

A Study on Ideals and Prime Ideals of Sub-Distributive Semirings and Its Applications to Symmetric Fuzzy Numbers

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Abstract : From an algebraic point of view, Semirings provide the most natural generalization of group theory and ring theory. In the absence of additive inverse in a semiring, one had to impose a weaker condition on the semiring, i.e., the additive cancellative law to study interesting structural properties. In many practical situations, fuzzy numbers are used to model imprecise observations derived from uncertain measurements or linguistic assessments. In this connection, a special class of fuzzy numbers whose shape is symmetric with respect to a vertical line called the symmetric fuzzy numbers i.e., for $\alpha \in (0, 1]$ the α – cuts will have a constant mid-point and the upper end of the interval will be a non-increasing function of α , the lower end will be the image of this function, is suitable. Based on this description, arithmetic operations and a ranking technique to order the symmetric fuzzy numbers were dealt with in detail. Wherein it was observed that the structure of the class of symmetric fuzzy numbers forms a commutative semigroup with cancellative property. Also, it forms a multiplicative monoid satisfying sub-distributive property. In this paper, we introduce the algebraic structure, sub-distributive semiring and discuss its various properties viz., ideals and prime ideals of sub-distributive semiring, sub-distributive ring of difference etc. in detail. Symmetric fuzzy numbers are visualized as an illustration.

Keywords : semirings, subdistributive ring of difference, subdistributive semiring, symmetric fuzzy numbers

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