



Preface

Special issue on recent advances in soft set decision making: Theories and applications



Within the long-standing efforts to extend the knowledge of—and the ability to deal effectively with—the vague, noisy, or imprecise information arising in numerous areas, soft set theory has received much attention since its introduction by Molodtsov [1]. It leverages on the idea that complex concepts may be perceived and described from multiple points of view, with each aspect contributing an approximate description of the whole entity. Successful applications of the soft set theory have spanned various fields, ranging from decision making to operations research. Enrichment of soft set theory is continuing and it is driving parallel efforts on both the theoretical side and practical applications.

Aslıhan Sezger, Naim Çağman, and Akın Osman Atagün explore, in A completely new view to soft intersection rings via soft uni-int product, soft intersection rings, soft intersection left (right, two-sided) ideals, in relation with soft union-intersection product. They also define and analyze soft intersection bi-ideals, interior ideals, quasi-ideals, generalized bi-ideals of rings and soft semiprime ideals with respect to soft set operations and soft union-intersection product. Properties of these soft intersection ideals are used to characterize regular, regular duo, intra-regular and strongly regular rings.

In A novel soft rough set: soft rough hemirings and its multi-criteria group decision making, Jianming Zhang, Qi Liu and Tutut Herawan direct their attention to soft rough algebras, investigating the relationships among rough sets, soft sets and hemirings. In addition, they study the characteristic properties of hemirings from different points of view.

Possibility neutrosophic soft sets and PNS-decision making method, by Faruk Karaaslan, introduces possibility neutrosophic soft sets and related concepts such as possibility neutrosophic soft subset, possibility neutrosophic soft null set, and possibility neutrosophic soft universal set. Operations on possibility neutrosophic soft sets are defined and studied and a decision making method based on possibility neutrosophic soft sets is proposed.

An awareness of the ways emotions can irrationally influence our assessments and choices can help us make better decisions. Xindong Peng and Yang Yong, in Algorithms for interval-valued fuzzy soft sets in stochastic multi-criteria decision making based on regret theory and prospect theory with combined weight, describe an interval-valued fuzzy soft approach to stochastic multi-criteria

decision making based on regret theory, constructing a new axiomatic definition of interval-valued fuzzy distance measure. After integrating objective information with subjective considerations from the decision maker, so that the attitude of the decision maker towards risk is accounted for, they propose two algorithms which take regret aversion and prospect preference of decision makers into consideration in the decision process.

Starting from a practical problem, the assessment of shoreline resources of 32 real ports, Ke Gong, Panpan Wang, and Yi Peng in Fault-tolerant enhanced bijective soft set with applications focus on the tolerance of bijective soft set-based data mining processes. The introduction of misclassification degree to the bijective soft set can support the mining of decision rules and the discovery of possibly faulty data.

An application of OWA operators in fuzzy business diagnosis, by Hernán Vigier, Valeria Scherger, and Antonio Tercen˜o, proposes an enrichment of the fuzzy models of business failure, identifying causes through Balanced Scorecard and grouping them by means of Ordered Weighted Average operators. An empirical estimation and verification of the proposals in a set of small and medium-sized enterprises (SMEs) in the construction industry are also presented, providing a precise definition of the set of causes and symptoms.

Weijie Chen and Yan Zou, in An integrated method for supplier selection from the perspective of risk aversion, develop a new Multiple Criteria Group Decision Making method that takes risk aversion into account and consider misinterpretations of information, a frequent situation when a decision maker has a superficial knowledge of the domain and its specific terminology.

In Soft fuzzy rough set-based MRI Brain segmentation, Anupama Nam-buru and Srinivas Kumar Samay propose a Magnetic Resonance image segmentation algorithm based on soft fuzzy rough sets. Regions in the medical image are obtained by means of soft fuzzy rough approximations, avoiding thresholds and weights and achieving robustness to bias field, initialization of centroids and noise.

Banghe Han, Yongming Li, and Shengling Geng, in 0-1 linear programming methods for optimal normal and pseudo parameter reductions of soft sets, propose algorithms for solving parameter reduction problems of soft sets and give potential applications. The normal and pseudo parameter reduction problems of soft sets are translated into several equivalent 0-1

Linear programming problems, allowing the use of widely available software for integer programming. Their methods perform well when the number of parameters is large.

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Reference

- [1] [D. Molodtsov](#), *Soft set theory—first results*, *Comput. Math. Appl.* 37 (4) (1999) 19–31.

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