Understanding
Digital Image Processing
Using **MATLAB**

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Chapter 1. Reading and Writing Image Data

- o Getting Information About a Graphics File
- o Reading Image Data
- o Writing Image Data to a File
- o Converting Between Graphics File Formats

Chapter 2. Displaying and Exploring Images

- o Displaying Images Using the imshow Function
- o Controlling the Appearance of the Figure
- o Displaying Each Image in a Separate Figure
- o Dividing a Figure Window into Multiple Display Regions
- o Opening the Image Tool
- o Specifying the Colormap
- o Importing Image Data from the Workspace
- o Exporting Image Data to the Workspace
- o Using the getimage Function to Export Image Data
- o Saving the Image Data Displayed in the Image Tool
- o Printing the Image in the Image Tool
- o Exploring Very Large Images
- o Creating an R-Set File
- o Opening an R-Set File
- o Navigating an Image Using the Overview Tool

Chapter 3. Building GUIs with Modular Tools

Chapter 4. Spatial Transformations

- o Resizing an Image
- o Rotating an Image
- o Cropping an Image
- o Using a Transformation Matrix

Chapter 5. Image Registration

- o Control Point Registration
- o Specifying Control Points Using the Control Point Selection Tool
- o Registering Multimodal MRI Images

Chapter 6. Designing and Implementing 2-D Linear Filters for Image Data

- o Performing Linear Filtering of Images Using imfilter
- o Boundary Padding Options
- o Multidimensional Filtering
- o Filtering an Image with Predefined Filter Types

Chapter 7. Transforms

- o Locating Image Features
- o Discrete Cosine Transform (DCT) and Image Compression
- o Reconstructing an Image from Parallel Projection Data
- o Reconstructing a Head Phantom Image

Chapter 8. Morphological Operations

- Morphological Opening
- Skeletonization
- Perimeter Determination
- Filling Holes
- Lookup Table

Chapter 9. Analyzing and Enhancing Images

- Displaying a Contour Plot of Image Data
- Image Histogram Using imhist
- Detecting Edges Using the edge Function
- Tracing Object Boundaries in an Image
- Texture Functions
- Understanding Intensity Adjustment
- Adjusting Intensity Values to a Specified Range
- Removing Noise By Median Filtering

Chapter 10. ROI-Based Processing

- Creating a Binary Mask
- Filtering a Region in an Image
- Filling an ROI
- Using the deconvlucy Function to Deblur an Image

Chapter 11. Color

- Reducing Colors Using imapprox
- Dithering

Chapter 12. Neighborhood and Block Operations

- Implementing Linear and Nonlinear Filtering as Sliding Neighborhood Operations
- Implementing Block Processing Using the blockproc Function
- Using Column Processing with Distinct Block Operations

About the Book

Understanding of digital image processing using MATLAB is a book for a course of Image Processing using Matlab along with techniques for developing GUI and to covers few advanced topics. The emphasis is given on how to process the image start from basics to advanced level and design GUI in Matlab software for user applications. This book will help to learn about how to do image processing and to develop user friendly and more interactive GUI in Matlab with the help of basic tool along with programming, graphical user interface and image processing techniques. Every chapter begins with introductory remarks about its contents. The measure contents of all chapters consist of theory, syntax and example along with developed GUI. Every chapter is ended with detail summary and exercise for the reader. User can get benefited from the given set of exercises to do mastery in digital image processing.

This book is developed using latest MATLAB Software. The examples are upper compatible to MATLAB versions. It is useful for the beginner to learn basics of Image Processing using MATLAB and start with the simple GUI based DIP steps and reach to the advanced level so that readers can do design by their own and can develop application interface.

This book is useful for the degree and post graduate courses to learn and to get mastery in Image Processing and Matlab for designing their interactive user environments. Contents of this book can use directly for one semester. This book is very much useful for computer science and engineering, mathematics, and scientific communities those who are going to develop menu driven tool for their DIP based projects.

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