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Nota di contenuto	Digital Signal and Image Processing using MATLAB; Contents; Preface; Notations and Abbreviations; Introduction to MATLAB; 1 Variables; 1.1 Vectors and matrices; 1.2 Arrays; 1.3 Cells and structures; 2 Operations and functions; 2.1 Matrix operations; 2.2 Pointwise operations; 2.3 Constants and initialization; 2.4 Predefined matrices; 2.5 Mathematical functions; 2.6 Matrix functions; 2.7 Other useful functions; 2.8 Logical operators on boolean variables; 2.9 Program loops; 3 Graphically displaying results; 4 Converting numbers to character strings; 5 Input/output; 6 Program writing Part I Deterministic SignalsChapter 1 Signal Fundamentals; 1.1 The concept of signal; 1.1.1 A few signals; 1.1.2 Spectral representation of signals; 1.2 The Concept of system; 1.3 Summary; Chapter 2 Discrete Time Signals and Sampling; 2.1 The sampling theorem; 2.1.1 Perfect reconstruction; 2.1.2 Digital-to-analog conversion; 2.2 Plotting a signal as a function of time; 2.3 Spectral representation; 2.3.1 Discrete-time Fourier transform (DTFT); 2.3.2 Discrete Fourier transform (DFT); 2.4

Fast Fourier transform; Chapter 3 Spectral Observation; 3.1 Spectral accuracy and resolution
3.1.1 Observation of a complex exponential3.1.2 Plotting accuracy of the DTFT; 3.1.3 Frequency resolution; 3.1.4 Effects of windowing on the resolution; 3.2 Short term Fourier transform; 3.3 Summing up; 3.4 Application examples and exercises; 3.4.1 Amplitude modulations; 3.4.2 Frequency modulation; Chapter 4 Linear Filters; 4.1 Definitions and properties; 4.2 The z-transform; 4.2.1 Definition and properties; 4.2.2 A few examples; 4.3 Transforms and linear filtering; 4.4 Difference equations and rational TF filters; 4.4.1 Stability considerations; 4.4.2 FIR and IIR filters
4.4.3 Causal solution and initial conditions4.4.4 Calculating the responses; 4.4.5 Stability and the Jury test; 4.5 Connection between gain and poles/zeros; 4.6 Minimum phase filters; 4.7 Filter design methods; 4.7.1 Going from the continuous-time filter to the discretetime filter; 4.7.2 FIR filter design using the window method; 4.7.3 IIR filter design; 4.8 Oversampling and undersampling; 4.8.1 Oversampling; 4.8.2 Undersampling; Chapter 5 Filter Implementation; 5.1 Filter implementation; 5.1.1 Examples of filter structures; 5.1.2 Distributing the calculation load in an FIR filter
5.1.3 FIR block filtering5.1.4 FFT filtering; 5.2 Filter banks; 5.2.1 Decimation and expansion; 5.2.2 Filter banks; Chapter 6 An Introduction to Image Processing; 6.1 Introduction; 6.1.1 Image display, color palette; 6.1.2 Importing images; 6.1.3 Arithmetical and logical operations; 6.2 Geometric transformations of an image; 6.2.1 The typical transformations; 6.2.2 Aligning images; 6.3 Frequential content of an image; 6.4 Linear filtering; 6.5 Other operations on images; 6.5.1 Undersampling; 6.5.2 Oversampling; 6.5.3 Contour detection; 6.5.4 Median filtering; 6.5.5 Maximum enhancement
6.5.6 Image binarization

Sommario/riassunto

This title provides the most important theoretical aspects of Image and Signal Processing (ISP) for both deterministic and random signals. The theory is supported by exercises and computer simulations relating to real applications.More than 200 programs and functions are provided in the MATLAB® language, with useful comments and guidance, to enable numerical experiments to be carried out, thus allowing readers to develop a deeper understanding of both the theoretical and practical aspects of this subject.