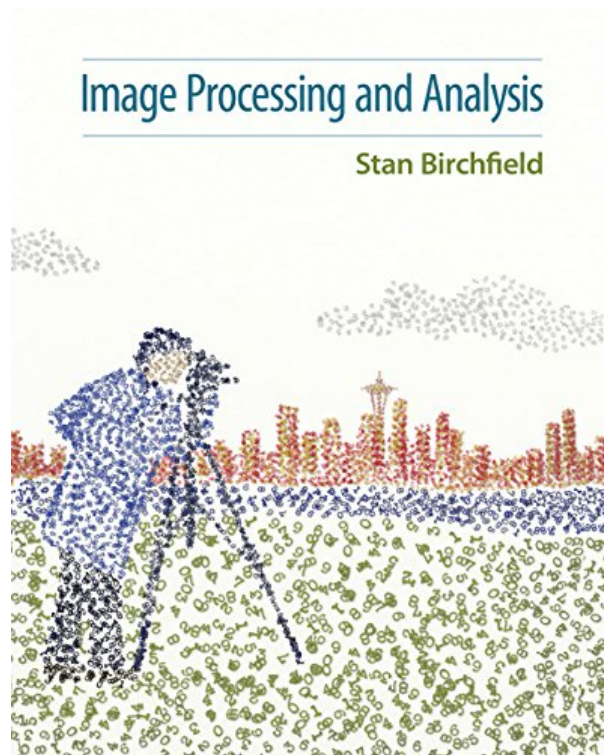


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# Image Processing and Analysis

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Stan Birchfield



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"This book style matches perfectly with our teaching style in our school. Our university hallmark is learn-by-doing philosophy. The author gives many algorithms with detailed pseudocode, which we can apply directly to practical problems." "The presentation has good balance between theories and examples. The author provides students with a good problem-solving methodology in the examples. Specifically, the author provides enough suggestions, hints, and solution techniques so that the examples clarify the information."

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Give your students a contemporary treatment of image processing that balances a broad coverage of major subject areas with in-depth examination of the most foundational topics. Birchfield's IMAGE PROCESSING AND ANALYSIS offers a clear presentation that even your beginning students can follow along with higher-level discussions that will challenge your most advanced students. The book effectively balances key topics from the field of image processing in a format that gradually progresses from easy to more challenging material, while consistently reinforcing a fundamental understanding of the core concepts. The book's hands-on learning approach and full-color presentation allow your students to begin working with images immediately. The book encourages programming as it incorporates algorithmic details and hints, using numerous full-color illustrations and detailed pseudocode to facilitate an understanding of algorithms and aid in implementation.

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The best book for computer vision !

By VIDYA MURALI

The new book Image Processing and Analysis by Stan Birchfield is an excellent textbook that nearly achieves the impossible: exhaustively cover all aspects of image processing fundamentals, the mathematics involved, camera optics, human and animal vision, machine learning and psycho-physics.

The most engaging part about this book is the structure. Proceeding from explaining simple concepts to solving simple example problems, augmented with exciting challenges at the end of every chapter, the book causes you to learn. Programming is essential and can only be learned by working hands-on and this book serves as the best accompaniment to a class that is meant to be programming/project based.

The concepts have a certain natural order, but emphasis is laid on learning and quickly solving problems to grasp the fundamentals. A topic when touched has been explored extensively, almost makes it unnecessary to look for additional references. But the author has painstakingly pointed out further reading in each chapter, for practical knowledge of applications, or additional textbook resources. The book has plenty of math but written in a very minimalist, easy to understand manner. The presence of tiny-pixel-images showing the different stages alongside an algorithm, makes it delightful for the reader to embark upon the reading, fully confident in the ultimate understanding of the idea. The diagrams, plots and graphs have a remarkable clarity, which allows you to glean information at a single glance.

The material in this book is intensive, extensive and superior to stalwart textbooks that have been references in this subject for the past decade. The well known and respected book on image processing by Gonzalez and Woods, falls short on several key topics like projective geometry and image formation in nature. In this book, the author takes a deep dive into some of the physics and math which are important foundations for camera calibration and multiple view geometry. I lead a team of computer vision researchers at Ford Research, Palo Alto and have found these chapters to be an important reference all the time. Mounting cameras on vehicles and calibrating them, is key to almost all the work we do. In addition for 360 degree sensing it become necessary to understand image projection in different views relative to the vehicle. I have found this textbook more valuable than previous books for my work..

The organization of the material allows this book to not just be suitable for a classroom/academic setting, but

also in the industry where people might transition into the field of computer vision. Given the advent of artificial intelligence, machine learning and computer vision in industries involving self-driving cars, home automation and the like, a team looking to incorporate image processing in the latest technical offering would do well to pursue a textbook like this, not just to educate themselves, but also because this book provides a credible source of reference, based on which algorithms can be built, made sense of and tested, enhanced/augmented.

There is probably one interesting feature the book missed and may well be added in forthcoming editions. The field of retinal encoding is receiving plenty of attention from the industry and is also directly related to the human visual system and image formation. The author would do well to touch upon the topic in detail.

Computer vision is a delightful field; after all, we are trying to make computers "see" and make decisions, analyse data suitable for day-to-day activities like browsing, searching, purchasing, driving, etc. If you plan to take the leap into image processing for machine intelligence, do so with this book in hand. It is a worthy companion.

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