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# Read Online Steganography And Digital Watermarking

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This book constitutes the thoroughly refereed post-proceedings of the 5th International Workshop on Information Hiding, IH 2002, held in Noordwijkerhout, The Netherlands, in October 2002. The 27 revised full papers presented were carefully selected during two rounds of reviewing and revision from 78 submissions. The papers are organized in topical sections on information hiding and networking, anonymity, fundamentals of watermarking, watermarking algorithms, attacks on watermarking algorithms, steganography algorithms, steganalysis, and hiding information in unusual content.

The bestselling first edition of "Disappearing Cryptography" was known as the best introduction to information hiding. This fully revised and expanded second edition describes a number of different techniques that people can use to hide information, such as encryption.

This book constitutes the refereed proceedings of the 4th International Workshop on Digital Watermarking Secure Data Management, IWDW 2005, held in Siena, Italy in September 2005. The 31 revised full papers presented were careful-

ly reviewed and selected from 74 submissions. The papers are organized in topical sections on steganography and steganalysis, fingerprinting, watermarking, attacks, watermarking security, watermarking of unconventional media, channel coding and watermarking, theory, and applications.

This book constitutes the thoroughly refereed post-workshop proceedings of the Third International Workshop on Information Hiding, IH'99, held in Dresden, Germany, in September/October 1999. The 33 revised full papers presented were carefully reviewed and selected from a total of 68 submissions. The dominating topic, dealt with in various contexts, is watermarking. The papers are organized in sections on fundamentals of steganography, paradigms and examples, beyond symmetric steganography; watermarking: proving ownership, detection and decoding, embedding techniques, new designs and applications, improving robustness, software protection; separating private and public information; and stego-engineering.

Every day millions of people capture, store, transmit, and manipulate digital data. Unfortunately free access digital multimedia communication also provides

virtually unprecedented opportunities to pirate copyrighted material. Providing the theoretical background needed to develop and implement advanced techniques and algorithms, *Digital Watermarking and Steganography*: Demonstrates how to develop and implement methods to guarantee the authenticity of digital media Explains the categorization of digital watermarking techniques based on characteristics as well as applications Presents cutting-edge techniques such as the GA-based breaking algorithm on the frequency-domain steganalytic system The popularity of digital media continues to soar. The theoretical foundation presented within this valuable reference will facilitate the creation on new techniques and algorithms to combat present and potential threats against information security.

This book focuses on image based security techniques, namely visual cryptography, watermarking, and steganography. This book is divided into four sections. The first section explores basic to advanced concepts of visual cryptography. The second section of the book covers digital image watermarking including watermarking algorithms, frameworks for modeling watermarking systems, and the evaluation of watermarking techniques. The next section analyzes steganography and steganalysis, including the notion, terminology and building blocks of steganographic communication. The final section of the book describes the concept of hybrid approaches which includes all image-based security techniques. One can also explore various advanced research domains related to the multimedia security field in the final section. The book includes many examples and applications, as well as implementation using MATLAB, wherever required. Features: Provides a comprehensive

introduction to visual cryptography, digital watermarking and steganography in one book Includes real-life examples and applications throughout Covers theoretical and practical concepts related to security of other multimedia objects using image based security techniques Presents the implementation of all important concepts in MATLAB

This book covers newly developed and novel Steganography techniques and algorithms. The book outlines techniques to provide security to a variety of applications using Steganography, with the goal of both hindering an adversary from decoding a hidden message, and also preventing an adversary from suspecting the existence of covert communications. The book looks into applying these newly designed and improved algorithms to provide a new and efficient Steganographic system, called Characteristic Region-Based Image Steganography (CR-BIS). The algorithms combine both the robustness of the Speeded-Up Robust Features technique (SURF) and Discrete Wavelet Transform (DWT) to achieve characteristic region Steganography synchronization. The book also touches on how to avoid hiding data in the whole image by dynamically selecting characteristic regions for the process of embedding. Applies and discusses innovative techniques for hiding text in a digital image file or even using it as a key to the encryption; Provides a variety of methods to achieve characteristic region Steganography synchronization; Shows how Steganography improves upon cryptography by using obscurity features.

