A  APPENDICES

A.1  THE FOUND FUZZY SET EXTENSIONS WITH THE MOST COMMON KEYWORDS

Table A1: The found fuzzy set extensions with the most common keywords (RQ2, RQ3)a

| No | Fuzzy set extensions | Keywords |
| --- | --- | --- |
| 1 | atanassov intuitionistic fuzzy set | group decision making [88], [335], terminological difficulties [31], [263] |
| 2 | axiomatic fuzzy set | semantic interpretation [135,288,319], eigenfaces [183] |
| 3 | balanced fuzzy set | fuzzy neural network [121], learning [119], mcdm [120] |
| 4 | bipolar fuzzy set | graph representation [15,292], relational analysis method [82], terminological difficulties [225] [28], MULTIMOORA [300] |
| 5 | complex fuzzy set | granular computing [291], graph representation [15], [14], machine learning [209,348], particle swarm optimization [171], mcdm [237], [105], [286] |
| 6 | complex intuitionistic fuzzy set | mcdm [106], [89] |
| 7 | complex pythagorean fuzzy sets | group decision making [131] |
| 8 | complex q-rung orthopair fuzzy set | topsis [8,196] |
| 9 | convex fuzzy set | relational database [30] |
| 10 | dynamic fuzzy sets | group decision making [350], image segmentation [239,297], medical diagnosis [121], moving object detection [297] |
| 11 | dual hesitant fuzzy set | group decision making [287], madm [352], mcdm [353], topsis [262], correlation coefficient [260,385] |
| 12 | dual hesitant fuzzy soft set | correlation coefficient [115,372], expert system [87], mcdm [18], medical diagnosis [18] |
| 13 | eigen fuzzy sets | image analysis [241], convex combination [240] |
| 14 | fermatean fuzzy set | group decision making [165], mcdm [274,333], topsis [63,154,333] |
| 15 | fuzzy multiset | information fusion [217], medical diagnosis [32,73], terminological difficulties [32] |
| 16 | fuzzy rough set | information system [339], machine learning [58], object recognition [257], particle swarm optimization [207], 3-way decision [339] |
| 17 | fuzzy soft set | normal parameter reduction [38] |
| 18 | general type-2 fuzzy set | karnik-mendel algorithm [159,363], computing with words [137], controller [99], gene-expression data [69] |
| 19 | hesitant fuzzy linguistic term set | madm [67], mcdm [79,101,381], topsis [381], vikor [67], group decision making [284] |
| 20 | hesitant fuzzy set | madm [7,27], magdm [27,395], management [397], mcdm [138], mcgdm [340], medical diagnosis [78], multiplicative consistency [384], pattern recognition [361], quality function deployment [193], supplier selection [193], todim [367], topsis [27,193], vikor [27,397], 3-way decision [186], big data [114] |
| 21 | hesitant fuzzy soft set | madm [304], magdm [25,270], topsis [25], group decision making [295] |
| 22 | interval neutrosophic hesitant fuzzy set | madm [347], topsis [93], vikor [93], correlation coefficient [93,200] |
| 23 | interval neutrosophic set | madm [337], mcdm [278,337], correlation coefficient [278] |
| 24 | interval type-2 fuzzy set | karnik-mendel algorithm [159,213], madm [311], magdm [312], management [222,390], mcda [147], mcdm [61], mcgdm [70], mobile robot [132], neural network [245], particle swarm optimization [275], perceptual computing [325], qualiflex [66], risk management [222], software development [42], stability analysis [178], supplier selection [96], topsis [390], tracking control [160], vikor [197], best-worst method [95], c-means algorithm [65], controller [325], data envelopment analysis [53], dematel [96,390], dynamic system [170], edge-detection method [91], facility location selection [36], fmea [318], fuzzy multiple attributes group decision-making [45], green supplier selection [197], construction [221] |
| 25 | interval-valued dual hesitant fuzzy set | madm [357], mcdm [282], topsis [356], correlation coefficient [356], group decision making [169] |
| 26 | interval-valued fuzzy set | mcdm [23], prediction [112], terminological difficulties [50], topsis [194] |
| 27 | interval-valued hesitant fuzzy set | madm [354], magdm [386], mcdm [377], pattern recognition [156], topsis [94], vikor [226], correlation coefficient [140], green supplier selection [226] |
| 28 | interval-valued intuitionistic fuzzy set | madm [116,320], magdm [142], mcdm [388], mcgdm [34], pattern recognition [156], programming [173], risk management [243], topsis [116], vikor [309], ahp [243], supplier selection [355] |
| 29 | interval-valued pythagorean fuzzy set | mcdm [10], topsis [254] |
| 30 | interval-valued q-rung orthopair fuzzy set | madm [83,153], topsis [81,153,338], 3-way decision [185], aras [139], fmea [139], magdm [81], group decision making [149] |
| 31 | interval-valued spherical fuzzy set | topsis [163], group decision making [163] |
| 32 | intuitionistic fuzzy rough sets | minimization [393,394] |
| 33 | intuitionistic fuzzy set | expert system [56], fault diagnosis [303], fmea [162,396], fuzzy c-mean [72], fuzzy clustering [387], fuzzy neural network [317], fuzzy time series [248], anp [4], generalized nets [299], genetic algorithm [179], gra [267], image processing [108], information system [39], intuitionistic fuzzy c-means [387], mabac [396], madm [285], magdm [57], magnetic resonance imaging [387], mathematical programming [48], matrix game [174,175,235], mcda [48], mcdm [5], mcgdm [204], medical diagnosis [125,172], multimoora [368], multiperson [48,321], neural network [317], particle swarm optimization [161], pattern recognition [62,75], programming [111], promethee [188], quality [299], recommender system [107], renewable energy [64], reputation [315], risk management [314], 3-way decision [123], supplier selection [146], supply chain [203], todim [376], topological spaces [1,80,330], topsis [146,314], vendor selection [146], vikor [90,376,396], correlation coefficient measure [75], covid-19 [204], data envelopment analysis [90], data mining [233], decision support system [285], dematel [118], electre [261] |
