

The series »Studies in Computational Intelligence« (SCI) publishes new developments and advances in the various areas of computational intelligence – quickly and with a high quality. The intent is to cover the theory, applications, and design methods of computational intelligence, as embedded in the fields of engineering, computer science, physics and life science, as well as the methodologies behind them. The series contains monographs, lecture notes and edited volumes in computational intelligence spanning the areas of neural networks, connectionist systems, genetic algorithms, evolutionary computation, artificial intelligence, cellular automata, self-organizing systems, soft computing, fuzzy systems, and hybrid intelligent systems. Critical to both contributors and readers are the short publication time and world-wide distribution – this permits a rapid and broad dissemination of research results.

This book presents logical approaches to monitoring, modelling and optimization of fed-batch fermentation processes based on artificial intelligence methods, in particular, neural networks and genetic algorithms. Both computer simulation and experimental validation are demonstrated in this book. The approaches proposed in this book can be readily adopted for different processes and control schemes to achieve maximum productivity with minimum development and production costs.

The book begins with a historical introduction to the field of bioprocess control based on artificial intelligence approaches, followed by two chapters which cover the optimization of fed-batch culture using genetic algorithms. Online biomass soft-sensors are constructed in Chapter 4 using recurrent neural networks. The bioprocess is then modelled in Chapter 5 by cascading two soft-sensor neural networks. Optimization and validation of the final product are detailed in Chapters 6 and 7. The general conclusions are drawn in Chapter 8.

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