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Nota di contenuto	Classification, Parameter Estimation and State Estimation; Contents; Preface; Foreword; 1 Introduction; 1.1 The scope of the book; 1.1.1 Classification; 1.1.2 Parameter estimation; 1.1.3 State estimation; 1.1.4 Relations between the subjects; 1.2 Engineering; 1.3 The organization of the book; 1.4 References; 2 Detection and Classification; 2.1 Bayesian classification; 2.1.1 Uniform cost function and minimum error rate; 2.1.2 Normal distributed measurements; linear and quadratic classifiers; 2.2 Rejection; 2.2.1 Minimum error rate classification with reject option 2.3 Detection: the two-class case2.4 Selected bibliography; 2.5 Exercises; 3 Parameter Estimation; 3.1 Bayesian estimation; 3.1.1 MMSE estimation; 3.1.2 MAP estimation; 3.1.3 The Gaussian case with linear sensors; 3.1.4 Maximum likelihood estimation; 3.1.5 Unbiased linear MMSE estimation; 3.2 Performance of estimators; 3.2.1 Bias and covariance; 3.2.2 The error covariance of the unbiased linear MMSE estimator; 3.3 Data fitting; 3.3.1 Least squares fitting; 3.3.2 Fitting using a robust error norm; 3.3.3 Regression; 3.4 Overview of the family

of estimators; 3.5 Selected bibliography
3.6 Exercises4 State Estimation; 4.1 A general framework for online estimation; 4.1.1 Models; 4.1.2 Optimal online estimation; 4.2 Continuous state variables; 4.2.1 Optimal online estimation in linear-Gaussian systems; 4.2.2 Suboptimal solutions for nonlinear systems; 4.2.3 Other filters for nonlinear systems; 4.3 Discrete state variables; 4.3.1 Hidden Markov models; 4.3.2 Online state estimation; 4.3.3 Offline state estimation; 4.4 Mixed states and the particle filter; 4.4.1 Importance sampling; 4.4.2 Resampling by selection; 4.4.3 The condensation algorithm; 4.5 Selected bibliography
4.6 Exercises5 Supervised Learning; 5.1 Training sets; 5.2 Parametric learning; 5.2.1 Gaussian distribution, mean unknown; 5.2.2 Gaussian distribution, covariance matrix unknown; 5.2.3 Gaussian distribution, mean and covariance matrix both unknown; 5.2.4 Estimation of the prior probabilities; 5.2.5 Binary measurements; 5.3 Nonparametric learning; 5.3.1 Parzen estimation and histogramming; 5.3.2 Nearest neighbour classification; 5.3.3 Linear discriminant functions; 5.3.4 The support vector classifier; 5.3.5 The feed-forward neural network; 5.4 Empirical evaluation; 5.5 References
5.6 Exercises6 Feature Extraction and Selection; 6.1 Criteria for selection and extraction; 6.1.1 Inter/intra class distance; 6.1.2 Chernoff-Bhattacharyya distance; 6.1.3 Other criteria; 6.2 Feature selection; 6.2.1 Branch-and-bound; 6.2.2 Suboptimal search; 6.2.3 Implementation issues; 6.3 Linear feature extraction; 6.3.1 Feature extraction based on the Bhattacharyya distance with Gaussian distributions; 6.3.2 Feature extraction based on inter/intra class distance; 6.4 References; 6.5 Exercises; 7 Unsupervised Learning; 7.1 Feature reduction; 7.1.1 Principal component analysis
7.1.2 Multi-dimensional scaling

Sommario/riassunto

Classification, Parameter Estimation and State Estimation is a practical guide for data analysts and designers of measurement systems and postgraduates students that are interested in advanced measurement systems using MATLAB. 'Prtools' is a powerful MATLAB toolbox for pattern recognition and is written and owned by one of the co-authors, B. Duin of the Delft University of Technology. After an introductory chapter, the book provides the theoretical construction for classification, estimation and state estimation. The book also deals with the skills required to bring the theoretical co