processing course into one that challenges the students to achieve that deeper level of understanding where mathematical abstraction and technology come together. Since the book links the concepts of Fourier representation with multirate system, generalized sampling theory, signal compression, computational complexity, and wavelets representations, it would serve as a good source for an advanced signal processing course at the upper undergraduate or at the graduate level. It is clear that this book has been written with great care and dedication. It includes more than 160 homework problems (about half of them solved) and 220 examples. Also, the book is supported by companion *Mathematica* software, lecture slides, and an instructor's solution manual, accessible from the website that accompanies the book.

## CONCLUSIONS

*Foundations of Signal Processing* is written by highly accomplished researchers in the field. The book shows not only the authors' expertise but also their passion for signal processing and a genuine interest in communicating and teaching the ins and outs of this area. Beyond its classroom use, *Foundations of Signal Processing* is a must-have for scientists and engineers who have sufficient interest in owning more than a couple books on signal processing. For scientists and engineers working in signal processing, it will be a pleasure to read, even when already familiar with the presented concepts. Over time, because of its distinct, consistent, and strong personality, *Foundations of Signal Processing* may be considered a "classic" book on signal processing.

## REVIEWER

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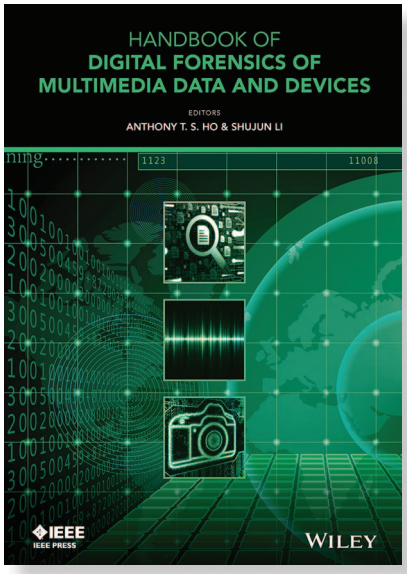
Luisa Verdoliva

# *Handbook of Digital Forensics of Multimedia Data and Devices*

The recovery and analysis of digital information has become a major component of many criminal investigations today. Given the ever-increasing number of personal digital devices, such as notebooks, tablets, and smartphones, as well as the development of communication infrastructures, we all gather, store, and generate huge amounts of data. Some of this information may be precious evidence for investigation and may be used in courts. During the last several decades, increasing research efforts have therefore been dedicated toward defining tools and protocols for the analysis of evidence coming from digital sources.

## BRIDGING THE GAP BETWEEN COMMUNITIES

Despite this fast-growing momentum, digital forensics has much suffered from the cultural gap between its major core disciplines: computer science and signal processing. For years, the focus on computer science methods and tools has been dominant. In comparison, signal processing research entered the digital forensics arena only recently, in large part to analyze the underlying structure of visual and audio evidence.




Anthony T.S. Ho and Shujun Li, Editors
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704 pages.

*Handbook of Digital Forensics of Multimedia Data and Devices,* edited by Anthony T.S. Ho and Shujun Li, attempts to link research in these two communities by providing a wide-ranging and up-to-date reference for both researchers and practitioners. The digital forensics ecosystem is surveyed with the necessary breadth in the first half of the book, by exploring all phases of the forensics workflow and detailing several tools of interest. Gaining insight into these aspects is of paramount importance for practitioners, but also for academic researchers who are often not aware of the standard practices and processes required to preserve digital evidence, e.g., for legal purposes. Similarly, practitioners have the opportunity to discover the state of the art in forensics research in the second half of the book, which is written from a signal

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processing perspective. This balanced mix is a major asset of this book, making it suitable for readers of diverse background.

*Handbook of Digital Forensics of Multimedia Data and Devices* is organized in four parts, comprising four chapters each, starting from practical forensic labs problems, through the most advanced underlying technologies used for their solution.

The first part deals with operational aspects of digital forensic services for multimedia data and digital devices. The forensic procedures of three laboratories managed by law enforcement agencies are presented. Then, current standards and best practices are reviewed, followed by digital triage forensics and audio/video file authentication.

The second part focuses on the recovery of relevant pieces of evidence from multimedia data. It considers photogrammetry, file-carving approaches, the interplay between biometrics and forensics, and the analysis of large collections of multimedia data by means of visual analytics.

The challenges of tracing the source of multimedia data and verifying their authenticity, which is a central issue in criminal investigations, is addressed in the third part. Several approaches are presented for different applications (camera, printer/scanner, microphone), spanning different levels of depth. Then, a hands-on chapter is dedicated to the authentication of printed documents.

The fourth and final part considers the main approaches for passive multimedia content analysis. It starts by describing techniques for region duplication and splicing detection in images and videos, moving on to review camera-based approaches for image forgery detection, with a special focus on chromatic aberration methods. The last two chapters are devoted to emerging research challenges: 1) processing history recovery, which aims at identifying the correct sequence of processing steps that have been applied to an image/video, and 2) counterforensics, which establishes the techniques that could be developed by a malicious adversary to deceive current forensic methods.

## WHEN PRACTICE FEEDS RESEARCH

Another virtue of this book is that, although every chapter is written by a different set of authors, thus ensuring the highest degree of expertise, the editors successfully managed to develop and organize the book in a uniform and well-thought-out way. Fundamental concepts are explained beforehand and in simple terms, followed by specific techniques, examples, and case studies. This helps to gain insight about practical applications and yields a good overall balance between theory and practice. The various parts, and even individual chapters, are largely self-contained, allowing selective readings (and giving rise to some repetitions).

I personally found that reading *Handbook of Digital Forensics of Multimedia Data and Devices* has been a particularly rewarding experience. As an academic researcher, I was initially more interested in the later parts of the book that deal with the technical details of the most recent forensics techniques. Nevertheless, the first few chapters were actually enlightening for me, as they opened a window to a world of which I knew little. Understanding how real-world investigations are conducted in laboratories shed some light on the actual relevance and applicability of forensic methods, and even suggested some promising areas for future research. Moreover, it was interesting to learn more about the numerous case studies that deal with some pressing societal issues (e.g., child pornography). It was also instructive to gain insight into the human–machine interaction and the importance of machine learning techniques, both badly needed when a large bulk of data is available. All these practical considerations contributed to strengthening the connection between the different points of views discussed throughout the book.

In line with the comprehensive approach undertaken, one could regret the absence of a chapter on social network forensics, which is a rapidly growing field of study. More generally, a weak point of the book is that it misses some of the most recent developments. This shortcoming is not unusual and is due to a combination of the lengthy editorial process for any book and the fast progress of research in emerging areas.

To mitigate this issue, the editors set up a companion website (www.wiley.com/go/digitalforensics) to complement the book. Besides granting access to multimedia material, the objective is to maintain an up-to-date source of information covering available datasets, reference source code and software, standards and best practices, related books and journals, and upcoming conferences and events.

## CONCLUSIONS

In summary, *Handbook of Digital Forensics of Multimedia Data and Devices* is a well-conceived and timely book. Besides providing a reference for this field, it also offers a fresh and open perspective, promoting a long-needed cross-fertilization of diverse worlds and academic fields. The editorial choices make the book accessible to a broad audience—from newcomers, who will find a solid and smooth guide to this vast field of study—to established researchers, who may enjoy the aspects of systematic analysis of specific topics.

## REVIEWER

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