| 34 | intuitionistic fuzzy soft set | gra [52], group decision making [373] |
| 35 | l-fuzzy set | qualitative reasoning [259], topological spaces [155] |
| 36 | linguistic hesitant fuzzy set | madm [214], mcdm [392], quality [98], todim [98], topsis [102], vikor [68], best-worst method [98], correlation coefficient [102,214], group decision making [77] |
| 37 | linguistic intuitionistic fuzzy set | madm [55], magdm [158,284], topsis [244], decision support model [187], group decision making [215], sentiment analysis [187], cognition [205] |
| 38 | linguistic pythagorean fuzzy set | madm [113], magdm [152,273], mcgdm [283,383], topsis [85,113,283], gra [152], group decision making [192,362] |
| 39 | m-polar fuzzy set | madm [229], topsis [271], disease [9], fuzzy concept lattice [290], graph representation [293] |
| 40 | multi-fuzzy set | diagnosis [316] |
| 41 | multi-valued neutrosophic set | qualiflex [249,251], todim [133], correlation coefficient [250,251], electre [250], madm [281], mcdm [250], mcgdm [252] |
| 42 | n-dimensional fuzzy sets | reciprocity [24], cloud computing [358], fuzzy negations [216], information fusion [218] |
| 43 | neutrosophic set | supplier selection [366], topsis [232], vikor [145], group decision making [366], image segmentation [37] |
| 44 | neutrosophic soft set | todim [342], topsis [230,255], vikor [145], correlation coefficient [144], edas [255], group decision making [230] |
| 45 | normal fuzzy set | todim [279], correlation coefficient [279], madm [279,341] |
| 46 | paired fuzzy set | terminological difficulties [225] |
| 47 | picture fuzzy set | relational analysis method [266,322], todim [266], topsis [103,374], vikor [289] |
| 48 | pythagorean fuzzy set | renewable energy [332], risk management [180], service quality [129,360], supplier selection [327], sustainability [332], todim [20,284,313], topsis [308,375], vikor [220], waspas [129], biogeography-based optimization [389], codas [29], conflict analysis [71], copras [308], correlation coefficient measure [74], deep learning [389], dematel [181], edas [181], gra [151], green supplier selection [327], linmap [51], management [247], market volatility [313], moora [124], occupational-health [60], promethee [49] |
| 49 | pythagorean fuzzy soft sets | topsis [22,272,399], ahp [21,400], correlation coefficient [399], madm [399] |
| 50 | pythagorean hesitant fuzzy set | qualiflex [130], topsis [150,391], group decision making [150], mcdm [391] |
| 51 | polygonal fuzzy set | rule interpolation [43,54], sparse fuzzy rule-based systems [54] |
| 52 | probabilistic fuzzy set | time series prediction [forecasting] [109], [44], ann [371], c-means algorithm [110], k-means clustering [110], pattern classification [369], controller [369,370] |
| 53 | probabilistic hesitant fuzzy set | todim [189], vikor [157,231], correlation coefficient [298], magdm [136] |
| 54 | q-rung orthopair fuzzy set | quality [97,182], todim [59], topsis [86,199,323], vikor [148], 3-way decision [184,305], correlation coefficient [177,294], mabac [256], mcdm [12,141], supplier selection [206] |
| 55 | random fuzzy set | bootstrap techniques [264,265], c-means algorithm [92], machine learning [306] |
| 56 | rough fuzzy set | transformation-based interpolation [41], 3-way decision [364,365], decision systems [17], gaussian kernel [17], granular computing [195,208], inclusion degree [168,301,382], incremental learning [127], information system [302,329,351] |
| 57 | simplified neutrosophic set | correlation coefficient [280,331], mcdm [253,277,343], medical diagnosis [2,346] |
| 58 | Single-valued neutrosophic set | topsis [236], ahp [296], correlation coefficient [246,344], madm [84,224], magdm [345], mcdm [19,344], power average [198] |
| 59 | spherical fuzzy set | todim [201,326], correlation coefficient [104], madm [164] |
| 60 | three-dimensional fuzzy set | controller design [378], distributed parameter system [176], stability analysis [379,380] |
| 61 | type-1 fuzzy set | computing with words [242], facility location selection [143,223], fuzzy multiple attributes group decision-making [47], karnik-mendel algorithm [40,190], mcdm [258], perceptual computer [324], recognition [276], topsis [223] |
| 62 | type-2 fuzzy set | vikor [310], artificial intelligence [219], data envelopment analysis [234], data mining [191], edge detection [100], fuzzy ahp [76], fuzzy c-mean [134], fuzzy image processing [35], granular computing [11], hidden markov models [359], image processing [35,128], inference system [126], magdm [46], mcgdm [202], medical diagnosis [33], mobile robot [26], ontology [167], particle swarm optimization [6], regression model [398], risk management [268], social network [228], subtractive clustering [238,269], supplier selection [117], terminological difficulties [33,349] |
| 63 | typical hesitant fuzzy set | consistency [212], correlation coefficient [211], group decision making [210] |
| 64 | t-spherical fuzzy set | topsis [227], correlation coefficient [104], madm [16], medical diagnosis [104], pattern recognition [104] |
| 65 | z-number | ahp [13], delphi [166], group decision making [336], mcdm [307], mobile robot [3], qualiflex [328], sustainability [122], topsis [334] |

