

HOSTED BY



ELSEVIER

Available online at www.sciencedirect.com

ScienceDirect

Fuzzy Information and Engineering

<http://www.elsevier.com/locate/fiae>



ORIGINAL ARTICLE

Soft Ternary Semirings



S. Kar · A. Shikari

Received: 21 October 2014/ Revised: 30 October 2015/
Accepted: 12 January 2016/

Abstract In this paper, we introduce the notion of soft ternary semiring by using the concept of soft set theory. Besides, we characterize the notions of regularity and intra-regularity in soft ternary semiring by using different soft (left, lateral, right, quasi, bi) ideals of soft ternary semirings.

Keywords Ternary semiring · Soft ternary semiring · Soft ideal · Regular soft ternary semiring · Intra-regular soft ternary semiring

© 2016 Fuzzy Information and Engineering Branch of the Operations Research Society of China. Hosting by Elsevier B.V. All rights reserved.

1. Introduction

Science and technology are now featured with complex processes and phenomena for which complete information is not always available to us. For such cases, mathematical models are developed to handle various types of systems containing uncertainty. In our daily life, uncertainty appears in common phenomena because our surroundings is full of uncertainties. Therefore, it is quiet natural for us to model this uncertainty prevailing in physical world. A large number of these models is based on an extension of ordinary set theories such as fuzzy sets, intuitionistic fuzzy sets, soft sets etc. Among these there are mainly three theories namely, theory of probability, theory of fuzzy sets and interval mathematics, which are used to model such situations. But all these theories have certain limitations to describe uncertain problems in a lucid manner. Theory of probability can deal only stochastically stable phenomena

S. Kar (✉) · A. Shikari

Department of Mathematics, Jadavpur University, Kolkata-700032, West Bengal, India
email: karsukhendu@yahoo.co.in

Peer review under responsibility of Fuzzy Information and Engineering Branch of the Operations Research Society of China.

© 2016 Fuzzy Information and Engineering Branch of the Operations Research Society of China. Hosting by Elsevier B.V. All rights reserved.

This is an open access article under the CC BY-NC-ND license
(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).
<http://dx.doi.org/10.1016/j.fiae.2016.03.001>

which need a large number of trials. Interval mathematics are also not adequate for problems with different level of uncertainties. Most of the problems in engineering science, medical science, social science, environmental science etc. have various uncertainties. The problems in system identification involve characteristics which are essentially non probabilistic in nature. Perhaps the most appropriate theory to tackle problems of uncertainty is fuzzy set theory introduced by Zadeh [18]. Intuitionistic fuzzy sets have also drawn the attention of many researchers in the last decades. This is mainly due to the fact that intuitionistic fuzzy sets are consistent with human behavior by reflecting and modeling the hesitancy present in real-life. In fact, the fuzzy sets give the degree of membership of an element in a given set, while the intuitionistic fuzzy sets give both a degree of membership and a degree of non-membership. But major difficulty arising in these theories are probably due to the inadequacy of parameters. The theory of soft set seems to be more adequate and it is a general mathematical tool for dealing with uncertain, fuzzy and not clearly defined objects. The notion of soft set was developed by D. Molodtsov [14] by involving enough parameters so that it will be helpful for modeling uncertainty. Soft set theory [12, 13] has a rich potential for applications in our day to day problems. It can be considered as a technique for solving real life problems like medical diagnosis, decision-making, data analysis and decision support systems. Soft set theory can be applied to many areas of engineering science, social science, medical science etc. with great efficiency.

On the other hand, there is a large literature dealing with ternary algebra. In 1971, W.G. Lister [11] introduced the notion of ternary ring and provided some types of representations of ternary ring. The notion of ternary semiring was first introduced by Dutta and Kar [5] as a generalization of ternary ring introduced by Lister [11]. A great deal of research has been done and is being done in the area of ternary semiring [7, 9, 10]. Besides the algebraic soft structures were studied by many researchers [1-4, 15-17] with the help of soft set theory, the notion of soft semirings were introduced by Feng et al. [8] in 2008. Our approach to study soft ternary semiring is motivated by the above soft algebraic structures.

The main purpose of this paper is to introduce the algebraic structure of soft ternary semiring which extends the notion of ternary semiring in soft set setting. In this paper, we define the notion of soft ternary semiring by using the concept of soft set theory and characterize the notion of regularity and intra-regularity in soft ternary semiring by using different soft (left, lateral, right, quasi, bi) ideals of soft ternary semirings.

2. Soft Sets and Ternary Semirings

In this section, we recall some basic notions of soft sets and ternary semirings which will be needed for characterizing soft ternary semirings.

Definition 2.1 [8] *Let U be an initial universal set and E be a set of parameters. Suppose that $\mathcal{P}(U)$ denotes the power set of U and A be a non-empty subset of E . A pair (η, A) is called a soft set over U , where $\eta : A \rightarrow \mathcal{P}(U)$ is a mapping.*

In other words, a soft set over U is a parameterized family of subsets of the universe U . For $\epsilon \in A$, $\eta(\epsilon)$ may be considered as the set of ϵ -approximate elements of the soft set (η, A) .

Download English Version:

<https://daneshyari.com/en/article/494514>

Download Persian Version:

<https://daneshyari.com/article/494514>

[Daneshyari.com](https://daneshyari.com)