64.00 MB 1.906 4.193 2.786

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البحث رقم (6)

Title

Divided two-part adaptive intrusion detection system

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Abstract :

The main objective of this paper is to design a more complete intrusion detection system solution. The paper presents an efficient approach for reducing the rate of alerts using divided two-part adaptive intrusion detection system (DTPAIDS). The proposed DTPAIDS has a high degree of autonomy in tracking suspicious activity and detecting positive intrusions. The proposed DTPAIDS is designed with the aim of reducing the rate of detected false positive intrusion through two achievements. The first achievement is done by implementing adaptive self-learning neural network in the proposed DTPAIDS to gives it the ability to be automatic adaptively system based on Radial Basis Functions (RBF) neural network. The second achievement is done through dividing the proposed intrusion detection system IDS into two parts. The first

part is IDS1, which is installed in the front of firewall and responsible for checking each entry user's packet and deciding if the packet considered is an attack or not. The second is IDS2, which is installed behind the firewall and responsible for detecting only the attacks which passed the firewall. This proposed approach for IDS exhibits a lower false alarm rate when detects novel attacks. The simulation tests are conducted using DARPA 1998 dataset. The experimental results show that the proposed DTPAIDS [1] reduce false positive rate, [2] detects intrusion occurrence sensitively and precisely, [3] accurately self–adapts diagnose model, thus improving its detection accuracy.

Keywords:

Intrusion detection system (IDS)_FPs_RBF neural network_Anomaly intrusion detection system_Misuse detection_Intrusion prevention system (IPS)_Neural network

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Osama S. Faragallah received his B.S. in 1997, MSc in 2002 and Ph.D. in 2007, all in Computer Sciences and Engineering from Menoufia University, faculty of Electronic Engineering, Egypt. He was a demonstrator at the Department of Computer Sciences and Engineering, at Menoufia University, from 1997 to 2002, become an assistant lecturer in 2002 and was promoted to a lecturer in 2007. His research interests cover computer networks, network security, cryptography, Internet security, multimedia security, image encryption, watermarking, stenography, data hiding and chaos theory.

البحث رقم (7)

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Title

Enhanced semi-automated method to identify the endo-cardium and epi-cardium borders

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Abstract:

We present two semi-automatic solution methods for the three dimensional (3D) segmentation of cavity and myocardium from a 3D cardiac multislice CT (MSCT) data. The main framework of the segmentation algorithms is based on random walks, in which the novelty lies in a seeds-selection method composed of region growing technique and morphological operation to locate and identify the cavity and myocardium of the left ventricle (LV). In the first solution, a semi-automatic segmentation approach (Method_1) is suggested to extract the epi-cardium and endo-cardium boundaries of LV of the heart. This proposed solution depends on the use of the normal random walker algorithm.

In the second solution, a semiautomatic segmentation approach (Method_2) based on improved
random walks is proposed. Segmentation is done within the framework of toboggan algorithm in combination with a random walk based technique. The two proposed semi-automatic segmentation methods either based on the normal random walker or the improved random walker algorithms utilized six-connected lattice topology and a conjugate gradient method to promote the segmentation performance of the 3D data. The two semi-automatic solution methods were evaluated using 20 cardiac MSCT datasets. Semi-automatic generated contours were compared to expert contours. For Method_1, 83.4% of epi-cardial contours and 74.7% of endo-cardial contours had a maximum error of 5mm along 95% of the contour arc length. For Method_2, those numbers were 94.3% (epi-cardium) and 92.3% (endo-cardium), respectively. Volume regression analysis revealed good linear correlations between manual and semiautomatic volumes, $r \geq 0.99$.
 [DOI: 10.1117/1.JEI.21.2.023024]

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Title

Homomorphic image encryption

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Abstract:

This paper presents a new homomorphic image cryptosystem. The idea of this system is based on encrypting the reflectance component after the homomorphic transform and embedding the illumination component as a least significant bit watermark into the encrypted reflectance component. A comparison study is held between the RC6 block cipher algorithm and the chaotic Baker map algorithm for the encryption of the reflectance component. We present a security analysis for the proposed cryptosystem against the entropy, brute-force, statistical, and differential attacks from a strict cryptographic viewpoint. Experimental results verify and prove that the proposed homomorphic image cryptosystem is highly secure from the cryptographic viewpoint. The results also prove that this cryptosystem has a very powerful diffusion mechanism (a small change in the plain text makes a great change in the cipher image). The homomorphic encryption using RC6 algorithm is more secure than that using the chaotic Baker map algorithm but not robust to noise. Thus, the proposed homomorphic cryptosystem can be used in different applications, depending on the core algorithm used. © 2009 Society of Photo-Optical Instrumentation Engineers. _DOI: 10.1117/1.3167847_

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Title

Satellite image fusion based on principal component analysis and high-pass filtering

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الملخص
This paper presents an integrated method for the fusion of satellite images. Several commercial earth observation satellites carry dual-resolution sensors, which provide high spatial resolution or simply high-resolution (HR) panchromatic (pan) images and low-resolution (LR) multi-spectral (MS) images. Image fusion methods are therefore required to integrate a high-spectral-resolution MS image with a high-spatial-resolution pan image to produce a pan-sharpened image with high spectral and spatial resolutions. Some image fusion methods such as the intensity, hue, and saturation (IHS) method, the principal component analysis (PCA) method, and the Brovey transform (BT) method provide HR MS images, but with low spectral quality. Another family of image fusion methods, such as the high-pass-filtering (HPF) method, operates on the basis of the injection of high frequency components from the HR pan image into the MS image. This family of methods provides less spectral distortion. In this paper, we propose the integration of the PCA method and the HPF method to provide a pan-sharpened MS image with superior spatial resolution and less spectral distortion. The experimental results show that the proposed fusion method retains the spectral characteristics of the MS image and, at the same

time, improves the spatial resolution of the pan sharpened image.
OCIS codes: 100.0100, 100.02980, 280.0280.

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Title

Quadruple Difference Expansion-Based Reversible Data Hiding Method for Digital Images

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KEYWORDS :

information hiding, reversible data embedding, lossless data embedding, steganography, difference expansion, payload capacity

ABSTRACT:

Lossless data hiding is a special type of data hiding technique that guarantees not only the secret data but also the ability of cover media to be reconstructed without any distortion. A latest lossless data hiding technique is proposed by Hong Lin Jin's that is based on hiding only one data bit in the spatial domain in gray-level image. However, this method uses double

difference expansion to embed bits which results in a small embedding capacity.
For this purpose, we propose an improved algorithm with the potential of increasing the payload capacity and maintaining good image quality. The proposed
improved algorithm is characterized by two aspects. First, the proposed improved reversible data hiding scheme is enhanced to exhibit data hiding in color palette images. Second, the embedding level is improved by using quadruple difference expansion to guarantee the embedding of 2-bit data into color images. Experiments of the proposed improved method have been conducted
over several well-known test images. The results show that the proposed improved method significantly improves the embedding capacity over Hong Lin Jin's scheme by the range of 15–35% for grayscale images and 20–46% for
color images while still maintaining the quality of the stego-images.

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