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AN APPLICATION OF VAGUE BI ALGEBRA FILTERS FOR OPTIMIZING DECISION-MAKING IN COMPLEX SYSTEMS

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Abstract

Vague BI algebra filter studies are a field of research that applies the concepts of filters to vague BI algebras, a type of algebraic structure that generalizes both Boolean algebras and fuzzy logic. This field of research has many practical applications in areas such as computer science, artificial intelligence, and decision-making theory, where the analysis of uncertain or imprecise information is often required. Researchers in this area investigate a wide range of topics, including the construction of filters, the properties of subsets and elements within vague BI algebras, and the lattice structure of the algebra. They also use filters to develop new algorithms and decision-making tools that can handle vague or uncertain information. Overall, the study of filters in vague BI algebras is an active and growing field of research that has the potential to significantly impact a range of real-world applications.

Keywords: Vague algebra, Fuzzy logic, Business intelligence, Data analysis, Data filtering

Introduction

Vague BI algebra filter studies refer to a branch of research in algebraic logic and fuzzy set theory that focuses on the application of filters to vague BI algebras. Vague BI algebras are a type of algebraic structure that generalize both Boolean algebras and fuzzy logic, and are often used to represent vague or uncertain information. Filters, on the other hand, are a fundamental concept in algebraic structures that can be used to analyze the properties of sets or elements within these structures. In the context of vague BI algebras, filters can be used to study a wide range of topics, including the lattice structure of the algebra, the properties of subsets and elements within the algebra, and the relationship between different types of algebraic structures. Some common topics of research in this area include the construction of filters and their properties, the study of filter bases and ideals, and the use of filters to develop new algorithms and decision-making tools for uncertain or imprecise information. Overall, the study of filters in vague BI algebras is an active and growing field of research that has applications in a wide range of fields, including computer science, artificial intelligence, and decision-making theory.

Overview of vague algebra

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Vague algebra, also known as fuzzy algebra, is a branch of mathematics that deals with uncertain or imprecise quantities. It extends the principles of classical algebra to include values that are not precisely defined or known. Vague algebra is based on the concept of fuzzy sets, which allow for a more flexible and nuanced approach to modeling and analyzing complex systems. In vague algebra, values are represented as fuzzy sets, which are characterized by membership functions that assign a degree of membership to each element in the set. This degree of membership can range from 0 (not a member) to 1 (fully a member), and can represent a range of uncertainty or ambiguity in the value being modeled. Operations in vague algebra, such as addition, subtraction, multiplication, and division, are defined in terms of the membership functions of the fuzzy sets involved.

Vague algebra has many applications in fields such as business intelligence, data analysis, decision making, and control systems. By allowing for the modeling of uncertain and imprecise data, vague algebra can provide more accurate and meaningful results than traditional crisp algebra. It also allows for the consideration of multiple criteria or factors in decision making, and can be used to create more flexible and adaptive control systems. Overall, vague algebra is a powerful tool for dealing with uncertainty and complexity in a wide range of applications.

Operations and properties

Vague algebra operations and properties are based on the principles of fuzzy set theory. Some of the key operations and properties of vague algebra include:

- Membership function: The membership function is a core concept in vague algebra. It maps each element of a fuzzy set to a value between 0 and 1, indicating the degree to which that element belongs to the set. The shape of the membership function can be used to model different degrees of uncertainty or ambiguity in the values being represented.
- Complement: The complement of a fuzzy set is defined as the set of elements that do not belong to the original set. The complement of a fuzzy set can be calculated by subtracting each element's membership value from 1.

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- Union: The union of two fuzzy sets A and B is a fuzzy set that includes all the elements that belong to either A or B. The membership value of an element in the union is the maximum of its membership values in A and B.
- Intersection: The intersection of two fuzzy sets A and B is a fuzzy set that includes only the elements that belong to both A and B. The membership value of an element in the intersection is the minimum of its membership values in A and B.
- Fuzzy arithmetic: Fuzzy arithmetic operations like addition, subtraction, multiplication, and division can be performed on fuzzy sets by applying the operations to their corresponding membership functions.
- De Morgan's laws: De Morgan's laws apply to fuzzy sets just like they do for crisp sets. The complement of the union of two fuzzy sets is equal to the intersection of their complements, and the complement of the intersection of two fuzzy sets is equal to the union of their complements.
- Associativity, commutativity, and distributivity: These properties hold for vague algebra operations, just like they do for crisp algebra operations.

These operations and properties enable vague algebra to provide a powerful framework for modeling and analyzing complex systems with uncertain or imprecise data. By defining operations and properties that capture the nuances of fuzzy sets, vague algebra allows for more accurate and meaningful analysis of complex systems.

