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Nota di contenuto	KALMAN FILTERING AND NEURAL NETWORKS; CONTENTS; Preface; Contributors; 1 Kalman Filters; 1.1 Introduction; 1.2 Optimum Estimates; 1.3 Kalman Filter; 1.4 Divergence Phenomenon: Square-Root Filtering; 1.5 Rauch-Tung-Striebel Smoother; 1.6 Extended Kalman Filter; 1.7 Summary; References; 2 Parameter-Based Kalman Filter Training: Theory and Implementation; 2.1 Introduction; 2.2 Network Architectures; 2.3 The EKF Procedure; 2.3.1 Global EKF Training; 2.3.2 Learning Rate and Scaled Cost Function; 2.3.3 Parameter Settings; 2.4 Decoupled EKF (DEKF); 2.5 Multistream Training 2.5.1 Some Insight into the Multistream Technique2.5.2 Advantages and Extensions of Multistream Training; 2.6 Computational Considerations; 2.6.1 Derivative Calculations; 2.6.2 Computationally

Efficient Formulations for Multiple-Output Problems; 2.6.3 Avoiding Matrix Inversions; 2.6.4 Square-Root Filtering; 2.7 Other Extensions and Enhancements; 2.7.1 EKF Training with Constrained Weights; 2.7.2 EKF Training with an Entropic Cost Function; 2.7.3 EKF Training with Scalar Errors; 2.8 Automotive Applications of EKF Training; 2.8.1 Air/Fuel Ratio Control; 2.8.2 Idle Speed Control
2.8.3 Sensor-Catalyst Modeling2.8.4 Engine Misfire Detection; 2.8.5 Vehicle Emissions Estimation; 2.9 Discussion; 2.9.1 Virtues of EKF Training; 2.9.2 Limitations of EKF Training; 2.9.3 Guidelines for Implementation and Use; References; 3 Learning Shape and Motion from Image Sequences; 3.1 Introduction; 3.2 Neurobiological and Perceptual Foundations of our Model; 3.3 Network Description; 3.4 Experiment 1; 3.5 Experiment 2; 3.6 Experiment 3; 3.7 Discussion; References; 4 Chaotic Dynamics; 4.1 Introduction; 4.2 Chaotic (Dynamic) Invariants; 4.3 Dynamic Reconstruction
4.4 Modeling Numerically Generated Chaotic Time Series4.4.1 Logistic Map; 4.4.2 Ikeda Map; 4.4.3 Lorenz Attractor; 4.5 Nonlinear Dynamic Modeling of Real-World Time Series; 4.5.1 Laser Intensity Pulsations; 4.5.2 Sea Clutter Data; 4.6 Discussion; References; 5 Dual Extended Kalman Filter Methods; 5.1 Introduction; 5.2 Dual EKF-Prediction Error; 5.2.1 EKF-State Estimation; 5.2.2 EKF-Weight Estimation; 5.2.3 Dual Estimation; 5.3 A Probabilistic Perspective; 5.3.1 Joint Estimation Methods; 5.3.2 Marginal Estimation Methods; 5.3.3 Dual EKF Algorithms; 5.3.4 Joint EKF
5.4 Dual EKF Variance Estimation5.5 Applications; 5.5.1 Noisy Time-Series Estimation and Prediction; 5.5.2 Economic Forecasting-Index of Industrial Production; 5.5.3 Speech Enhancement; 5.6 Conclusions; Acknowledgments; Appendix A: Recurrent Derivative of the Kalman Gain; Appendix B: Dual EKF with Colored Measurement Noise; References; 6 Learning Nonlinear Dynamical System Using the Expectation-Maximization Algorithm; 6.1 Learning Stochastic Nonlinear Dynamics; 6.1.1 State Inference and Model Learning; 6.1.2 The Kalman Filter; 6.1.3 The EM Algorithm; 6.2 Combining EKS and EM
6.2.1 Extended Kalman Smoothing (E-step)

Sommario/riassunto

State-of-the-art coverage of Kalman filter methods for the design of neural networks This self-contained book consists of seven chapters by expert contributors that discuss Kalman filtering as applied to the training and use of neural networks. Although the traditional approach to the subject is almost always linear, this book recognizes and deals with the fact that real problems are most often nonlinear. The first chapter offers an introductory treatment of Kalman filters with an emphasis on basic Kalman filter theory, Rauch-Tung-Striebel smoother, and the extended Kalman filter. O