In the last few decades, the use of the Internet has grown tremendously, and the use of online communications has grown even more. The lack of security in private messages between individuals, however, allows hackers to collect loads of

sensitive information. Modern security measures are required to prevent this attack on the world's communication technologies. Advanced Digital Image Steganography Using LSB, PVD, and EMD: Emerging Research and Opportunities provides evolving research exploring the theoretical and practical aspects of data encryption techniques and applications within computer science. The book provides introductory knowledge on steganography and its importance, detailed analysis of how RS and PDH are performed, discussion on pixel value differencing principles, and hybrid approaches using substitution, PVD, and EMD principles. It is ideally designed for researchers and graduate and under graduate students seeking current research on the security of data during transit.

The rapid development of new information technologies has improved the ease of access to digital information. It also leads to the problem of illegal copying and redistribution of digital media. The concept of digital watermarking came up while trying to solve the problems related to the management of intellectual property of media. The concept of digital watermarking is derived from steganography. Both steganography and watermarking describe techniques that are used to convey information by embedding it into the cover data. However, steganography typically relates to covering point-to-point communication between two parties. Thus steganography methods are usually not robust against modification of the data, or have only limited robustness. Digital watermarking on the other hand should be robust against attempts to remove the hidden data. A popular application of watermarking is to give proof of ownership. It is obvious that for this application the water-

mark should be robust against any manipulation that may attempt to remove it.

This volume constitutes the proceedings of the 20th International Workshop on Digital Forensics and Watermarking, IWDW 2021, held in Beijing, China, in November 2021. The 18 full papers in this volume were carefully reviewed and selected from 32 submissions. They are categorized in the following topical headings: Forensics and Security Analysis; Watermarking and Steganology.

Multimedia Security: Watermarking, Steganography, and Forensics outlines essential principles, technical information, and expert insights on multimedia security technology used to prove that content is authentic and has not been altered. Illustrating the need for improved content security as the Internet and digital multimedia applications rapidly evolve, this book presents a wealth of everyday protection application examples in fields including multimedia mining and classification, digital watermarking, steganography, and digital forensics. Giving readers an in-depth overview of different aspects of information security mechanisms and methods, this resource also serves as an instructional tool on how to use the fundamental theoretical framework required for the development of extensive advanced techniques. The presentation of several robust algorithms illustrates this framework, helping readers to quickly master and apply fundamental principles. Presented case studies cover: The execution (and feasibility) of techniques used to discover hidden knowledge by applying multimedia duplicate mining methods to large multimedia content. Different types of image steganographic schemes based on vector quantization. Techniques used to detect changes in human motion behavior.

and to classify different types of small-group motion behavior Useful for students, researchers, and professionals, this book consists of a variety of technical tutorials that offer an abundance of graphs and examples to powerfully convey the principles of multimedia security and steganography. Imparting the extensive experience of the contributors, this approach simplifies problems, helping readers more easily understand even the most complicated theories. It also enables them to uncover novel concepts involved in the implementation of algorithms, which can lead to the discovery of new problems and new means of solving them.

Disappearing Cryptography, Second Edition describes how to take words, sounds, or images and hide them in digital data so they look like other words, sounds, or images. When used properly, this powerful technique makes it almost impossible to trace the author and the recipient of a message. Conversations can be submerged in the flow of information through the Internet so that no one can know if a conversation exists at all. This full revision of the best-selling first edition describes a number of different techniques to hide information. These include encryption, making data incomprehensible; steganography, embedding information into video, audio, or graphics files; watermarking, hiding data in the noise of image or sound files; mimicry, "dressing up" data and making it appear to be other data, and more. The second edition also includes an expanded discussion on hiding information with spread-spectrum algorithms, shuffling tricks, and synthetic worlds. Each chapter is divided into sections, first providing an introduction and high-level summary for those who want to understand the concepts without wading through technical

explanations, and then presenting greater detail for those who want to write their own programs. To encourage exploration, the author's Web site [www.wayner.org/books/discrypt2/](http://www.wayner.org/books/discrypt2/) contains implementations for hiding information in lists, sentences, and images. Each chapter is divided into sections, providing first an introduction and high-level summary for those who want to understand the concepts without wading through technical details, and then an introductory set of details, for those who want to write their own programs. Fully revised and expanded. Covers key concepts for non-technical readers. Goes into technical details for those wanting to create their own programs and implement algorithms.

