Abstract

In this paper, a new architecture combining dynamic neural units and fuzzy logic approaches is proposed for a complex chemical process modeling. Such processes need a particular care where the designer constructs the neural network, the fuzzy and the fuzzy neural network models which are very useful in black box modeling. The proposed architecture is specified to
the pH chemical reactor due to its large existence in the real industrial life and it is a realistic
dynamic nonlinear system to demonstrate the feasibility and the performance of the founding
results using the fuzzy dynamic neural units. A comparison was made between four strategies,
the fuzzy modeling, the recurrent neural networks, the dynamic recurrent neural networks and
the fuzzy dynamic neural units.

Reference

  system models. IEEE Trans. on Neural Networks, 8, pp. 553–567.
- Narendra, K. S. and Parthasarathy, K. 1990. Identification and Control Of Dynamical
  Systems Using Neural Networks. IEEE Trans. on Neural Networks, 1 (1), 4-27.
- Patan, K. 2008. Artificial Neural Networks for the Modelling and Fault Diagnosis of
  Technical Processes. Springer-Verlag Berlin Heidelberg.
- Roffel, B. and Betlem, B. 2006. Process Dynamics and Control, Modeling for Control and
  Approach for Nonlinear Process Control', Engineering Applications of Artificial Intelligence, 8(5),
  483-498.
  systems for modelling and controlling real systems a comparative study', Engineering
  Applications of Artificial Intelligence, 17, 265–273.
  IEE Proceedings on Control Theory Applications, 142(6), 51-561.
  Computational Approach to Learning and Machine Intelligence. Prentice Hall.
  New Age International Publishers.
- Nelles, O. 2001. Nonlinear system identification from classical approaches to neural
  networks and fuzzy models. Springer-Verlag.
- Rutkowski, L. 2004. Flexible Neuro Fuzzy Systems Structures Learning and
  for fault diagnosis in technical protests. In: IEEE international conference systems man and
  Cybernetics SMC’94 USA, 2120–2125.
- Saad Saoud, L. and Khellaf, A. 2009. Identification and Control of a Nonlinear Chemical
  process Plant Using Dynamical Neural Units.’ Third International Conference on Electrical
  Engineering Design and technologies, Tunisia, October 31- November 2.
- N Bhat, N. and McAvoy, T.J. 1990. Use of neural nets for dynamic modeling and control
Computer Science

Index Terms
Artificial Intelligence

Key words
pH process
Dynamic neural units
Nonlinear system

identification
Fuzzy modeling