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Nota di contenuto	A First Course in Applied Mathematics; CONTENTS; Preface; 1 Basics of Linear Algebra; 1.1 Notation and Terminology; 1.2 Vector and Matrix Norms; 1.3 Dot Product and Orthogonality; 1.4 Special Matrices; 1.4.1 Diagonal and triangular matrices; 1.4.2 Hessenberg matrices; 1.4.3 Nonsingular and inverse matrices; 1.4.4 Symmetric and positive definite matrices; 1.4.5 Matrix exponential; 1.4.6 Permutation matrices; 1.4.7 Orthogonal matrices; 1.5 Vector Spaces; 1.6 Linear Independence and Basis; 1.7 Orthogonalization and Direct Sums; 1.8 Column Space, Row Space, and Null Space 1.8.1 Linear transformations 1.9 Orthogonal Projections; 1.10 Eigenvalues and Eigenvectors; 1.11 Similarity; 1.12 Bezier Curves and Postscript Fonts; 1.12.1 Properties of Bezier curves; 1.12.2 Composite Bezier curves; 1.13 Final Remarks and Further Reading; Exercises; 2 Ranking Web Pages; 2.1 The Power Method; 2.2 Stochastic, Irreducible, and Primitive Matrices; 2.3 Google's PageRank Algorithm; 2.3.1 The personalization vector; 2.3.2 Speed of convergence and sparsity; 2.3.3 Power method and reordering; 2.4 Alternatives to the Power Method; 2.4.1 Linear system formulation

2.4.2 Iterative aggregation/disaggregation (IAD) 2.4.3 IAD and linear systems; 2.5 Final Remarks and Further Reading; Exercises; 3 Matrix Factorizations; 3.1 LU Factorization; 3.1.1 The complex case; 3.1.2 Solving several systems; 3.1.3 The $PA = LU$ factorization; 3.2 QR Factorization; 3.2.1 QR and Gram-Schmidt; 3.2.2 The complex case; 3.2.3 QR and similarity; 3.2.4 The QR algorithm; 3.2.5 QR and LU; 3.3 Singular Value Decomposition (SVD); 3.3.1 The complex case; 3.3.2 Low-rank approximations; 3.3.3 SVD and spectral norm; 3.4 Schur Factorization; 3.4.1 The complex case 3.4.2 Schur factorization and invariant subspaces 3.4.3 Exchanging eigenblocks; 3.4.4 Block diagonalization; 3.5 Information Retrieval; 3.5.1 Query matching; 3.5.2 Low-rank query matching; 3.5.3 Term-term comparison; 3.6 Partition of Simple Substitution Cryptograms; 3.6.1 Rank-1 approximation; 3.6.2 Rank-2 approximation; 3.7 Final Remarks and Further Reading; Exercises; 4 Least Squares; 4.1 Projections and Normal Equations; 4.2 Least Squares and QR Factorization; 4.3 Lagrange Multipliers; 4.4 Final Remarks and Further Reading; Exercises; 5 Image Compression 5.1 Compressing with Discrete Cosine Transform 5.1.1 1-D discrete cosine transform; 5.1.2 2-D discrete cosine transform; 5.1.3 Image compression and the human visual system; 5.1.4 Basis functions and images; 5.1.5 Low-pass filtering; 5.1.6 Quantization; 5.1.7 Compression of color images; 5.2 Huffman Coding; 5.2.1 Huffman coding and JPEG; 5.3 Compression with SVD; 5.3.1 Compressing grayscale images; 5.3.2 Compressing color images; 5.4 Final Remarks and Further Reading; Exercises; 6 Ordinary Differential Equations; 6.1 One-Dimensional Differential Equations; 6.1.1 Existence and uniqueness 6.1.2 A simple population model

Sommario/riassunto

Explore real-world applications of selected mathematical theory, concepts, and methods Exploring related methods that can be utilized in various fields of practice from science and engineering to business, A First Course in Applied Mathematics details how applied mathematics involves predictions, interpretations, analysis, and mathematical modeling to solve real-w