Comparison with crisp algebra

Crisp algebra and vague algebra are two different mathematical frameworks used to represent and analyze data. Crisp algebra deals with precise, well-defined values, while vague algebra allows for the representation of uncertain, imprecise, or ambiguous values. In crisp algebra, values are typically represented by real numbers, integers, or other well-defined mathematical objects. Operations such as addition, subtraction, multiplication, and division are performed on these well-defined objects using established mathematical rules.

In vague algebra, values are represented as fuzzy sets, which are characterized by membership functions that assign a degree of membership to each element in the set. Operations in vague algebra are defined in terms of the membership functions of the fuzzy sets involved, and allow

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for more nuanced and flexible analysis of uncertain or imprecise data. The key difference between crisp algebra and vague algebra is that crisp algebra deals with precise, well-defined values, while vague algebra deals with uncertain, imprecise, or ambiguous values. While crisp algebra is well-suited for problems with precise data, it can be inadequate for complex systems with uncertain or imprecise data. Vague algebra provides a more powerful framework for modeling and analyzing complex systems, by allowing for the representation of uncertain or imprecise data, and the application of operations that capture the nuances of that data. Overall, while crisp algebra and vague algebra are both important mathematical frameworks, they are used in different contexts and for different types of data. Crisp algebra is well-suited for precise data, while vague algebra is better suited for uncertain or imprecise data.

Conclusion

In conclusion, vague algebra, also known as fuzzy algebra, is a branch of mathematics that deals with uncertain or imprecise quantities. It extends the principles of classical algebra to include values that are not precisely defined or known. Vague algebra is based on the concept of fuzzy sets, which allow for a more flexible and nuanced approach to modeling and analyzing complex systems. Vague algebra provides a powerful framework for dealing with uncertainty and complexity in a wide range of applications. By allowing for the modeling of uncertain and imprecise data, it can provide more accurate and meaningful results than traditional crisp algebra. It also allows for the consideration of multiple criteria or factors in decision making, and can be used to create more flexible and adaptive control systems. While crisp algebra and vague algebra are both important mathematical frameworks, they are used in different contexts and for different types of data. Crisp algebra is well-suited for precise data, while vague algebra is better suited for uncertain or imprecise data. Understanding vague algebra and its operations and properties can be a valuable tool for anyone working with complex systems that involve uncertainty or imprecision.

References

1. Borumand Saeid. A and Zarandi. A, Vague Set Theory Applied to BM - Algebras, International Journal of Algebra, 2011, Vol.5, No.5, pp 207-222.

ISSN: 2321-3914
Volume 4 Issue 3
December 2021
Impact Factor: 10.2
Subject Mathematics

2. Chul Hwan Park, Neutrosophic ideal of subtraction algebras, Neutrosophic sets and systems, 2019, Vol.24, pp 36-45
3. Florentin Smarandache, A Unifying Field in Togics: Neutrosophic Togic, Neutrosophy, Neutrosophic Set, Neutrosophic Probability (fifth edition) Book: lanuary 2005, DOI:10.5281/zenodo.49174, ISBN 978-1-59973-080-6, American Research Press, Rchoboth, 1998, 2000, 2003, 2005
4. Florentin Smarandache, NeutroAlgebra is a Generalization of Partial Algebra, International Journal of Neutrosophic Science (IJNS), 2020, Vol. 2, No. 1, PP. 08-17,
5. Francina Shalini. A and Remya. P. B, Neutrosophic Vague binary sets, Neutrosophic Sets and Systems, 2019, Vol. 29, pp 228-241
6. Gau. W. L and Buehrer. D. J, Vague Sets, IEEE transactions on systems, man and cybernetics, 1993, Vol. 23, No. 2, pp 610-614
7. Hakimuddin Khan, Musheer Ahmad and Ranjit Biswas, On Vague Groups, International Journal Of Computational Cognition, 2007, Vol. 5, no. 1, pp 26-30,
8. Hee Sik Kim and Young Hee Kim, On BE-algebras, Scientiae Mathematicae (Online), e-2006,1299-1302
9. Hu. Q. P and Li. X, On BCH-algebras, Mathematics Seminar Notes, 1983, Vol.11, pp 313-320
10. Jafari. A, Mariapresenti. L and Arockiarani. I, Vague direct product in BCK-algebra, TJ1SET-International Journal of Innovative Science, Engineering & Technology, 2017, Vol.4, Issue 8, August 2017, pp 1-8
11. Jun. Y. B, Roh. E. H and Kim. H. S, On BH-algebras, Scientiae Mathematicae, 1998, Vol.1, No.3, pp 347-354
12. Kaviyarasu. M and Indhira. K, Review on BCI/BCK- Algebras and Development, International Journal of Pure and Applied Mathematics, 2017, Vol. 117, No. 11, pp 377-383
13. Khadaeman. S, Zahedi. M. M, Borzooei. R. A, Jun. Y. B, Neutrosophic Hyper BCK-ideals, Neutrosophic sets and systems, 2019, Vol.27, pp 201-217
14. Kim. C. B and Kim. H. S, On BM - algebras, Sci. Math. Japo, 2006, Vol.63, No.3, pp 421-42

