This Week's Citation Classic®

Rosenfeld A & Kak A C. *Digital picture processing.* New York: Academic Press, 1976. 457 p.
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This book gives a broad presentation of the concepts and mathematical techniques of digital image processing and analysis. Specific topics treated are digitization, compression, enhancement, restoration, segmentation, geometry, and description. [The *SCI*® and *SSCI*® indicate that this book has been cited in over 580 publications.]

Digital Image Processing and Analysis

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In 1969 one of us (AR) published the first monograph on digital image processing and analysis.[1] Rapid progress in the field made it clear, by the mid-1970s, that an updated and expanded treatment was necessary; but the breadth of the field, which overlaps electrical engineering, computer science, and mathematics, made it difficult for any one person to do the job well. We therefore teamed up to write the present book, dividing the chapters between us. AR was the primary author of chapters 1 ("Introduction"), 3 ("Visual perception"), 6 ("Enhancement"), 8 ("Segmentation"), 9 ("Geometry"), and 10 ("Description"). ACK wrote chapters 2 ("Mathematical preliminaries"), 4 ("Digitization"), 5 ("Compression"), and 7 ("Restoration"). We spent many hours going over all the chapters together, often in painful detail. It was an educational experience for both of us and did much to improve the exposition.

The book's popularity and the continued growth of the field led us to conclude after three or four years that we ought to write a second edition, which was published (in two volumes) in 1982.[2] It was nearly twice the size of the first edition: two chapters ("Reconstruction" and "Matching") were added, and most of the other chapters were completely rewritten and greatly expanded. But still more could have been added; in particular, we included almost nothing about three-dimensional scenes (recovery of depth or surface orientation from an image, in particular) or about processing and analysis of time sequences of images taken by a moving sensor. If we ever do a third edition, it will definitely treat these topics, which in fact are central to our own current research interests.

The field of digital image processing and analysis continues to grow rapidly. Particular branches of the field have their own specialized conferences, journals, and textbooks. There are now many books on such topics as image coding (compression), image enhancement and restoration, image reconstruction from projections, two-dimensional signal processing, digital processing algorithms ("mathematical morphology," for example), and three-dimensional computer vision, as well as books on various applications of image analysis: document processing (character recomputation), remote sensing, medicine (cytology, radiology, and so on), industrial inspection, and robotics. AR has been publishing an annual bibliography of the literature in the field for nearly 20 years. It is far from complete; nevertheless, it currently runs over 1,500 references per year.[3]

Our field is only a few decades old; we have seen it grow from small beginnings to a very substantial size, both in the academic community and in real-world applications. We are pleased to have played a part in this growth, and we look forward with great anticipation to further developments.

1. **Rosenfeld A.** *Picture processing by computer.* New York: Academic Press, 1969. 196 p. (Cited 240 times.)
2. **Rosenfeld A & Kak A C.** *Digital picture processing.* New York: Academic Press, 1982. 2 vols. (Cited 360 times.)
3. **Rosenfeld A.** Image analysis and computer vision: 1987. *Comput. Vision Graph. Image P.* 42:234-93, 1988.

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