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Stabilization of Linear Stochastic Systems Modelled by Singularly Perturbed Itô Differential Equations

Vasile Drăgan

Full text

The aim of this paper is to provide a methodology to design a stabilizing feedback gain for a stochastic linear system described by a system of singularly perturbed Ito differential equations. Our goal is to deliver a procedure which allows us to design a stabilizing feedback gain via the solvability of some suitable systems of LMI independent of the small time constants existing in the system. Such procedure is useful in order to avoid the ill conditioning of the computations due to the presence of the small parameters in the system. The main differences between the stochastic framework and deterministic framework are displayed.

Key words: singular perturbations, *ltd* differential equations, exponential stability in mean square, composite control.

2000 Mathematics Subject Classification: 68P20, 68T35

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A Unified Algebraic Approach to Residual Generators Design

Adrian Mihail Stoica

Full text

The paper presents a design methodology of residual generators used in fault detection applications. Two fundamental design objectives are considered, namely the fault detection and, the attenuation of the disturbances acting on the monitored plant. Using a unitary framework to characterize the performances of the residual generators, it is shown that the proposed methodology can be effective for various models of the monitored plants.

Key words: Fault detection, Failure residuals, Residual generators, Multi-objective optimization, H$_\infty$ control.

2000 Mathematics Subject Classification: 53B25, 53C15

Design of an Expert System for Efficient Selection of Data Mining Method

Mirela Danubianu

The extraction of information and knowledge from large sets of data has been recognized as a key research topic in database systems and machine learning. Data mining tools predict future trends and behaviours, allowing business to take proactive decision. Also, these tools can answer to business problem that traditionally were too time consuming to resolve by scanning databases for hidden patterns, finding predictive information that experts may not see because it lies outside their expectation. We have realized a close analyze of the data mining methods, techniques and algorithms with their characteristics, with their advantages and weakness. As well we have taken into account the tasks to be resolved in order to discover the different types of knowledge, the kind of databases to work on (relational, object-relational, spatial, etc) and the type of data (categorical, numeric or boolean). All these aspects as well as the area for which on desire the implementation of the data mining system was been taken into account for the realization of the ExpertDM system which has the aim to finding the best data mining methods for solving a task and specifying the transformation which need to be made (others than the usual for data mining) for bringing the data at a proper form for applying these methods.

Key words: Expert systems, Data mining, Neural networks, Association rules.

2000 Mathematics Subject Classification: 68P20, 68T35

Hybrid Genetic Algorithm for Assembly Line Balancing with Fuzzy Times and Parallel Workstations

O. Brudaru, B. Valmar and D. Popovici

This paper deals with the design of balanced assembly lines with parallel workstations in the case when the execution times are real sampled fuzzy numbers. The need for parallel workstations appears whenever the assembly process contains some tasks whose processing times are longer than the cycle time. The variant when the execution times are fuzzy number was considered as a better compromise between the reality modelling and the efficiency of the solving techniques. In order to solve this problem, it is proposed an efficient greedy algorithm that constructs an assembly structure containing both serial and parallel workstations for a prescribed confidence threshold. An optimal detecting criterion allows the obtaining of a simple relationship between the solution given by the algorithm and an easily calculated lower bound of the number of serial and parallel workstations. The greedy algorithm is grafted on a genetic algorithm resulting a powerful tool for solving this problem The performance of the hybrid genetic algorithm related to efficiency of defuzzyfication rules, optimality of the number of workstations, absolute and relative deviation from the optimal value, are experimentally analyzed.

Keywords: assembly line balancing, parallel workstations, fuzzy numbers, hybrid genetic algorithm, greedy method

2000 Mathematics Subject Classification: 68R10, 68T27