a Note that all terms in Table A1 are presented as they are extracted from WoS and processed by VOSviewer.

REFERENCES

[1] Fadhil Abbas. 2021. Ideals on Intuitionistic Fuzzy Supra Topological Spaces. *International Journal of Fuzzy Logic and Intelligent Systems* 21, 1 (2021), 93–100. DOI:https://doi.org/10.5391/IJFIS.2021.21.1.93

[2] Mohamed Abdel-Basset, Mai Mohamed, and Jun Ye. 2021. Improved Cosine Similarity Measures of Simplified Neutrosophic Sets for Medical Diagnoses: Suggested Modifications. In *Neutrosophic Operational Research*. Springer International Publishing, 187–196. DOI:https://doi.org/10.1007/978-3-030-57197-9\_10

[3] Rahib H. Abiyev, Nurullah Akkaya, and Irfan Gunsel. 2019. Control of omnidirectional robot using z-number-based fuzzy system. *IEEE Trans Syst Man Cybern Syst* 49, 1 (2019), 238–252. DOI:https://doi.org/10.1109/TSMC.2018.2834728

[4] Eric Afful-Dadzie, Zuzana Komínková Oplatková, and Luis Antonio Beltran Prieto. 2017. Comparative State-of-the-Art Survey of Classical Fuzzy Set and Intuitionistic Fuzzy Sets in Multi-Criteria Decision Making. *International Journal of Fuzzy Systems* 19, 3 (June 2017), 726–738. DOI:https://doi.org/10.1007/s40815-016-0204-y

[5] Eric Afful-Dadzie, Zuzana Komínková Oplatkova, Stephen Nabareseh, and Roman Senkeřík. 2015. Selecting start-up businesses in a public venture capital with intuitionistic fuzzy TOPSIS. *Lecture Notes in Engineering and Computer Science* 2219, (2015), 471–476. Retrieved March 22, 2023 from http://www.iaeng.org/publication/WCECS2015/WCECS2015\_pp471-476.pdf

[6] Siddhartha Agarwal, Louis E. Pape, and Cihan H. Dagli. 2014. A hybrid genetic algorithm and particle swarm optimization with Type-2 Fuzzy sets for generating systems of systems architectures. In *Procedia Computer Science*, 57–64. DOI:https://doi.org/10.1016/j.procs.2014.09.037

[7] Manish Aggarwal. 2019. Hesitant information sets and application in group decision making. *Appl Soft Comput* 75, (2019), 120–129. DOI:https://doi.org/10.1016/j.asoc.2018.10.047

[8] D. Ajay, J. Aldring, and T. S. Jaganath. 2022. Software Selection for IT Industry Using Complex q-Rung Orthopair Fuzzy MCDM Model. In *Lecture Notes in Networks and Systems*, Springer Science and Business Media Deutschland GmbH, 641–648. DOI:https://doi.org/10.1007/978-3-031-09173-5\_74

[9] O. S. Albahri, H. A. AlSattar, Salem Garfan, Sarah Qahtan, A. A. Zaidan, Ibraheem Y. Y. Ahmaro, A. H. Alamoodi, B. B. Zaidan, A. S. Albahri, Mohammed S. Al-Samarraay, Ali Najm Jasim, and M. J. Baqer. 2022. Combination of Fuzzy-Weighted Zero-Inconsistency and Fuzzy Decision by Opinion Score Methods in Pythagorean m-Polar Fuzzy Environment: A Case Study of Sing Language Recognition Systems. *Int J Inf Technol Decis Mak* (May 2022), 1–29. DOI:https://doi.org/10.1142/s0219622022500183

[10] Abdullah Al-Barakati, Arunodaya Raj Mishra, Abbas Mardani, and Pratibha Rani. 2022. An extended interval-valued Pythagorean fuzzy WASPAS method based on new similarity measures to evaluate the renewable energy sources. *Appl Soft Comput* 120, (2022). DOI:https://doi.org/10.1016/j.asoc.2022.108689

[11] Rami Al-Hmouz, Witold Pedrycz, Abdullah Saeed Balamash, and Ali Morfeq. 2018. Hierarchical System Modeling. *IEEE Transactions on Fuzzy Systems* 26, 1 (2018), 258–269. DOI:https://doi.org/10.1109/TFUZZ.2017.2649581

[12] Jawad Ali and Muhammad Naeem. 2022. Complex q-Rung Orthopair Fuzzy Aczel-Alsina Aggregation Operators and Its Application to Multiple Criteria Decision-Making With Unknown Weight Information. *IEEE Access* 10, (2022), 85315–85342. DOI:https://doi.org/10.1109/ACCESS.2022.3197597

[13] Nurşah Alkan and Cengiz Kahraman. 2022. Fuzzy Analytic Hierarchy Process Using Spherical Z-Numbers: Supplier Selection Application. In *Lecture Notes in Networks and Systems*, Springer Science and Business Media Deutschland GmbH, 702–713. DOI:https://doi.org/10.1007/978-3-031-09173-5\_81

[14] Abd Ulzeez M J Alkouri, Morad Oqla Massa’deh, and Mabruka Ali. 2020. On bipolar complex fuzzy sets and its application. *Journal of Intelligent & Fuzzy Systems* 39, (2020), 383–397. DOI:https://doi.org/10.3233/JIFS-191350

[15] Abd Ulzeez M.J. Alkouri, Morad Oqla Massa’deh, and Mabruka Ali. 2020. On bipolar complex fuzzy sets and its application. *Journal of Intelligent and Fuzzy Systems* 39, 1 (2020), 383–397. DOI:https://doi.org/10.3233/JIFS-191350

[16] Ashraf Al-Quran. 2021. A New Multi Attribute Decision Making Method Based on the T-Spherical Hesitant Fuzzy Sets. *IEEE Access* 9, (2021), 156200–156210. DOI:https://doi.org/10.1109/ACCESS.2021.3128953

[17] Likui An, Sinan Ji, Changzhong Wang, and Xiaodong Fan. 2021. A multigranulation fuzzy rough approach to multisource information systems. *Soft comput* 25, 2 (January 2021), 933–947. DOI:https://doi.org/10.1007/s00500-020-05187-x

[18] Rishu Arora and Harish Garg. 2018. A robust correlation coefficient measure of dual hesitant fuzzy soft sets and their application in decision making. *Eng Appl Artif Intell* 72, (2018), 80–92. DOI:https://doi.org/10.1016/j.engappai.2018.03.019

[19] Samina Ashraf, Sumera Naz, Hossein Rashmanlou, and M. Aslam Malik. 2017. Regularity of graphs in single valued neutrosophic environment. *Journal of Intelligent and Fuzzy Systems* 33, 1 (2017), 529–542. DOI:https://doi.org/10.3233/JIFS-161960

[20] Shahzaib Ashraf, Saleem Abdullah, and Saifullah Khan. 2021. Fuzzy decision support modeling for internet finance soft power evaluation based on sine trigonometric Pythagorean fuzzy information. *J Ambient Intell Humaniz Comput* 12, 2 (February 2021), 3101–3119. DOI:https://doi.org/10.1007/s12652-020-02471-4