Investigators within the law enforcement and cyber forensics communities are generally aware of the concept of steganography, but their levels of expertise vary dramatically depending upon the incidents and cases that they have been exposed to. Now there is a book that balances the playing field in terms of awareness, and serves as a valuable reference source for the tools and techniques of steganography. The Investigator's Guide to Steganography provides a comprehensive look at this unique form of hidden communication from its earliest beginnings to its most modern uses. The book begins by exploring the past, providing valuable insight into how this method of communication began and evolved from ancient times to the present day. It continues with an in-depth look at the workings of digital steganography and watermarking methods, available tools on the Internet, and a review of companies who are providing cutting edge steganography and watermarking services. The third section builds on the first two by

outlining and discussing real world uses of steganography from the business and entertainment to national security and terrorism. The book concludes by reviewing steganography detection methods and what can be expected in the future. It is an informative and entertaining resource that effectively communicates a general understanding of this complex field.

This book constitutes the thoroughly refereed postproceedings of the Second International Workshop on Digital Watermarking, IWDW 2003, held in Seoul, Korea, in October 2004. The 44 revised full papers presented together with 4 invited articles were carefully selected during two rounds of reviewing and improvement from more than 90 submissions. The papers address all current aspects of digital watermarking, in particular theoretical modeling, robustness, capacity, imperceptibility and the human perceptual system, security and attacks, watermarking systems and implementations, and integration of digital watermarking in digital rights management.

This book intends to provide a comprehensive overview on different aspects of mechanisms and techniques for information security. It is written for students, researchers, and professionals studying in the field of multimedia security and steganography. Multimedia security and steganography is especially relevant due to the global scale of digital multimedia and the rapid growth of the Internet. Digital watermarking technology can be used to guarantee authenticity and can be applied as proof that the content has not been altered since insertion. Updated techniques and advances in watermarking are explored in this new edition. The combinational spatial and frequency domains watermarking technique provides a new concept of enlarging the

embedding capacity of watermarks. The genetic algorithm (GA) based watermarking technique solves the rounding error problem and provide an efficient embedding approach. Each chapter provides the reader with a fundamental, theoretical framework, while developing the extensive advanced techniques and considering the essential principles of the digital watermarking and steganographic systems. Several robust algorithms that are presented throughout illustrate the framework and provide assistance and tools in understanding and implementing the fundamental principles.

A comprehensive guide to the essential principles of image processing and pattern recognition Techniques and applications in the areas of image processing and pattern recognition are growing at an unprecedented rate. Containing the latest state-of-the-art developments in the field, Image Processing and Pattern Recognition presents clear explanations of the fundamentals as well as the most recent applications. It explains the essential principles so readers will not only be able to easily implement the algorithms and techniques, but also lead themselves to discover new problems and applications. Unlike other books on the subject, this volume presents numerous fundamental and advanced image processing algorithms and pattern recognition techniques to illustrate the framework. Scores of graphs and examples, technical assistance, and practical tools illustrate the basic principles and help simplify the problems, allowing students as well as professionals to easily grasp even complicated theories. It also features unique coverage of the most interesting developments and updated techniques, such as image watermarking, digital steganography, document processing and classification, solar image pro-

cessing and event classification, 3-D Euclidean distance transformation, shortest path planning, soft morphology, recursive morphology, regulated morphology, and sweep morphology. Additional topics include enhancement and segmentation techniques, active learning, feature extraction, neural networks, and fuzzy logic. Featuring supplemental materials for instructors and students, *Image Processing and Pattern Recognition* is designed for undergraduate seniors and graduate students, engineering and scientific researchers, and professionals who work in signal processing, image processing, pattern recognition, information security, document processing, multimedia systems, and solar physics.

