



Lacunary statistical convergence in intuitionistic fuzzy n -normed linear spaces

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ABSTRACT

In this article we introduce the notion of lacunary statistically convergent and lacunary statistically Cauchy sequences in intuitionistic fuzzy n -normed linear spaces and give their characterization. We show that some properties of lacunary statistical convergence of real sequences also hold for sequences in this space. Further, necessary and sufficient conditions for equality of the set of statistically convergent and lacunary statistically convergent sequences have been established.

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1. Introduction

Zadeh [1] introduced the fuzzy set theory in 1965. Later on fuzzy logic became an important area of research in various branches of mathematics such as metric and topological spaces [2–4], theory of functions [5,6], approximation theory [7], etc. Fuzzy set theory also finds its applications for modeling uncertainty and vagueness in various fields of science and engineering, e.g. computer programming [8], nonlinear dynamical systems [9], population dynamics [10], control of chaos [11], quantum physics [12], etc. The theory of intuitionistic fuzzy sets was introduced by Atanassov [13] which has been extensively used in decision making problems [14] and in E-infinity theory of high energy physics [15]. The theory of 2-norm and n -norm on a linear space was introduced by Gähler [16,17], which was developed by Kim and Cho [18], Malceski [19], Misiak [20], Gunawan and Mashadi [21]. Vijayabalaji and Narayanan [22] extended n -normed linear space to fuzzy n -normed linear space. Saadati and Park [23] introduced the notion of intuitionistic fuzzy normed space while the notion of intuitionistic fuzzy n -normed linear space or in short IFnNLS was introduced by Vijayabalaji et al. [24]. The idea of statistical convergence was first introduced by Steinhaus [25] and Fast [26] which was later on studied by many authors. Mursaleen [27] defined the notion of λ -statistical convergence to generalize the concept of statistical convergence. Karakus [28] studied statistical convergence on probabilistic normed spaces. Then Karakus et al. [29] generalized it on intuitionistic fuzzy normed spaces. Fridy and Orhan [30] introduced the idea of lacunary statistical convergence. Mursaleen and Mohiuddine [31] have recently studied lacunary statistical convergence in intuitionistic fuzzy normed spaces.

The aim of the present paper is to introduce and investigate lacunary statistically convergent and lacunary statistically Cauchy sequences in IFnNLSs and obtain some important results on them. In this paper we have defined the notion of convergence of a sequence in an IFnNLS in a different way than it has been defined in [24] and other related works and established the results with a new approach. Also we have given some new characterizations for lacunary statistically convergent and lacunary statistically Cauchy sequences. Generalizing the ideas described by Fridy and Orhan [30] for complex number sequences, we have proved some inclusion results between the set of statistically convergent and lacunary statistically convergent sequences in IFnNLSs.

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