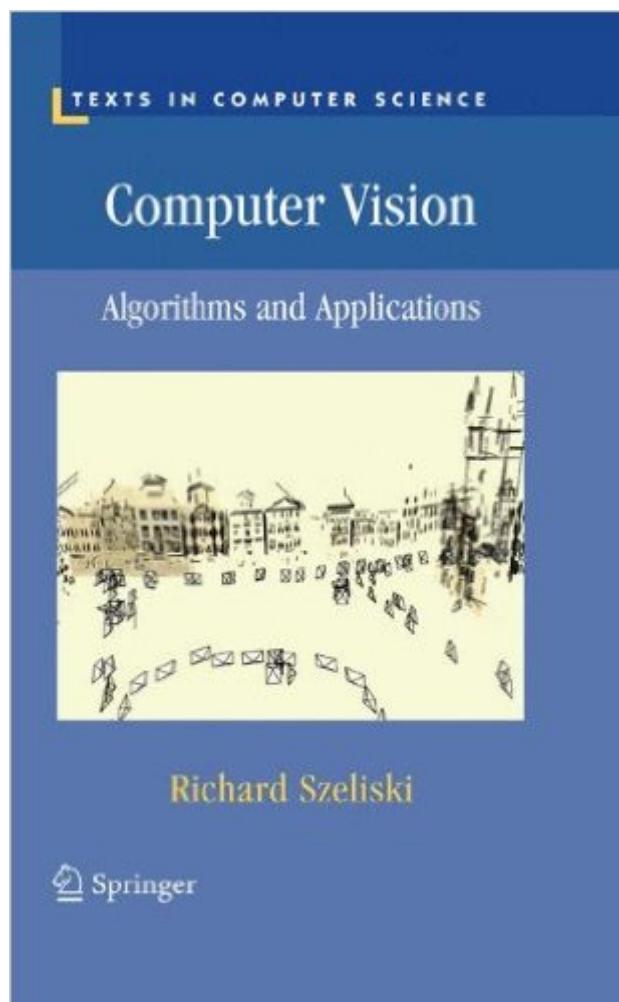


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# Computer Vision: Algorithms And Applications (Texts In Computer Science)



## Synopsis

Computer Vision: Algorithms and Applications explores the variety of techniques commonly used to analyze and interpret images. It also describes challenging real-world applications where vision is being successfully used, both for specialized applications such as medical imaging, and for fun, consumer-level tasks such as image editing and stitching, which students can apply to their own personal photos and videos. More than just a source of *recipes*, this exceptionally authoritative and comprehensive textbook/reference also takes a scientific approach to basic vision problems, formulating physical models of the imaging process before inverting them to produce descriptions of a scene. These problems are also analyzed using statistical models and solved using rigorous engineering techniques. Topics and features: structured to support active curricula and project-oriented courses, with tips in the Introduction for using the book in a variety of customized courses; presents exercises at the end of each chapter with a heavy emphasis on testing algorithms and containing numerous suggestions for small mid-term projects; provides additional material and more detailed mathematical topics in the Appendices, which cover linear algebra, numerical techniques, and Bayesian estimation theory; suggests additional reading at the end of each chapter, including the latest research in each sub-field, in addition to a full Bibliography at the end of the book; supplies supplementary course material for students at the associated website, <http://szeliski.org/Book/>. Suitable for an upper-level undergraduate or graduate-level course in computer science or engineering, this textbook focuses on basic techniques that work under real-world conditions and encourages students to push their creative boundaries. Its design and exposition also make it eminently suitable as a unique reference to the fundamental techniques and current research literature in computer vision.

## Book Information

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## Customer Reviews

From the reviews: "This large work by Szeliski (Microsoft Research), an experienced computer vision researcher and instructor, contains hundreds of glossy color photos that illustrate the variety of techniques used to analyze and interpret images. It is suitable for teaching a senior-level undergraduate course in computer vision or graduate courses covering the more demanding material. Its primary use will be as a general reference to the fundamental techniques and recent research literature for graduate students, faculty/researchers, and professionals. Summing Up: Recommended. Upper-division undergraduates and above." (C. Tappert, Choice, Vol. 48 (9), May, 2011) "The aim of this book is to provide a course in computer vision for undergraduate students in computer science or electrical engineering. The focus is on algorithms and applications. The mathematics covered is nicely presented. Each chapter contains exercises and references to additional reading. The book also contains many references to resources on the Internet." (Lisbeth Fajstrup, Zentralblatt MATH, Vol. 1219, 2011) "The main interests of Richard Szeliski's book is to give a up-to-date overview of the state of the art. It is a valuable resource for teaching computer vision at either the undergraduate or graduate level. It is an interesting read for any student or engineer who wants a broad introduction to the field of computer vision. From a teaching point of view, the book is a valuable resource, offering an extended list of exercises, project proposals, and appealing applications of computer vision techniques." (Sebastien Lefevre, ACM Computing Reviews, July, 2011)