This work is authored by Pratheek Praveen Kumar along with Ruchir Bhgat and Shiksha Suvarna, all three Telecommunications Engineers. Digital Watermarking is the process of irreversibly embedding information into a digital signal. The signal may be audio, pictures or video. There are two types of Watermarking, Visible Watermarking and Invisible Watermarking. In Visible Watermarking, the information is visible in the picture or video. Typically, the information is text or a logo which identifies the owner of the media. Example of Visible Watermark is when a television broadcaster adds its logo to the corner of transmitted video. In Invisible Watermarking, information is added as digital data to audio, picture or video, but it cannot be perceived as such (although it is possible to detect the hidden information). Digital Watermarking schemes are widely being used as potential solution for ownership protection. The Watermarking algorithms in general, may be viewed as digital communication scheme for imperceptible transmission of an auxiliary message

through cover image. Several software implementations of the proposed algorithms are available, but very few attempts have been made for the property of robustness and they are not able to provide the good visual Recovery Watermark Image (IWD) as user aspect. This is accomplished by spreading one watermark bit over many samples of the Cover data using a modulated spreading sequence. This is a study of this technology.

A successor to the popular Artech House title *Information Hiding Techniques for Steganography and Digital Watermarking*, this comprehensive and up-to-date new resource gives the reader a thorough review of steganography, digital watermarking and media fingerprinting with possible applications to modern communication, and a survey of methods used to hide information in modern media. This book explores Steganography, as a means by which two or more parties may communicate using invisible or subliminal communication. "Steganalysis" is described as methods which can be used to break steganographic communication. This comprehensive resource also includes an introduction to watermarking and its methods, a means of hiding copyright data in images and discusses components of commercial multimedia applications that are subject to illegal use. This book demonstrates a working knowledge of watermarking's pros and cons, and the legal implications of watermarking and copyright issues on the Internet.

This research book presents a sample of recent advances in information hiding techniques and their applications. It includes: Image data hiding scheme based on vector quantization and image graph coloring The copyright protection system for Android platform Reversible data hid-

ing ICA-based image and video watermarking Content-based invariant image watermarking Single bitmap block truncation coding of color images using cat swarm optimization Genetic-based wavelet packet watermarking for copyright protection Lossless text steganography in compression coding Fast and low-distortion capacity acoustic synchronized acoustic-to-acoustic steganography scheme Video watermarking with shot detection.

The common use of the Internet and cloud services in transmission of large amounts of data over open networks and insecure channels, exposes that private and secret data to serious situations. Ensuring the information transmission over the Internet is safe and secure has become crucial, consequently information security has become one of the most important issues of human communities because of increased data transmission over social networks. Digital Media Steganography: Principles, Algorithms, and Advances covers fundamental theories and algorithms for practical design, while providing a comprehensive overview of the most advanced methodologies and modern techniques in the field of steganography. The topics covered present a collection of high-quality research works written in a simple manner by world-renowned leaders in the field dealing with specific research problems. It presents the state-of-the-art as well as the most recent trends in digital media steganography. Covers fundamental theories and algorithms for practical design which form the basis of modern digital media steganography Provides new theoretical breakthroughs and a number of modern techniques in steganography Presents the latest advances in digital media steganography such as using deep learning and artificial neural network as

well as Quantum Steganography

Digital audio, video, images, and documents are flying through cyberspace to their respective owners. Unfortunately, along the way, individuals may choose to intervene and take this content for themselves. Digital watermarking and steganography technology greatly reduces the instances of this by limiting or eliminating the ability of third parties to decipher the content that he has taken. The many techniques of digital watermarking (embedding a code) and steganography (hiding information) continue to evolve as applications that necessitate them do the same. The authors of this second edition provide an update on the framework for applying these techniques that they provided researchers and professionals in the first well-received edition. Steganography and steganalysis (the art of detecting hidden information) have been added to a robust treatment of digital watermarking, as many in each field research and deal with the other. New material includes watermarking with side information, QIM, and dirty-paper codes. The revision and inclusion of new material by these influential authors has created a must-own book for anyone in this profession. This new edition now contains essential information on steganalysis and steganography New concepts and new applications including QIM introduced Digital watermark embedding is given a complete update with new processes and applications

