Image Processing with LabVIEW and IMAQ Vision

By Thomas Klinger

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Image Processing with LabVIEW and IMAQ Vision is the definitive tutorial on desktop imageprocessing with NI's breakthrough IMAQ Vision software. It delivers everything professionals willneed to get results: a highly accessible overview of the field's key concepts, tools, andtechniques; a start-to-finish IMAQ VISION tutorial; several complete application case studies; anextensive CD-ROM library of code and image samples, and a complete trial version of NI VisionBuilder for Automated Inspection for Windows.

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Editorial Review

From the Back Cover

The definitive tutorial on desktop image processing with NI's IMAQ Vision

This book brings together everything you need to achieve superior results with PC-based image processing and analysis. Expert Thomas Klinger combines a highly accessible overview of the field's key concepts, tools, and techniques; the first expert introduction to NI's breakthrough IMAQ Vision software; and several start-to-finish application case studies. You also get an extensive library of code and image samples, as well as a complete trial version of IMAQ Vision for Windows®. Coverage includes:

- Defining what to measure and how to measure it
- Acquiring images: working with CCDs, cameras, frame grabber cards, and leading medical image sources, including ultrasound, CT, and MRI
- Distributing images: compression techniques, image format standards, and DICOM medical imaging
- Processing images: gray-scale operations, spatial image filtering, frequency filtering,
- and morphology functions
- Analyzing images: pixel value and quantitative analyses, shape and pattern matching, bar codes, and more

With 300+ figures and 50+ exercises-all listed up front for easy access-this is the definitive image processing tutorial for every professional.

About the Author

THOMAS KLINGER is currently Head of the School for Medical Information Technology, Carinthia Tech Institute, University of Applied Sciences, Carinthia, Austria. Before joining the university, he served as Development Manager Electronics and Senior Electronics Developer for Philips Domestic Appliances and Personal Care Devices.

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Preface

The book you hold in your hands is part ofNational Instruments and Prentice Hall PTR's Virtual Instrumentation series, covering the toolbox and function library IMAQ™ Vision, the IMAQ Vision Builder, and the NI Vision Builder for Automated Inspection,which are used for image processing, image analysis, andmachine vision. It is intended for engineers and professionals, as well as for students, who want to take their first steps in the fields of image processing.

Today, many engineers have a lot of experience with LabVIEW™, mostly with data acquisition (DAQ); so they can now also use this tool for their image processing or machine vision tasks. In this book, I have tried to combine the image processing and analysis functions with a basic knowledge of imaging fundamentals, like image generation, image transport, image storage, and image compression. Although I know that not all of the tasks my readers have to deal with require this knowledge, these sections may be a reference for later

use.

Some statements on the requirements for the exercises and the examples: you need a LabVIEW version 6.0 or higher; actually, I wrote all of the exercises with a 6.0 (or 6i) version (which is obvious especially in the diagram screen shots), but all of them are tested with 6.1 as well. I cannot give any guarantee that the LabVIEW and IMAQ Vision programs (VIs) work with version 5 or lower (especially the ones from the CD-ROM will not; but if you program them yourself, they may). You can download an evaluation version of LabVIEW from .

Additionally, you need, of course, National Instruments' IMAQ Vision toolbox. Unfortunately, no evaluation version of IMAQ Vision is available (only a multimedia demo), so you have to buy it. The IMAQ Vision multimedia demo is part of the attached CD. By the way, do not confuse the IMAQ Vision toolbox with NI IMAQ, which contains the most important imaging drivers and is part of any LabVIEW installation.

Very good tools for most imaging tasks are IMAQ Vision Builder and NI Vision Builder for Automated Inspection (NI Vision Builder AI). The IMAQ Vision Builder helps you build image processing and analysis applications by constructing a script file and converting it into LabVIEW and IMAQ Vision programs. We will use the IMAQ Vision Builder in some of our exercises because in some cases it is easier to get quick and reliable results, although it is possible to program all of those exercises in LabVIEW and IMAQ Vision as well.

While I was just writing the (what I thought) final lines of this preface, National Instruments released a new tool, the NI Vision Builder for Automated Inspection (NI Vision Builder AI). This stand-alone software makes it even easier to set up and run simple machine vision applications; you do not even have to have LabVIEW installed on your system. We will discuss the Vision Builder AI in Chapter 1, although it will not be used for the exercises. You can find an evaluation version of Vision Builder AI on the CD-ROM. (Please read more about the attached CD in About the CD-ROM at the end of this book.)

This book does not cover all IMAQ Vision functions, especially not all utility functions like image management and manipulation VIs. The reason is that I do not want to provide a second IMAQ Vision User Manual. The User Manual is excellent, and it seems to make more sense to me to focus on some interesting and useful functions, which are explained in the book's examples. Moreover, this book is not a guide to good and structured LabVIEW programming; some exercises are definitely not good examples. For instance, most exercises in Chapters 4 and 5 open an image and an image workspace but do not close them, which really hurts a good programmer who learned to write structured software. The reason for not closing the image itself is that the image remains on the desktop and the results are visible. Also, if you do not close the workspace, the image is not corrupted by other open windows of the operating system.

So, hopefully I provided a useful set of fundamentals and exercises covering some of the most common image processing, image analysis, and machine vision tasks. If you have any proposals, questions, or simply comments, please contact me personally at

Users Review

From reader reviews:

Richard Smith:

This Image Processing with LabVIEW and IMAQ Vision book is not really ordinary book, you have after that it the world is in your hands. The benefit you get by reading this book will be information inside this

guide incredible fresh, you will get data which is getting deeper an individual read a lot of information you will get. That Image Processing with LabVIEW and IMAQ Vision without we know teach the one who reading through it become critical in pondering and analyzing. Don't always be worry Image Processing with LabVIEW and IMAQ Vision can bring any time you are and not make your handbag space or bookshelves' grow to be full because you can have it in your lovely laptop even cellphone. This Image Processing with LabVIEW and IMAQ Vision having excellent arrangement in word as well as layout, so you will not feel uninterested in reading.

Ethel Springer:

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