عنوان مقاله:

Improved Distributed Particle Filter Architecture with Novel Resampling Algorithm for Signal Tracking

محل انتشار:

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خلاصه مقاله:

Resampling is a critical step in Particle Filter (PF) because of particle degeneracy and impoverishment problems. Independent Metropolis Hasting (IMH) resampling algorithm is a robust and high-speed method that can be used as the resampling step in PF. In this paper, a new algorithm based on IMH resampling is first proposed. The proposed algorithm classifies the particles before entering to the resampling module. The classification causes those essential particles are only routed to the IMH resampler. Then we propose a distributed architecture to reduce the execution time and high-speed processing for resampling. Simulation results for tracking a signal indicate that the PF with the proposed resampling architecture has acceptable tracking performance in comparison to other resampling methods. The PF architecture with the novel Improved IMH (IIMH) resampling algorithm has ۳۳% more speed than the best-reported method in PF. Also, the proposed distributed PF architecture achieve ۷۹% more speed compared with the best-reported method in PF. FPGA-based implementation results indicate that the utilization of the proposed IIMH resampling algorithm in PF and also distributed architecture lead to hardware resource and area usage reduction.

کلمات کلیدی:

Particle Filter, Independent Metropolis Hasting Resampling, FPGA, Signal Tracking