Humans perceive the three-dimensional structure of the world with apparent ease. However, despite all of the recent advances in computer vision research, the dream of having a computer interpret an image at the same level as a two-year old remains elusive. Why is computer vision such a challenging problem and what is the current state of the art? Computer Vision: Algorithms and Applications explores the variety of techniques commonly used to analyze and interpret images. It also describes challenging real-world applications where vision is being successfully used, both for specialized applications such as medical imaging, and for fun, consumer-level tasks such as image editing and stitching, which students can apply to their own personal photos and videos. More than

just a source of "recipes," this exceptionally authoritative and comprehensive textbook/reference also takes a scientific approach to basic vision problems, formulating physical models of the imaging process before inverting them to produce descriptions of a scene. These problems are also analyzed using statistical models and solved using rigorous engineering techniques. Topics and features: Structured to support active curricula and project-oriented courses, with tips in the Introduction for using the book in a variety of customized courses. Presents exercises at the end of each chapter with a heavy emphasis on testing algorithms and containing numerous suggestions for small mid-term projects. Provides additional material and more detailed mathematical topics in the Appendices, which cover linear algebra, numerical techniques, and Bayesian estimation theory. Suggests additional reading at the end of each chapter, including the latest research in each sub-field, in addition to a full Bibliography at the end of the book. Supplies supplementary course material for students at the associated website, <http://szeliski.org/Book/>. Suitable for an upper-level undergraduate or graduate-level course in computer science or engineering, this textbook focuses on basic techniques that work under real-world conditions and encourages students to push their creative boundaries. Its design and exposition also make it eminently suitable as a unique reference to the fundamental techniques and current research literature in computer vision. Dr. Richard Szeliski has more than 25 years' experience in computer vision research, most notably at Digital Equipment Corporation and Microsoft Research. This text draws on that experience, as well as on computer vision courses he has taught at the University of Washington and Stanford.

For anyone looking for comprehensive coverage of all the fundamentals of computer vision, this is the book for you. The style of the book is that he gives you the general concept of a method and the required equations, and then provides you with the title of the paper it is sourced from (which are almost all available online as PDFs) in case you want more detail. Because of this approach, he has managed to fit into 800 pages what it could easily have taken 2000 to explain in fine detail. Don't take this as the book being too vague, because I have yet to need to refer to the papers to understand a concept (although it has been useful when I wanted more information into \*how\* the result was arrived at). It does help if you have a baseline understanding of how to do general operations on images (e.g. array manipulation in code) and whatnot, but a beginner could still use this book with a little more effort. There's no book that covers this breadth of information on computer vision, so I can't recommend it more highly.

It's an excellent textbook on learning the OpenCV technology. Hence I found one issue: In Table 3.3, Fourier transforms of the separable kernels shown in Figure 3.14", the X-axis should be labeled as "Omega/pi". Therefore, the marker "0.5" indicates "0.5 pi". On page 119, the top paragraph, the text said that "Reversal: The Fourier transform of a reversed signal is the complex conjugate of the signal's transform". This text indicates that if we extend the plot of Table 3.3 from "0.5 pi to 1.0 pi" by mirroring the plot of "0.0 to 0.5 pi". Also, the plots from "-1.0 pi to 0.0 pi" could be the mirror image from "0.0 pi to 1.0 pi". I assume that the author agreed with my judgement.

It's impossible to cover the whole topic in one book. This one has the main ideas, some explanations and examples, and a lot of external references. It's not an easy book (as I was hoping;)). You will need other sources to understand where the formulas came from, and what do they actually mean. As a result you will have a good understanding. It's better to start with this rather than with product oriented books (like OpenCV). These should go after, IMHO. PS: Author provides a free beta PDF (very smart idea), makes sense to check it first. I realized that was what I was looking for, and bot the book.

This is a comprehensive computer vision book and is definitely a good textbook. I used it to prepare my PhD qualifying exam and it went well. One negative comment is that the book focuses too much on the geometry stuff (nearly half of the book). However the computer vision community is developing as more machine-learning oriented.

I am rusty. I was a math and physics major many years ago. Computer vision is just fascinating. Just watch for new applications every day. Our startup, Visada, [www.visada.me](http://www.visada.me) relies on CV. Great book.

My favorite introductory computer vision book. Less technical than Multiple View Geometry, and a wide summary of all of the introductory concepts. Check out Ebay for the best prices though.

I believe that COMPUTER VISION by Richard Szeliski is a must read book about vision technology & integration into robotics/artificial intelligence from a hardware, software, computer science, and mathematics algorithms.

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