ISSN: 2321-3914
Volume 4 Issue 3
December 2021
Impact Factor: 10.2
Subject Mathematics

15. Khalid. H. M, Ahmad. B, Fuzzy H-ideals in BCI-algebras, Fuzzy Sets Syst. 101 (1): 1999, pp 153-158
16. Kordi. A & Moussavi. A, On fuzzy ideals of a BCI - algebras, Pure Mathematics and Applications, 2007, Vol. 18, pp 301-310
17. Lee. K. J, So. K. S and Bang. K. S, Vague BCK/BCI -algebras, /. Korean Soc.Math. Educ.Ser.B:pure Appl.Math., 2008, Vol.15, No.3, pp 297-308
18. Mohamed Abdel-Basset, Mai Mohamed, Mohamed Elhoseny, Le Hoang Son, Francisco Chiclana, Abd El-Nasser H Zaied, Cosine Similarity Measures of Bipolar Neutrosophic Set for Diagnosis of Bipolar Disorder Diseases, Artificial Intelligence In Medicine, 2019, Vol.101, doi:
19. Mohamed Abdel-Basset, Mumtaz Ali, Asma Atef, Uncertainty Assessments of Linear Time-Cost Tradeoffs using Neutrosophic Set, Computers & Industrial Engineering, 2020, Vol.141,
20. Mohamed Abdel-Basset, Mumtaz Ali, Asma Atef, Resource levelling problem in construction projects under neutrosophic environment, The Journal of Supercomputing, 2019, pp 1-25,

[31.] Mohamed Abdel-Basset and Rehab Mohamed, A novel plithogenic TOPSIS- CRITIC model for sustainable supply chain risk management, Journal of Cleaner Production, 2020, Vol.247, https://doi.Org/10.1016/j.jclepro.2019.119586

[32.] Muhammad Anwar Chaudhry and Faisal Ali, Multipliers in d-algebras, World Applied Sciences Journal, 2012, Vol.18, No. 11, pp 1649 - 1653, DOI: 10.5829/idosi.wasj.2012.18.11.1587

[33.] Muhammad Anwar Chaudhry and Hafiz Fakhar-ud-din, On Some Classes of BCH-algebras, IJMMMS, 2001, Vol.25, No.3, pp 205-211, http://ijmms.hindawi.com@Hindawi

ISSN: 2321-3914
Volume 4 Issue 3
December 2021
Impact Factor: 10.2
Subject Mathematics

[34.] Muhammad Akram, Hina Gulzar, Florentin Smarandache and Said Broumi, Certain Notions of Neutrosophic Topological K-algebras, Mathematics, 2018, Vol.6, No.234, pp 1-15, doi: 10.3390/math6110234

[35.] Muhiuddin.G, Smarandache.F, Young Bae Jun, Neutrosophic Quadruple ideals in Neutrosophic Quadruple BCI - algebras, Neutrosophic sets and systems, 2019, Vol. 25, pp 161-173

[36.] Muhiuddin. G, Bordbar. H, Smarandache. F, Jun. Y. B, Further results on (s, s) - neutrosophic subalgebras and ideals in BCK/BCI- algebras, Neutrosophic sets and systems, 2018, Vol.20, pp 36-43

[37.] Nageswararao. B, Ramakrishna. N, Eswarlal. T, Translates of vague (3-algebra, International Journal of Pure and Applied Mathematics, 2016, Vol. 106, No.4, pp 989-1002, url:http://www.ijpam.eu

[38.] Neggers. J and Kim. H. S, On d-algebras, Math Slovaca, 1996, Vol.49, pp 19-26

[39.] Neggers. J and Kim. H. S, On B-algebras, Mate.Vesnik, 2002, Vol.54, pp 21-29

[40.] Neggers. J and Kim Hee Sik, On [beta]-algebra, Math-Solvaca, 2002, Vol.52, No.5, pp 517-530

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