[21] Kumru Didem Atalay, Yusuf Tansel Iç, Barış Keçeci, Mustafa Yurdakul, and Melis Boran. 2021. Development of a new hesitant fuzzy ranking model for NTMP ranking problem. *Soft comput* 25, 23 (December 2021), 14537–14548. DOI:https://doi.org/10.1007/s00500-021-06372-2

[22] T. M. Athira, Sunil Jacob John, and Harish Garg. 2019. Entropy and distance measures of Pythagorean fuzzy soft sets and their applications. *Journal of Intelligent and Fuzzy Systems* 37, 3 (2019), 4071–4084. DOI:https://doi.org/10.3233/JIFS-190217

[23] Tomas Baležentis and Shouzhen Zeng. 2013. Group multi-criteria decision making based upon interval-valued fuzzy numbers: An extension of the MULTIMOORA method. *Expert Syst Appl* 40, 2 (2013), 543–550. DOI:https://doi.org/10.1016/j.eswa.2012.07.066

[24] B Bedregal, … I Mezzomo - … Transactions on Fuzzy, and Undefined 2018. -Dimensional Fuzzy Negations. *ieeexplore.ieee.org*. Retrieved March 22, 2023 from https://ieeexplore.ieee.org/abstract/document/8370752/?casa\_token=HtaCuqjk1KQAAAAA:hRQOVo-YcIRPzAm0o279kJyLGh0xfZI2ao8WtWD0motwv8xdFgAiWS4isMwBFACzZxNF0CelyVA

[25] Ismat Beg and Tabasam Rashid. 2016. Ideal solutions for hesitant fuzzy soft sets. *JOURNAL OF INTELLIGENT \& FUZZY SYSTEMS* 30, 1 (2016), 143–150. DOI:https://doi.org/10.3233/IFS-151740

[26] Aissa Bencherif and Fatima Chouireb. 2019. A recurrent TSK interval type-2 fuzzy neural networks control with online structure and parameter learning for mobile robot trajectory tracking. *Applied Intelligence* 49, 11 (November 2019), 3881–3893. DOI:https://doi.org/10.1007/s10489-019-01439-y

[27] Pranab Biswas, Surapati Pramanik, and Bibhas C. Giri. 2019. NH-MADM strategy in neutrosophic hesitant fuzzy set environment based on extended GRA. *Informatica (Netherlands)* 30, 2 (2019), 213–242. DOI:https://doi.org/10.15388/Informatica.2019.204

[28] Isabelle Bloch. 2011. Lattices of fuzzy sets and bipolar fuzzy sets, and mathematical morphology. *Inf Sci (N Y)* 181, 10 (2011), 2002–2015. DOI:https://doi.org/https://doi.org/10.1016/j.ins.2010.03.019

[29] Eda Bolturk. 2018. Pythagorean fuzzy CODAS and its application to supplier selection in a manufacturing firm. *Journal of Enterprise Information Management* 31, 4 (2018), 550–564. DOI:https://doi.org/10.1108/JEIM-01-2018-0020

[30] Patrick Bosc, Olivier Pivert, and Ludovic Liétard. 2003. On the comparison of aggregates over fuzzy sets. In *Intelligent Systems for Information Processing: From Representation to Applications*. 141–152. DOI:https://doi.org/10.1016/B978-044451379-3/50011-X

[31] Humberto Bustince, Edurne Barrenechea, Miguel Pagola, Javier Fernandez, Zeshui Xu, Benjamin Bedregal, Javier Montero, Hani Hagras, Francisco Herrera, and Bernard de Baets. 2016. A historical account of types of fuzzy sets and their relationships. *IEEE Transactions on Fuzzy Systems* 24, 1 (2016), 179–194. DOI:https://doi.org/10.1109/TFUZZ.2015.2451692

[32] Humberto Bustince, Edurne Barrenechea, Miguel Pagola, Javier Fernandez, Zeshui Xu, Benjamin Bedregal, Javier Montero, Hani Hagras, Francisco Herrera, and Bernard De Baets. 2016. A Historical Account of Types of Fuzzy Sets and Their Relationships. *IEEE TRANSACTIONS ON FUZZY SYSTEMS* 24, 1 (2016), 179–194. DOI:https://doi.org/10.1109/TFUZZ.2015.2451692

[33] Humberto Bustince, Edurne Barrenechea, Miguel Pagola, Javier Fernandez, Zeshui Xu, Benjamin Bedregal, Javier Montero, Hani Hagras, Francisco Herrera, and Bernard De Baets. 2016. A historical account of types of fuzzy sets and their relationships. *IEEE Transactions on Fuzzy Systems* 24, 1 (2016), 179–194. DOI:https://doi.org/10.1109/TFUZZ.2015.2451692

[34] Sedef Çalı and Şebnem Yılmaz Balaman. 2019. A novel outranking based multi criteria group decision making methodology integrating ELECTRE and VIKOR under intuitionistic fuzzy environment. *Expert Syst Appl* 119, (2019), 36–50. DOI:https://doi.org/10.1016/j.eswa.2018.10.039

[35] Oscar Castillo, Mauricio A Sanchez, Claudia I Gonzalez, Gabriela E Martinez, and Calzada Tecnologico. 2017. Review of recent type-2 fuzzy image processing applications. *mdpi.com* (2017). DOI:https://doi.org/10.3390/info8030097

[36] Ferhan Cebi and Irem Otay. 2015. Multi-Criteria and Multi-Stage Facility Location Selection under Interval Type-2 Fuzzy Environment: A Case Study for a Cement Factory. *INTERNATIONAL JOURNAL OF COMPUTATIONAL INTELLIGENCE SYSTEMS* 8, 2 (2015), 330–344. DOI:https://doi.org/10.1080/18756891.2015.1001956

[37] Jia Syuen Chai, Ganeshsree Selvachandran, Florentin Smarandache, Vassilis C. Gerogiannis, Le Hoang Son, Quang Thinh Bui, and Bay Vo. 2021. New similarity measures for single-valued neutrosophic sets with applications in pattern recognition and medical diagnosis problems. *Complex and Intelligent Systems* 7, 2 (April 2021), 703–723. DOI:https://doi.org/10.1007/s40747-020-00220-w

[38] Uddagiri Chandrasekhar and Neelu Khare. 2021. An intelligent tutoring system for new student model using fuzzy soft set-based hybrid optimization algorithm. *Soft comput* 25, 24 (December 2021), 14979–14992. DOI:https://doi.org/10.1007/s00500-021-06396-8

