Joint Threshold Adjustment and Power Allocation for Cognitive Target Tracking in Asynchronous Radar Network

Abstract :

In this paper, a joint threshold adjustment and power allocation (JTAPA) algorithm is developed for target tracking in asynchronous radar network (ARN). The basis of the JTAPA strategy is to feed back the target track information from the fusion center to local radar sites to enhance both the target detection capability and the resource utilization efficiency of the ARN. For the detector, we develop a threshold adjustment (TA) algorithm for better detection performance, based on the predicted target location information fed back from the fusion center. For the transmitter, we build an asynchronous power allocation (APA) model based on the perceptual information, and use optimization technique to control the limited power resource for the next period of time. The goal of the APA scheme is to achieve better target tracking accuracy with a given power budget. The Bayesian Cramér-Rao lower bound is derived, normalized, and subsequently utilized, as the optimization criterion for the APA strategy. The resulting nonconvex optimization problem is solved through relaxation incorporating the spectral projected gradient technique. Simulation results demonstrate that the integration of the TA and APA processes can evidently improve the tracking performance.