Steganography is the art of secret writing. The purpose of steganography is to hide the presence of a message from the intruder by using state-of-the-art methods, algorithms, architectures, models, and methodologies in the domains of cloud, internet of things (IoT), and the An-

droid platform. Though security controls in cloud computing, IoT, and Android platforms are not much different than security controls in an IT environment, they might still present different types of risks to an organization than the classic IT solutions. Therefore, a detailed discussion is needed in case there is a breach in security. It is important to review the security aspects of cloud, IoT, and Android platforms related to steganography to determine how this new technology is being utilized and improved continuously to protect information digitally. The benefits and challenges, along with the current and potential developments for the future, are important keystones in this critical area of security research. *Multidisciplinary Approach to Modern Digital Steganography* reviews the security aspects of cloud, IoT, and Android platforms related to steganography and addresses emerging security concerns, new algorithms, and case studies in the field. Furthermore, the book presents a new approach to secure data storage on cloud infrastructure and IoT along with including discussions on optimization models and security controls that could be implemented. Other important topics include data transmission, deep learning techniques, machine learning, and both image and text stenography. This book is essential for forensic engineers, forensic analysts, cybersecurity analysts, cyber forensic examiners, security engineers, cybersecurity network analysts, cyber network defense analysts, and digital forensic examiners along with practitioners, researchers, academicians, and students interested in the latest techniques and state-of-the-art methods in digital steganography. This informative, new resource presents the first comprehensive treatment of silicon-germanium heterojunction bipolar

transistors (SiGe HBTs). It offers you a complete, from-the-ground-up understanding of SiGe HBT devices and technology, from a very broad perspective. The book covers motivation, history, materials, fabrication, device physics, operational principles, and circuit-level properties associated with this new cutting-edge semiconductor device technology. Including over 400 equations and more than 300 illustrations, this hands-on reference shows you in clear and concise language how to design, simulate, fabricate, and measure a SiGe HBT. This book constitutes the strictly refereed post-workshop proceedings of the First International Workshop on Information Hiding, held in Cambridge, UK, in May/June 1996, within the research programme in computer security, cryptology and coding theory organized by the volume editor at the Isaac Newton Institute in Cambridge. Work on information hiding has been carried out over the last few years within different research communities, mostly unaware of each other's existence. The 26 papers presented define the state of the art and lay the foundation for a common terminology. This workshop is very likely to be seen at some point as one of those landmark events that mark the birth of a new scientific discipline.

*Information Hiding: Steganography and Watermarking - Attacks and Countermeasures* deals with information hiding. With the proliferation of multimedia on the Internet, information hiding addresses two areas of concern: privacy of information from surveillance (steganography) and protection of intellectual property (digital watermarking). Steganography (literally, covered writing) explores methods to hide the existence of hidden messages. These methods include invisible ink, mi-

crodot, digital signature, covert channel, and spread spectrum communication. Digital watermarks represent a commercial application of steganography. Watermarks can be used to track the copyright and ownership of electronic media. In this volume, the authors focus on techniques for hiding information in digital media. They analyze the hiding techniques to uncover their limitations. These limitations are employed to devise attacks against hidden information. The goal of these attacks is to expose the existence of a secret message or render a digital watermark unusable. In assessing these attacks, countermeasures are developed to assist in protecting digital watermarking systems. Understanding the limitations of the current methods will lead us to build more robust methods that can survive various manipulation and attacks. The more information that is placed in the public's reach on the Internet, the more owners of such information need to protect themselves from theft and false representation. Systems to analyze techniques for uncovering hidden information and recover seemingly destroyed information will be useful to law enforcement authorities in computer forensics and digital traffic analysis. *Information Hiding: Steganography and Watermarking - Attacks and Countermeasures* presents the authors' research contributions in three fundamental areas with respect to image-based steganography and watermarking: analysis of data hiding techniques, attacks against hidden information, and countermeasures to attacks against digital watermarks. *Information Hiding: Steganography and Watermarking - Attacks and Countermeasures* is suitable for a secondary text in a graduate level course, and as a reference for researchers and practitioners in industry.

This book constitutes the thoroughly refereed post-workshop proceedings of the 11th International Workshop on Information Hiding, IH 2009, held in Darmstadt, Germany, in June 2009. The 19 revised full papers presented were carefully reviewed and selected from 55 submissions. The papers are organized in topical sections on steganography, steganalysis, watermarking, fingerprinting, hiding in unusual content, novel applications and forensics.

Steganography, a means by which two or more parties may communicate using "invisible" or "subliminal" communication, and watermarking, a means of hiding copyright data in images, are becoming necessary components of commercial multimedia applications that are subject to illegal use. This new book is the first comprehensive survey of steganography and watermarking and their application to modern communications and multimedia.

Understand the building blocks of covert communication in digital media and apply the techniques in practice with this self-contained guide.