[39] Kajal Chatterjee, Mohuya B. Kar, and Samarjit Kar. 2013. Strategic Decisions Using Intuitionistic Fuzzy Vikor Method for Information System (IS) Outsourcing. *Proceedings - 2013 International Symposium on Computational and Business Intelligence, ISCBI 2013* (2013), 123–126. DOI:https://doi.org/10.1109/ISCBI.2013.33

[40] Chao Chen, Dongrui Wu, Jonathan Mark Garibaldi, Robert John, Jamie Twycross, and Jerry M. Mendel. 2018. A Comment on “A Direct Approach for Determining the Switch Points in the Karnik-Mendel Algorithm.” *IEEE Transactions on Fuzzy Systems* 26, 6 (2018), 3905–3907. DOI:https://doi.org/10.1109/TFUZZ.2018.2865134

[41] Chengyuan Chen, Guorong Chen, and Lixiao Feng. 2016. Multi-expert decision making using rough-fuzzy rule interpolation. *Proceedings of 2016 IEEE International Conference of Online Analysis and Computing Science, ICOACS 2016* (2016), 84–90. DOI:https://doi.org/10.1109/ICOACS.2016.7563054

[42] Shyi Ming Chen. 2001. Fuzzy group decision making for evaluating the rate of aggregative risk in software development. *Fuzzy Sets Syst* 118, 1 (2001), 75–88. DOI:https://doi.org/10.1016/S0165-0114(99)00103-7

[43] Shyi Ming Chen and Stenly Ibrahim Adam. 2018. Weighted fuzzy interpolated reasoning based on ranking values of polygonal fuzzy sets and new scale and move transformation techniques. *Inf Sci (N Y)* 435, (2018), 184–202. DOI:https://doi.org/10.1016/j.ins.2017.12.054

[44] Shyi Ming Chen and Stenly Ibrahim Adam. 2018. Weighted fuzzy interpolated reasoning based on ranking values of polygonal fuzzy sets and new scale and move transformation techniques. *Inf Sci (N Y)* 435, (2018), 184–202. DOI:https://doi.org/10.1016/j.ins.2017.12.054

[45] Shyi Ming Chen and Jia An Hong. 2014. Fuzzy multiple attributes group decision-making based on ranking interval type-2 fuzzy sets and the TOPSIS method. *IEEE Trans Syst Man Cybern Syst* 44, 12 (2014), 1665–1673. DOI:https://doi.org/10.1109/TSMC.2014.2314724

[46] Shyi Ming Chen and Li Wei Kuo. 2017. Autocratic decision making using group recommendations based on interval type-2 fuzzy sets, enhanced Karnik–Mendel algorithms, and the ordered weighted aggregation operator. *Inf Sci (N Y)* 412–413, (2017), 174–193. DOI:https://doi.org/10.1016/j.ins.2017.05.030

[47] SM Chen, LW Lee - Expert Systems with applications, and undefined 2010. Fuzzy multiple attributes group decision-making based on the ranking values and the arithmetic operations of interval type-2 fuzzy sets. *Elsevier*. Retrieved May 30, 2023 from https://www.sciencedirect.com/science/article/pii/S0957417409006381?casa\_token=MGhicqS0E0gAAAAA:W0eAWXZy57WbXmFPU35mqHZJWd3Ohh30DNEv0W6GRIIEwBD--iOFkEfP\_CqO2kp6txgxZZhJ

[48] Ting Yu Chen. 2011. A comparative analysis of score functions for multiple criteria decision making in intuitionistic fuzzy settings. *Inf Sci (N Y)* 181, 17 (2011), 3652–3676. DOI:https://doi.org/10.1016/j.ins.2011.04.030

[49] Ting Yu Chen. 2018. A Novel PROMETHEE-Based Outranking Approach for Multiple Criteria Decision Analysis with Pythagorean Fuzzy Information. *IEEE Access* 6, (2018), 54495–54506. DOI:https://doi.org/10.1109/ACCESS.2018.2869137

[50] Ting Yu Chen and Jih Chang Wang. 2009. Interval-valued fuzzy permutation method and experimental analysis on cardinal and ordinal evaluations. *J Comput Syst Sci* 75, 7 (2009), 371–387. DOI:https://doi.org/10.1016/j.jcss.2009.03.002

[51] Ting-Yu Chen. 2019. Multiple Criteria Group Decision Making Using a Parametric Linear Programming Technique for Multidimensional Analysis of Preference Under Uncertainty of Pythagorean Fuzziness. *IEEE ACCESS* 7, (2019), 174108–174128. DOI:https://doi.org/10.1109/ACCESS.2019.2957161

[52] Weijie Chen and Yan Zou. 2017. An integrated method for supplier selection from the perspective of risk aversion. *Applied Soft Computing Journal* 54, (2017), 449–455. DOI:https://doi.org/10.1016/j.asoc.2016.10.036

[53] Xiaoqing Chen, Xinwang Liu, Qun Wu, Muhammet Deveci, and Luis Martinez. 2022. Measuring technological innovation efficiency using interval type-2 fuzzy super-efficiency slack-based measure approach. *Eng Appl Artif Intell* 116, (2022). DOI:https://doi.org/10.1016/j.engappai.2022.105405

[54] Shou Hsiung Cheng, Shyi Ming Chen, and Chia Ling Chen. 2015. A new method for fuzzy interpolative reasoning based on ranking values of polygonal fuzzy sets and automatically generated weights of fuzzy rules. In *Proceedings - International Conference on Machine Learning and Cybernetics*, 346–351. DOI:https://doi.org/10.1109/ICMLC.2015.7340946

[55] Yali Cheng, Yonghong Li, and Jie Yang. 2021. Multi-attribute decision-making method based on a novel distance measure of linguistic intuitionistic fuzzy sets. *Journal of Intelligent and Fuzzy Systems* 40, 1 (2021), 1147–1160. DOI:https://doi.org/10.3233/JIFS-201429

[56] Wojciech Cholewa. 2015. Gradual forgetting operator in intuitionistic statement networks. *Advances in Intelligent Systems and Computing* 322, (2015), 613–620. DOI:https://doi.org/10.1007/978-3-319-11313-5\_54

[57] Yanchang Chu, Peide Liu, and Honggang Li. 2019. Multi-attribute group decision making method based on some trapezoid intuitionistic fuzzy linguistic Bonferroni mean aggregation operators. *Journal of Intelligent and Fuzzy Systems* 36, 4 (2019), 3869–3889. DOI:https://doi.org/10.3233/JIFS-181045

[58] Daniel, Cornelis Chris Lenz Oliver Urs, and Peralta. 2021. Adapting Fuzzy Rough Sets for Classification with Missing Values. In *Rough Sets*, Springer International Publishing, 192–200.

