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论文与报告

基于在线最小二乘支持向量机的广义预测控制

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摘要

This paper proposes a practical generalized predictive control (GPC) algorithm based on online least squares support vector machines (LS-SVM) which can deal with nonlinear systems effectively. At each sampling period the algorithm recursively modifies the model by adding a new data pair and deleting the least important one out of the consideration on realtime property. The data pair deleted is determined by the absolute value of lagrange multiplier from last sampling period. The paper gives the recursive algorithm of model parameters when adding a new data pair and deleting an existent one, respectively, and thus the inversion of a large matrix is avoided and the memory can be controlled by the algorithm entirely. The nonlinear LS-SVM model is applied in GPC algorithm at each sampling period. The experiments of generalized predictive control on pH neutralizing process show the effectiveness and practicality of the proposed algorithm.

关键词 Generalized predictive control least squares support vector machines fuzzy least squares support machines online modeling pH neutralizing process

分类号

Generalized Predictive Control with Online Least Squares Support Vector Machines

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Abstract

This paper proposes a practical generalized predictive control (GPC) algorithm based on online least squares support vector machines (LS-SVM) which can deal with nonlinear systems effectively. At each sampling period the algorithm recursively modifies the model by adding a new data pair and deleting the least important one out of the consideration on realtime property. The data pair deleted is determined by the absolute value of lagrange multiplier from last sampling period. The paper gives the recursive algorithm of model parameters when adding a new data pair and deleting an existent one, respectively, and thus the inversion of a large matrix is avoided and the memory can be controlled by the algorithm entirely. The nonlinear LS-SVM model is applied in GPC algorithm at each sampling period. The experiments of generalized predictive control on pH neutralizing process show the effectiveness and practicality of the proposed algorithm.

Key words Generalized predictive control least squares support vector machines fuzzy least squares support machines online modeling pH neutralizing process

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