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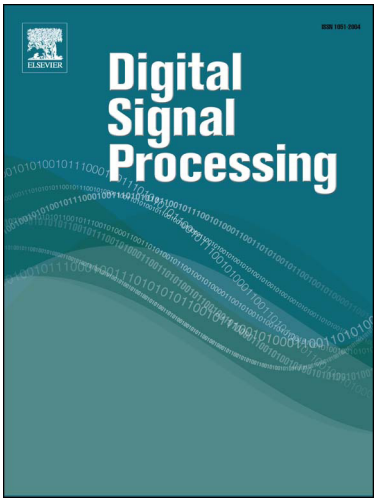

Variance-constrained state estimation for nonlinear complex networks with uncertain coupling strength

Wenling Li, Jian Sun, Yingmin Jia, Junping Du, Xiaoyan Fu

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Variance-constrained state estimation for nonlinear complex networks with uncertain coupling strength

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Abstract

This paper studies the state estimation problem for a class of discrete-time nonlinear complex networks with uncertain coupling strength. The purpose of this problem is to design a recursive state estimator such that, for all admissible coupling strength uncertainties and linearized errors of nonlinear functions, the estimation error is mean square bounded and the variance of the estimation error is not more than the prescribed upper bound. By adopting the structure of the extended Kalman filter, the gain matrix is determined by minimizing the trace of the prescribed upper bound matrix. It is shown that the estimator can be developed by solving two Riccati-like difference equations. A numerical example involving localization of mobile robots is provided to illustrate the effectiveness of the proposed estimator. Compared with the non-coupling estimator, simulation results show that the tracking accuracy has been improved by 82% using the proposed estimator.

Index Terms

State estimation, Complex networks, Uncertain coupling strength, Variance-constrained

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