[59] Adjei Peter Darko and Decui Liang. 2020. Some q-rung orthopair fuzzy Hamacher aggregation operators and their application to multiple attribute group decision making with modified EDAS method. *Eng Appl Artif Intell* 87, (2020). DOI:https://doi.org/10.1016/j.engappai.2019.103259

[60] Ezgi Demir and Çaglar Karamaşa. 2020. Analysis of experts’ psychological behaviors under risk with Pythagorean fuzzy sets and Todim method in terms of balanced scorecard: An example of factoring and financial leasing companies. *Journal of Multiple-Valued Logic and Soft Computing* 35, 1–2 (2020), 125–145. Retrieved March 22, 2023 from https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=15423980&AN=148272340&h=r%2FihFkDtUD9q%2BAgKbKpMr%2FbhNcdfEQpaxOToil0BaxgtcenOrf2pIA7e5TvH%2FkGnAy3G7iPlqdlFKIpP7xq%2B7g%3D%3D&crl=c

[61] Murat Levent Demircan and Suzan Tunc. 2020. A Proposed Service Level Improvement Methodology for Public Transportation Using Interval Type-2 Fuzzy Edas Based on Customer Satisfaction Data. *JOURNAL OF MULTIPLE-VALUED LOGIC AND SOFT COMPUTING* 35, 1–2, SI (2020), 113–124.

[62] Wankai Deng, He Deng, and Lifang Cheng. 2015. Enhancement of brain tumor MR images based on intuitionistic fuzzy sets. *MIPPR 2015: Parallel Processing of Images and Optimization; and Medical Imaging Processing* 9814, (2015), 98140H. DOI:https://doi.org/10.1117/12.2205334

[63] Zhan Deng and Jianyu Wang. 2022. New distance measure for Fermatean fuzzy sets and its application. *International Journal of Intelligent Systems* 37, 3 (March 2022), 1903–1930. DOI:https://doi.org/10.1002/int.22760

[64] Kaan Deveci, Rabia Cin, and Ahmet Kağızman. 2020. A modified interval valued intuitionistic fuzzy CODAS method and its application to multi-criteria selection among renewable energy alternatives in Turkey. *Applied Soft Computing Journal* 96, (2020). DOI:https://doi.org/10.1016/j.asoc.2020.106660

[65] Soumyadip Dhar and Malay K Kundu. 2020. Interval Type-2 Fuzzy Set and Theory of Weak Continuity Constraints for Accurate Multiclass Image Segmentation. *IEEE TRANSACTIONS ON FUZZY SYSTEMS* 28, 9 (2020), 2151–2163. DOI:https://doi.org/10.1109/TFUZZ.2019.2930932

[66] Hasan Dincer and Serhat Yuksel. 2019. IT2-Based Fuzzy Hybrid Decision Making Approach to Soft Computing. *IEEE ACCESS* 7, (2019), 15932–15944. DOI:https://doi.org/10.1109/ACCESS.2019.2895359

[67] J Dong, F Yuan, S Wan - Computers & Industrial Engineering, and undefined 2017. Extended VIKOR method for multiple criteria decision-making with linguistic hesitant fuzzy information. *Elsevier*. Retrieved March 22, 2023 from https://www.sciencedirect.com/science/article/pii/S0360835217303273?casa\_token=bqkRWCWLKhAAAAAA:QC58QusV\_AoghYqE40CI2TOYdbRx2XI4mzfnkQBkgVg2\_ZeCTZEPqKoXm8897NKcKuV0J5Oj

[68] Jiu ying Dong, Fang fang Yuan, and Shu ping Wan. 2017. Extended VIKOR method for multiple criteria decision-making with linguistic hesitant fuzzy information. *Comput Ind Eng* 112, (2017), 305–319. DOI:https://doi.org/10.1016/j.cie.2017.07.025

[69] Abolfazl Doostparast Torshizi and Mohammad Hossein Fazel Zarandi. 2014. A new cluster validity measure based on general type-2 fuzzy sets: Application in gene expression data clustering. *Knowl Based Syst* 64, (2014), 81–93. DOI:https://doi.org/10.1016/j.knosys.2014.03.023

[70] Yahya Dorfeshan, Seyed Meysam Mousavi, Edmundas Kazimieras Zavadskas, and Jurgita Antucheviciene. 2021. A New Enhanced ARAS Method for Critical Path Selection of Engineering Projects with Interval Type-2 Fuzzy Sets. *Int J Inf Technol Decis Mak* 20, 01 (2021), 37–65. DOI:https://doi.org/10.1142/S0219622020500418

[71] Junliang Du, Sifeng Liu, Yong Liu, and Jinhong Yi. 2022. A novel approach to three-way conflict analysis and resolution with Pythagorean fuzzy information. *Inf Sci (N Y)* 584, (2022), 65–88. DOI:https://doi.org/10.1016/j.ins.2021.10.051

[72] Yogita K. Dubey and Milind M. Mushrif. 2015. Intuitionistic fuzzy roughness measure for segmentation of brain MR images. *ICAPR 2015 - 2015 8th International Conference on Advances in Pattern Recognition* (2015). DOI:https://doi.org/10.1109/ICAPR.2015.7050657

[73] P. A. Ejegwa, C. Jana, and M. Pal. 2022. Medical diagnostic process based on modified composite relation on pythagorean fuzzy multi-sets. *Granular Computing* 7, 1 (January 2022), 15–23. DOI:https://doi.org/10.1007/s41066-020-00248-w

