

# Bing!

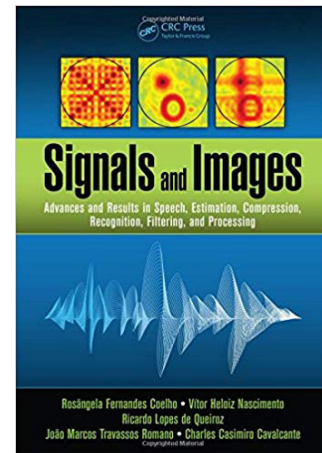
An email from my point of contact at CRC Press just arrived in my mailbox.

*“Dear Melissa, We have these titles ... your journal might be interested in reviewing... Kind Regards, Hard-working CRC Press Employee”*

[A confession: at times, I have judged a book by its cover or title] – I consented to have the journal review “Signals and Images” without much thought, so much of what we do in Remote Sensing is the manipulation of the encoded signal displayed as images. Every image is signal, every bit of image processing is statistical or model-driven manipulations of encoded signal, this should be a straightforward review. A reviewer had been chosen, the review lined up and the book sent but then all that fell apart and the book languished on my desk for nearly 2 years.

The book, “*Signals and Images*”, consists of five parts: Part 1—Theory and Methods; Part 2—Acoustic Signal Processing; Part 3—Image Processing; Part 4—Signal Processing in Communications; Part 5—Selected Topics in Signal Processing. The review was never supposed to tackle the entire broad spectrum of signal processing addressed by the book’s many contributors to this 598 page edited volume. The review for the journal was to be much more manageable, only concerning itself with Part 1—Theory and Methods and Part 3—Image Processing.

Enough languishing, I thought, sitting at my desk, a review must be written. Thinking about an image interpretation undergraduate classroom, I sat in many years ago. Seeing the “checklist” our professor had given us which included as many boxes about “bits<sup>1</sup>” and “brooms<sup>2</sup>” to check as it did “season” and “sun-angel<sup>3</sup>” – the words echoing in my head time and again to remember to ask, where the image came from [i.e., how the signal was captured/encoded] and what has happened to the signal since then, [i.e., how has it been processed since encoding]. This reviewer endeavors to plunge into signals headfirst, hoping to find friendly sensors and algorithms. A small aside, our image interpretation professor was as much



## Signals and Images: Advances and Results in Speech, Estimation, Compression, Recognition, Filtering, and Processing

Rosângela Fernandes Coelho, Vitor Heloiz Nascimento, Ricardo Lopes de Queiroz, João Marcos Travassos Romano, Charles Casimiro Cavalcante

CRC Press, 2017. ISBN 9781138893016 - CAT# K32817

**Review by** Melissa J. Rura-Porterfield, Ph.D.

concerned with the technical underpinnings of how an image was captured as what one might discern by looking at the output of the capture.

**Part 1—Theory and Models** which includes Chapter 1 on blind source separation [independent component separation]; Chapter 2 on kernel-based non-linear signal processing; Chapter 3 on arithmetic transformed methods for trigonometric discrete transforms and finally Chapter 4 on agent modeling. Coming from a perspective in Remote Sensing, used to texts like *Remote Sensing: The Quantitative Approach* among others [4, 5, 6, 7, 8] that tend to emphasize signal processing for geometric correction, signal variance under atmospheric conditions, or signal encoding for specific sensor platforms, particularly for moving or orbiting platforms, this section sort of left this

- 1 Quantization levels [from the check list including: IFOV at nadir; Data Rate; Quantization levels; Earth coverage; Altitude; Swath Width; Inclination]
- 2 Sensor Technology [Frame, Push Broom; Whiskbroom...]
- 3 Remote Sensing and Image Interpretation, 7th Edition by Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman
- 4 Introductory Digital Image Processing by John R. Jensen
- 5 Pattern Classification by Richard O. Duda, Peter E. Hart, David G. Stork
- 6 Remote Sensing: The Image Chain Approach by John R. Schott
- 7 Introduction to Modern Photogrammetry by Edward M Mikhail, James Bethel, Chris McGlone
- 8 Remote Sensing: The Quantitative Approach by P. H. Swain (Editor), Shirley M. Davis (Editor)

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reader wanting. Part 1's perspective seemed singular for such a broad text. Although the preface billed the text possibly suitable as a textbook for undergraduate or graduate students this reviewer feels that the preface was more correct in encouraging this to be a supplement to a textbook or as a reference book for researchers.

**Part 3—Image Processing** includes Chapter 9 on energy-aware video compression; Chapter 10 on rotation and scale-invariant template matchings and Chapter 11 on 3D-TV. As I read this sitting at my desk thinking about the image chain,<sup>6</sup> my heart dropped and my disappointment became clear and proved my folly in cover/title judging. There was nothing about image capture at all, nor was encoding or atmosphere or even transmission to be read here. Although the authors do from a perspective address a type of image processing, I was left wondering about how Remote Sensing got forgotten in the discussion. But, just like my British friends like to tell me, "Melissa, the America Revolution only got one paragraph in our 8th-grade history book, I don't remember much about it..." In the broadness of the topic "*Signals and Images*" the perspectives that come out of Remote Sensing and Photogrammetry were overlooked or did not register as of much importance to these authors. Probably, the book review editor at the time, myself, misjudged the book's audience and should have paid closer attention to the Table of Contents.

There is much we in Remote Sensing can learn about signal capture, signal encoding, signal processing, and signal transmission, first and foremost is to remind ourselves regularly that every image is a signal encoded for our viewing pleasure and secondly there is a whole branch of knowledge devoted to understanding that better. Although, I learned much from this book and do recommend it, probably the most important takeaway today is to encourage our readership to not lose sight of their image chain. Asking questions like 1) "How / When / Where / Why was this image captured?" 2) "How / When / Where / Why has this image been processed?" 3) "How does that effect my intentioned uses of the image?"

We must stand firm in the collection and maintenance of metadata. Remembering that time way back when, when your professor gave you that checklist and you knew that your "bits" and "bytes," and "brooms" had better be in order and if you had band interleave, band sequential was not going to load for your viewing pleasure, so pay attention. No matter how far away we get from those checklists do not forget to remember your professor asking you, time and again, how was this image captured and what has happened to it since then?

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