
Preface

Today, computer vision techniques are used for various purposes, and there exist many textbooks and references that describe principles of programming and system organization. At the same time, ever new research is going on all over the world, and the achievements are offered in the form of open source code on the Web. It appears, therefore, that sufficient environments already exist for students and researchers for embarking on computer vision research.

However, although executing a public source code may be easy, improving or modifying it for other applications is rather difficult, because the intent of the code author is difficult to discern simply by reading the code. On the other hand, many computer vision textbooks focus on theoretical principles coupled with application demos. As a result, one is often at a loss as to how to write a program oneself. Actual implementation of algorithms requires many small details that must be carefully taken into consideration, which a ready-to-use code does not provide. This book intends to fill that gap, describing in detail the computational procedures for programming 3D geometric tasks. The algorithms presented in this book are based on today's state of the art, yet arranged in a form simple and easy enough to understand. The authors also believe that they are the most appropriate form for practical use in real situations.

In this book, the mathematical background of the presented algorithms is mostly omitted for the ease of reading, but for theoretically minded readers detailed derivations and justifications are given in the form of Problems in each chapter; their Solutions are given at the end of the volume. Also, historical notes and related references are discussed in the Supplemental Note at the end of each chapter. In this sense, this book can also serve as a theoretical reference of computer vision research. To help readers implement the algorithms in this book, sample codes of typical procedures are placed on the publisher's Web page.¹

This book is based on the teaching materials that the authors used for student projects at Okayama University and Toyohashi University of Technology, Japan. Every year, new students with little background knowledge come to our labs to do computer vision work. According to our experience, the most effective way for them to learn is to let them implement basic algorithms such as those given here.

¹<http://www.springer.com/book/9783319484921>

Through this process, they learn the basic know-how of programming and at the same time gradually understand the theoretical background as their interest deepens. Thus we are hoping that this book can serve not only as a reference of the latest computer vision techniques but also as useful material for introductory courses of computer vision.

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²<http://www.morganclaypool.com>.

Guide to 3D Vision Computation

Geometric Analysis and Implementation

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