[74] Paul Augustine Ejegwa, Yuming Feng, Shiping Wen, and Wei Zhang. 2021. Determination of Pattern Recognition Problems based on a Pythagorean Fuzzy Correlation Measure from Statistical Viewpoint. *2021 13th International Conference on Advanced Computational Intelligence, ICACI 2021* (2021), 132–139. DOI:https://doi.org/10.1109/ICACI52617.2021.9435895

[75] Paul Augustine Ejegwa and Idoko Charles Onyeke. 2021. Intuitionistic fuzzy statistical correlation algorithm with applications to multicriteria-based decision-making processes. *International Journal of Intelligent Systems* 36, 3 (March 2021), 1386–1407. DOI:https://doi.org/10.1002/int.22347

[76] Melike Erdoʇan and Ihsan Kaya. 2016. Evaluating alternative-fuel busses for public transportation in Istanbul using interval type-2 fuzzy AHP and TOPSIS. *Journal of Multiple-Valued Logic and Soft Computing* 26, 6 (2016), 625–642. Retrieved March 23, 2023 from https://www.researchgate.net/profile/Melike-Erdogan/publication/273947851\_Evaluating\_of\_Alternative-Fuel\_Busses\_for\_Public\_Transportation\_in\_Istanbul\_Using\_Interval\_Type-2\_Fuzzy\_AHP\_and\_TOPSIS/links/5dca7057458515143503f728/Evaluating-of-Alternative-Fuel-

[77] Aliya Fahmi, Saleem Abdullah, and Fazli Amin. 2021. Aggregation operators on cubic linguistic hesitant fuzzy numbers and their application in group decision-making. *Granular Computing* 6, 2 (April 2021), 303–320. DOI:https://doi.org/10.1007/s41066-019-00188-0

[78] B. Farhadinia, H. Liao, and E. Herrera-Viedma. 2021. A modified class of correlation coefficients of hesitant fuzzy information. *Soft comput* 25, 10 (May 2021), 7009–7028. DOI:https://doi.org/10.1007/s00500-021-05629-0

[79] Bahram Farhadinia and Enrique Herrera-Viedma. 2018. Entropy Measures for Hesitant Fuzzy Linguistic Term Sets Using the Concept of Interval-Transformed Hesitant Fuzzy Elements. *INTERNATIONAL JOURNAL OF FUZZY SYSTEMS* 20, 7, SI (2018), 2122–2134. DOI:https://doi.org/10.1007/s40815-017-0379-x

[80] Tao Feng, Shao Pu Zhang, Ju Sheng Mi, and Yan Li. 2009. Intuitionistic fuzzy topology space based on fuzzy rough sets. *Proceedings of the 2009 International Conference on Machine Learning and Cybernetics* 2, (2009), 706–711. DOI:https://doi.org/10.1109/ICMLC.2009.5212420

[81] Hengxia Gao, Yanbing Ju, Wenkai Zhang, and Dawei Ju. 2019. Multi-Attribute Decision-Making Method Based on Interval-Valued q -Rung Orthopair Fuzzy Archimedean Muirhead Mean Operators. *IEEE Access* 7, (2019), 74300–74315. DOI:https://doi.org/10.1109/ACCESS.2019.2918779

[82] Hui Gao, Guiwu Wei, and Yuhan Huang. 2018. Dual Hesitant Bipolar Fuzzy Hamacher Prioritized Aggregation Operators in Multiple Attribute Decision Making. *IEEE Access* 6, (2018), 11508–11522. DOI:https://doi.org/10.1109/ACCESS.2017.2784963

[83] Jie Gao and Zeshui Xu. 2019. Differential calculus of interval-valued q-rung orthopair fuzzy functions and their applications. *International Journal of Intelligent Systems* 34, 12 (December 2019), 3190–3219. DOI:https://doi.org/10.1002/int.22190

[84] Totan Garai, Harish Garg, and Tapan Kumar Roy. 2020. A ranking method based on possibility mean for multi-attribute decision making with single valued neutrosophic numbers. *J Ambient Intell Humaniz Comput* 11, 11 (November 2020), 5245–5258. DOI:https://doi.org/10.1007/s12652-020-01853-y

[85] Harish Garg. 2018. Linguistic Pythagorean fuzzy sets and its applications in multiattribute decision-making process. *International Journal of Intelligent Systems* 33, 6 (June 2018), 1234–1263. DOI:https://doi.org/10.1002/int.21979

[86] Harish Garg, Zeeshan Ali, and Tahir Mahmood. 2021. Generalized dice similarity measures for complex q-Rung Orthopair fuzzy sets and its application. *Complex and Intelligent Systems* 7, 2 (April 2021), 667–686. DOI:https://doi.org/10.1007/s40747-020-00203-x

[87] Harish Garg and Rishu Arora. 2018. Dual Hesitant Fuzzy Soft Aggregation Operators and Their Application in Decision-Making. *Cognit Comput* 10, 5 (2018), 769–789. DOI:https://doi.org/10.1007/s12559-018-9569-6

[88] Harish Garg and Kamal Kumar. 2019. Linguistic Interval-Valued Atanassov Intuitionistic Fuzzy Sets and Their Applications to Group Decision Making Problems. *IEEE TRANSACTIONS ON FUZZY SYSTEMS* 27, 12 (2019), 2302–2311. DOI:https://doi.org/10.1109/TFUZZ.2019.2897961

[89] Harish Garg and Dimple Rani. 2019. Some results on information measures for complex intuitionistic fuzzy sets. *International Journal of Intelligent Systems* 34, (March 2019), 2319–2363. DOI:https://doi.org/10.1002/int.22127

[90] Xiuli Geng and Qinming Liu. 2015. A hybrid service supplier selection approach based on variable precision rough set and VIKOR for developing product service system. *Int J Comput Integr Manuf* 28, 10 (October 2015), 1063–1076. DOI:https://doi.org/10.1080/0951192X.2014.959058

[91] Yosr Ghozzi, Nesrine Baklouti, Hani Hagras, Mounir Ben Ayed, and Adel M. Alimi. 2022. Interval Type-2 Beta Fuzzy Near Sets Approach to Content-Based Image Retrieval. *IEEE Transactions on Fuzzy Systems* 30, 3 (2022), 805–817. DOI:https://doi.org/10.1109/TFUZZ.2021.3049900

