Quantitative Modelling of Gene Networks of Biological Systems Using Fuzzy Petri Nets and Fuzzy Sets

Raed I. Hamed

PII: S1018-3647(16)30781-9
DOI: http://dx.doi.org/10.1016/j.jksus.2017.01.005
Reference: JKSUS 438

To appear in: *Journal of King Saud University - Science*

Received Date: 20 December 2016
Revised Date: 4 January 2017
Accepted Date: 14 January 2017

Please cite this article as: R.I. Hamed, Quantitative Modelling of Gene Networks of Biological Systems Using Fuzzy Petri Nets and Fuzzy Sets, *Journal of King Saud University - Science* (2017), doi: http://dx.doi.org/10.1016/j.jksus.2017.01.005

Quantitative Modelling of Gene Networks of Biological Systems Using Fuzzy Petri Nets and Fuzzy Sets

Raed I. Hamed

Department of IT, College of Science and Technology, University of Human Development, Sulaymaniyah, Iraq, E-Mail: raed.alfalahy@uhd.edu.iq

Summary

Quantitative demonstrating of organic frameworks has turned into an essential computational methodology in the configuration of novel and investigation of existing natural frameworks. Be that as it may, active information that portray the framework's elements should be known keeping in mind the end goal to get pertinent results with the routine displaying strategies. These information are frequently robust or even difficult to get. Here, we exhibit a model of quantitative fuzzy rationale demonstrating approach that can adapt to obscure motor information and hence deliver applicable results despite the fact that dynamic information are fragmented or just dubiously characterized. Besides, the methodology can be utilized as a part of the blend with the current cutting edge quantitative demonstrating strategies just in specific parts of the framework, i.e., where the data are absent. The contextual analysis of the methodology suggested in this paper is performed on the model of nine-quality genes. We propose a kind of FPN model in light of fuzzy sets to manage the quantitative modelling of biological systems. The tests of our model appear that the model is practical and entirely powerful for information impersonation and thinking of fuzzy expert frameworks.

Index Terms— FPNs, fuzzy sets, uncertain data, GRNs, quantitative modelling.

1 Introduction

As of late computational models show a crucial device which may be utilized for the configuration, enhancement and in *silico* verification of a new natural system previously its trial realization [1], [2]. Picking a fitting demonstrating procedure relies on the multifaceted nature of the watched GRN, wanted accuracy of final results and the accessibility of precise information, which portray the dynamical behaviors of any system. For the sake of standing quantitative techniques, the most part of the numerical reenactments should be taken into account of the arrangement of customary differential conditions. While depicting frameworks' progression precisely, this methodology requires exact data with a specific goal to deliver valuable simulation results [3], [4], [5], [6].

The flow of a discretionary GRN behaviour can be generally portrayed with three unique procedures, i.e., transcription, translation and degradation of biological processes. Each procedure of the biological processes can be given no less than one substance response and its having a place kinetic rates also may be known as reaction kinetics. Kinetic rates can be now and again (precisely) controlled by utilizing different parameter forecast and estimation systems. On the off chance that test information for each process is accessible, these strategies can gauge missing Kinetic rates data, and can be utilized