Privacy and Copyright protection is a very important issue in our digital society, where a very large amount of multimedia data are generated and distributed daily using different kinds of consumer electronic devices and very popular communication channels, such as the Web and social networks. This book introduces state-of-the-art technology on data hiding and copyright protection of digital images, and offers a solid basis for future study and research.

A comprehensive review of the most recent applications of intelligent multi-modal data processing *Intelligent Multi-Modal Data Processing* contains a review of the most recent applications of data pro-

cessing. The Editors and contributors – noted experts on the topic – offer a review of the new and challenging areas of multimedia data processing as well as state-of-the-art algorithms to solve the problems in an intelligent manner. The text provides a clear understanding of the real-life implementation of different statistical theories and explains how to implement various statistical theories. Intelligent Multi-Modal Data Processing is an authoritative guide for developing innovative research ideas for interdisciplinary research practices. Designed as a practical resource, the book contains tables to compare statistical analysis results of a novel technique to that of the state-of-the-art techniques and illustrations in the form of algorithms to establish a pre-processing and/or post-processing technique for model building. The book also contains images that show the efficiency of the algorithm on standard data set. This important book: Includes an in-depth analysis of the state-of-the-art applications of signal and data processing Contains contributions from noted experts in the field Offers information on hybrid differential evolution for optimal multilevel image thresholding Presents a fuzzy decision based multi-objective evolutionary method for video summarisation Written for students of technology and management, computer scientists and professionals in information technology, Intelligent Multi-Modal Data Processing brings together in one volume the range of multi-modal data processing.

Data hiding techniques have been widely used to provide copyright protection, data integrity, covert communication, non-repudiation, and authentication, among other applications. In the context of the increased dissemination and distribution of multimedia content over the internet,

data hiding methods, such as digital watermarking and steganography, are becoming increasingly relevant in providing multimedia security. The goal of this book is to focus on the improvement of data hiding algorithms and their different applications (both traditional and emerging), bringing together researchers and practitioners from different research fields, including data hiding, signal processing, cryptography, and information theory, among others.

Privacy and Copyright protection is a very important issue in our digital society, where a very large amount of multimedia data are generated and distributed daily using different kinds of consumer electronic devices and very popular communication channels, such as the Web and social networks. This book "Steganography and Watermarking" introduces state-of-the-art technology on data hiding and copyright protection of digital images, and offers a solid basis for future study and research. Steganographic technique overcomes the traditional cryptographic approach, providing new solutions for secure data transmission without raising users' malicious intention. In steganography, some secret information can be inserted into the original data in imperceptible and efficient ways to avoid distortion of the image, and enhance the embedding capacity, respectively. Digital watermarking also adopts data hiding techniques for copyright protection and tampering verification of multimedia data. In watermarking, an illegitimate copy can be recognized by testing the presence of a valid watermark and a dispute on the ownership of the image resolved. Different kinds of steganographic and watermarking techniques, providing different features and diverse characteristics, have been presented in this book. This book

provides a reference for theoretical problems as well as practical solutions and applications for steganography and watermarking techniques. In particular, both the academic community (graduate student, post-doc and faculty) in Electrical Engineering, Computer Science, and Applied Mathematics; and the industrial community (engineers, engineering managers, programmers, research lab staff and managers, security managers) will find this book interesting.

Multimedia security has become a major research topic, yielding numerous academic papers in addition to many watermarking-related companies. In this emerging area, there are many challenging research issues that deserve sustained study towards an effective and practical system. This book explores the myriad of issues regarding multimedia security, including perceptual fidelity analysis, image, audio, and 3D mesh ob-

ject watermarking, medical watermarking, error detection (authentication) and concealment, fingerprinting, digital signature and digital right management.

This book constitutes the refereed proceedings of the 16th International Workshop on Digital Forensics and Watermarking, IWDW 2017, held in Magdeburg, Germany, in August 2017. The 30 papers presented in this volume were carefully reviewed and selected from 48 submissions. The contributions are covering the state-of-the-art theoretical and practical developments in the fields of digital watermarking, steganography and steganalysis, forensics and anti-forensics, visual cryptography, and other multimedia-related security issues. Also included are the papers on two special sessions on biometric image tampering detection and on emerging threats of criminal use of information hiding : usage scenarios and detection approaches.