Some fixed point theorems for $(\theta,\eta)-$contractive multivalued mappings in Menger probabilistic $b-$metric like spaces

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Extended Abstract

Introduction

The concept of a Menger probabilistic metric space (briefly, Menger PM-space) was initiated by Menger [6]. The idea of Menger was to use a distribution function instead of a nonnegative number for the value of a metric. The notion of a probabilistic metric space corresponds to the situation when we do not know exactly the distance between two points. Thus, one thinks of the distance between two points x and y as being probabilistic with $F_{x,y}(t)$ representing the probability that the distance between x and y is less than t. Sehgal and Bharucha-Reid obtained a generalization of the Banach contraction principle on a complete Menger PM-space, which is a milestone in developing fixed point theory in a Menger PM-space [9]. After that, Schweizer and Sklar studied the properties of Menger PM-spaces and gave some basic results on these spaces [8]. Hasanvand and Khanehgir introduced Menger probabilistic $b-$metric space and proved some fixed point theorems in these spaces. On the other hand, Hadžić and Pap described and proved some fixed point theorems for multi valued $(\psi-\mathrm{C})-$contractive mappings in probabilistic metric spaces [3]. Žikić generalized multi valued case of Hick's contraction [10]. Beitollahi and Azhdari studied the fixed point theorem for $(\psi,\phi,\varepsilon,\lambda)-$contraction multi valued mapping in the Menger probabilistic metric spaces [1]. Now, we introduce the class of $(\theta,\eta)-$contractive multivalued mappings in a Menger probabilistic $b-$metric like space and we state and prove a fixed point theorem for this type of contractions. Then we investigate the generalized $\beta-\gamma-$type contractive mapping. Also, we give some examples to verify the effectiveness and practicability of our results.

Material and methods

In this scheme, first we define the concept of Menger probabilistic $b-$ metric like space and then we establish a fixed point theorem for $(\theta, \eta)-$ contractive multivalued mappings defined on these spaces. After that, we deal with the generalized $\beta - \gamma -$ type contractive mappings and study some fixed point results for these types of contractions.

Results and discussion

We establish a fixed point theorem for $(\theta, \eta)-$ contractive multivalued mappings in Menger probabilistic $b-$ metric like spaces and then solve some illustrative examples to verify the effectiveness and applicability of our results.

Conclusion

The following conclusions were drawn from this research.

- We define the concept of Menger probabilistic $b-$ metric like space.

- We establish a fixed point theorem for $(\theta, \eta)-$ contractive multivalued mappings defined on Menger probabilistic $b-$ metric like spaces.

- We investigate a fixed point result for the generalized $\beta - \gamma -$ type contractive mappings.

Keywords: $b-$ metric like space; Menger probabilistic metric space; fixed point; contractive mapping; multi valued mapping.

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