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Kalman filter; 2.3.1 Linear filter approximations; 2.3.2 The extended Kalman filter equations
2.4 The unscented Kalman filter2.4.1 The unscented transformation; 2.4.2 The unscented Kalman filter algorithm; 2.5 The point mass filter; 2.5.1 Transition and prediction densities; 2.5.2 The likelihood function and normalization factor; 2.5.3 Conditional density; 2.5.4 The point mass filter equations; 2.6 The particle filter; 2.6.1 The particle filter for single-object tracking; 2.6.2 The OID-PF for single-object tracking; 2.6.3 Auxiliary bootstrap filter for single-object tracking; 2.6.4 Extended Kalman auxiliary particle filter for single-object tracking; 2.7 Performance bounds
2.8 Illustrative exampleAngle tracking; 2.9 Summary; 3: Maneuvering object tracking; 3.1 Modeling for maneuvering object tracking; 3.1.1 Single model via state augmentation; 3.1.2 Multiple-model-based approaches; 3.2 The optimal Bayesian filter; 3.2.1 Process, measurement and noise models; 3.2.2 The conditional density and the conditional model probability; 3.2.3 Optimal estimation; 3.3 Generalized pseudo-Bayesian filters; 3.3.1 Generalized pseudo-Bayesian filter of order 1; 3.3.2 Generalized pseudo-Bayesian filter of order 2; 3.4 Interacting multiple model filter
3.4.1 The IMM filter equations3.5 Particle filters for maneuvering object tracking; 3.5.1 Bootstrap filter for maneuvering object tracking; 3.5.2 Auxiliary bootstrap filter for maneuvering object tracking; 3.5.3 Extended Kalman auxiliary particle filter for maneuvering object tracking; 3.6 Performance bounds; 3.7 Illustrative example; 3.8 Summary; 4: Single-object tracking in clutter; 4.1 The optimal Bayesian filter; 4.1.1 Object dynamics, sensor measurement and noise models; 4.1.2 Conditional density; 4.1.3 Optimal estimation; 4.2 The nearest neighbor filter
4.2.1 The nearest neighbor filter equations

Sommario/riassunto

Kalman filter, particle filter, IMM, PDA, ITS, random sets... The number of useful object-tracking methods is exploding. But how are they related? How do they help track everything from aircraft, missiles and extra-terrestrial objects to people and lymphocyte cells? How can they be adapted to novel applications? Fundamentals of Object Tracking tells you how. Starting with the generic object-tracking problem, it outlines the generic Bayesian solution. It then shows systematically how to formulate the major tracking problems - maneuvering, multiobject, clutter, out-of-sequence sensors - within this Bayesian framework and how to derive the standard tracking solutions. This structured approach makes very complex object-tracking algorithms accessible to the growing number of users working on real-world tracking problems and supports them in designing their own tracking filters under their unique application constraints. The book concludes with a chapter on issues critical to successful implementation of tracking algorithms, such as track initialization and merging.