Recent Advances in Soft Computing and Data Mining

Proceedings of the Fifth International Conference on Soft Computing and Data Mining (SCDM 2022), May 30-31, 2022

Editors: Rozaida Ghazali, Nazri Mohd Nawi, Mustafa Mat Deris, Jemal H. Abawajy, Nureize Arbaiy

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SCDM2022

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Preface

Rapid advancements in data storage technology along with the increase in data accessibility have paved the way for data science to become one of the fastest-growing research and application fields. Data science revolves around gaining insights from data, using different tools, statistical models, and machine learning algorithms, with the goal to discover hidden patterns from the raw data. To take on competitors, organizations need to recruit more and more skilled data scientists to help them leverage data analytics. However, extracting useful information has proven extremely challenging. Our conventional mathematical and analytical methods still face difficulty in deciphering complex data systems. To tackle this, data mining, which supports a wide range of business intelligence applications, has opened up exciting opportunities for discovering patterns in various types of data. With the deployment of data and soft computing techniques to scour extensive databases, diverse unique and meaningful patterns can be found, which otherwise remain unknown. As a result, new theories, algorithms, and technologies are continually being developed to run advanced statistical interpretations. Additionally, soft computing techniques can handle imprecision, uncertainty, partial truth, and approximation to achieve tractability, robustness, and low solution cost. The techniques, individually or in an integrated manner, are turning out to be strong candidates for performing tasks in the area of data mining, business, decision support systems, supply chain management, medicine, financial systems, automotive systems and manufacturing, image processing, etc. It provides the challenge of transforming data into innovative solutions perceived as a new value by customers.

Following the success of our four previous SCDM conferences in 2014 until 2020, we were glad to continue this journey of achievements with our fifth international conference. This year, the SCDM 2022 was held in a virtual space on May 30–31, 2022. It allowed remote participants to access live, interactive networking opportunities, and content, no matter where they are located. We received 61 paper submissions from 14 countries around the world. The conference also approved one special session that is Emerging Trends in Intelligent Systems and Data Science. Each paper in regular submission and special session was screened by the

proceeding's chair and carefully peer-reviewed by at least three experts from the program committee. Finally, only 39 papers with the highest quality and merit were accepted for oral presentation and publication in this volume proceeding, giving an acceptance rate of 64%.

On behalf of SCDM 2022, we would like to express our highest gratitude to the conference organizer; Faculty of Computer Science & Information Technology, UTHM, and also to the Soft Computing & Data Mining research group, Steering Committee, Conference Chair, Program Committee Chair, Organizing Chairs, Special Session Chair, all Program and Reviewer Committee members for their valuable efforts in the review process that helped us to guarantee the highest quality of the selected papers for the conference.

We would also like to express our thanks to the keynote speakers, Prof. Dr Farid Meziane from the University of Derby, England; Dr Afnizanfaizal Abdullah from Aerodyne Group, Malaysia; and Prof. Dr Abdul Samad Hasan Basari from Universiti Tun Hussein Onn Malaysia. Our special thanks are also due to Dr Thomas Ditzinger for publishing the proceeding in Lecture Notes in Networks and Systems, Springer. We wish to thank the members of the organizing committee for their very substantial work, especially those who played essential roles.

Lastly, we would like to give the warmest of thanks to all the authors for their valuable input as well as all the participants for their enthusiastic engagement. We thank you for your time, service, and for making this conference as successful as it is.

Rozaida Ghazali
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Mustafa Mat Deris
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Contents

Arithmetic Operations of Intuitionistic Z-Numbers Using Horizontal Membership Functions

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Abstract

An intuitionistic Z-number (IZN) is an integration of an intuitionistic fuzzy number with a Z-number. The IZN composes of two components; restriction and reliability components, which are represented by the membership and non-membership degrees to indicate the hesitancy. The objective of this paper is to propose new arithmetic operations of IZN using the horizontal membership functions, which are closely related the concept of the relative distance measure. For that reason, the addition, subtraction, multiplication and division on normal trapezoidal IZNs are considered. The proposed operations preserve the arithmetic operations over real numbers and the original IZN-based information, avoiding any significant loss of information. The implementation of the bandwidth method in deriving the operations has reduced the computational complexity on IZN. In the future, aggregation operators of IZN can be derived using the proposed arithmetic operations.

Keywords

Intuitionistic Z-number **Arithmetic operation** **Horizontal membership function** **Relative distance measure**

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