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A Simplex Trained Neural Network-Based Architecture for Sensor Fusion and Tracking of Target Maneuvers.

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Abstract: One of the major applications for which neural network-based methods are being successfully employed is in the design of intelligent integrated processing architectures that efficiently implement sensor fusion operations. In this paper we shall present a novel scheme for developing fused decisions for surveillance and tracking in typical multi-sensor environments characterized by the disparity in the data streams arriving from various sensors. This scheme employs an integration of a multilayer neural network trained with features extracted from the multi-sensor data and a Kalman filter in order to permit reliable tracking of maneuvering targets, and provides an intelligent way of implementing an overa without any attendant increases in computational complexity. A particular focus is given to optimizing the neural network architecture and the learning strategy which are particularly critical to develop the capabilities required for tracking of target maneuvers. Towards these goals, a network growing scheme and a simplex algorithm that seeks the global minimum of the training error are presented. To provide validation of these methods, results of several tracking experiments involving targets executing complex maneuvers in noisy and clutter environments are presented.

Keywords:

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