[92] Paolo Giordani and Ana Belén Ramos-Guajardo. 2016. A fuzzy clustering procedure for random fuzzy sets. *Fuzzy Sets Syst* 305, (2016), 54–69. DOI:https://doi.org/10.1016/j.fss.2016.02.006

[93] Bibhas C Giri, Mahatab Uddin Molla, and Pranab Biswas. 2020. TOPSIS Method for Neutrosophic Hesitant Fuzzy Multi-Attribute Decision Making. *INFORMATICA* 31, 1 (2020), 35–63. DOI:https://doi.org/10.15388/20-INFOR392

[94] H Gitinavard, S M Mousavi, and B Vahdani. 2017. Soft computing-based new interval-valued hesitant fuzzy multi-criteria group assessment method with last aggregation to industrial decision problems. *Soft comput* 21, 12 (2017), 3247–3265. DOI:https://doi.org/10.1007/s00500-015-2006-9

[95] İlker Gölcük. 2022. An interval type-2 fuzzy axiomatic design method: A case study for evaluating blockchain deployment projects in supply chain. *Inf Sci (N Y)* 602, (2022), 159–183. DOI:https://doi.org/10.1016/j.ins.2022.04.034

[96] İlker Gölcük, Esra Duygu Durmaz, and Ramazan Şahin. 2022. Interval type-2 fuzzy development of FUCOM and activity relationship charts along with MARCOS for facilities layout evaluation. *Appl Soft Comput* 128, (2022), 109414. DOI:https://doi.org/10.1016/j.asoc.2022.109414

[97] Jia Wei Gong, Qiang Li, Linsen Yin, and Hu Chen Liu. 2020. Undergraduate teaching audit and evaluation using an extended MABAC method under q-rung orthopair fuzzy environment. *International Journal of Intelligent Systems* 35, 12 (December 2020), 1912–1933. DOI:https://doi.org/10.1002/int.22278

[98] Jia Wei Gong, Hu Chen Liu, Xiao Yue You, and Linsen Yin. 2021. An integrated multi-criteria decision making approach with linguistic hesitant fuzzy sets for E-learning website evaluation and selection. *Appl Soft Comput* 102, (2021). DOI:https://doi.org/10.1016/j.asoc.2021.107118

[99] Claudia I. Gonzalez, Patricia Melin, Juan R. Castro, and Oscar Castillo. 2019. Edge detection approach based on type-2 fuzzy images. *Journal of Multiple-Valued Logic and Soft Computing* 33, 4–5 (2019), 431–458. Retrieved March 10, 2023 from https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=15423980&AN=140409476&h=LS5XwSSZMvFyGpuyRC%2Fx6OMGkKEhnu8%2B232fboQfrl1UPAwteelBD%2F8tnYXmp%2FLlF%2Bv0KIrppoOCCXr9Tjbg%2BA%3D%3D&crl=c&casa\_token=qLckbZdT09

[100] Claudia I. Gonzalez, Patricia Melin, Juan R. Castro, and Oscar Castillo. 2019. Edge detection approach based on type-2 fuzzy images. *Journal of Multiple-Valued Logic and Soft Computing* 33, 4–5 (2019), 431–458. Retrieved March 10, 2023 from https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=15423980&AN=140409476&h=LS5XwSSZMvFyGpuyRC%2Fx6OMGkKEhnu8%2B232fboQfrl1UPAwteelBD%2F8tnYXmp%2FLlF%2Bv0KIrppoOCCXr9Tjbg%2BA%3D%3D&crl=c

[101] Xunjie Gou, Zeshui Xu, and Huchang Liao. 2017. Multiple criteria decision making based on Bonferroni means with hesitant fuzzy linguistic information. *Soft comput* 21, 21 (November 2017), 6515–6529. DOI:https://doi.org/10.1007/s00500-016-2211-1

[102] Jian Guan, Dao Zhou, and Fanyong Meng. 2017. Distance Measure and Correlation Coefficient for Linguistic Hesitant Fuzzy Sets and Their Application. *Informatica (Netherlands)* 28, 2 (2017), 237–268. DOI:https://doi.org/10.15388/Informatica.2017.128

[103] Sait Gül and Ali Aydoğdu. 2021. Novel Entropy Measure Definitions and Their Uses in a Modified Combinative Distance-Based Assessment (CODAS) Method Under Picture Fuzzy Environment. *Informatica (Netherlands)* 32, 4 (2021), 759–794. DOI:https://doi.org/10.15388/21-INFOR458

[104] Abhishek Guleria and Rakesh Kumar Bajaj. 2021. On some new statistical correlation measures for T-spherical fuzzy sets and applications in soft computing. *Journal of Information Science and Engineering* 37, 2 (2021), 323–336. DOI:https://doi.org/10.6688/JISE.202103\_37(2).0003

[105] Muhammad Gulistan and Salma Khan. 2019. Extentions of neutrosophic cubic sets via complex fuzzy sets with application. *Complex & Intelligent Systems* 6, (March 2019). DOI:https://doi.org/10.1007/s40747-019-00120-8

[106] Muhammad Gulzar, M Haris Mateen, Dilshad Alghazzawi, and Nasreen Kausar. 2020. A Novel Applications of Complex Intuitionistic Fuzzy Sets in Group Theory. *IEEE Access* 8, (2020), 196075–196085. DOI:https://doi.org/10.1109/ACCESS.2020.3034626

[107] Junpeng Guo, Jiangzhou Deng, and Yong Wang. 2019. An intuitionistic fuzzy set based hybrid similarity model for recommender system. *Expert Syst Appl* 135, (2019), 153–163. DOI:https://doi.org/10.1016/j.eswa.2019.06.008

[108] Kaihong Guo and Yongzhi Zhou. 2021. The Method for Image Noise Detection Based on the Amount of Knowledge Associated with Intuitionistic Fuzzy Sets. *Communications in Computer and Information Science* 1505 CCIS, (2021), 54–66. DOI:https://doi.org/10.1007/978-981-16-8143-1\_6

[109] Krishna Kumar Gupta and Sanjay Kumar. 2019. Hesitant probabilistic fuzzy set based time series forecasting method. *Granular Computing* 4, 4 (October 2019), 739–758. DOI:https://doi.org/10.1007/s41066-018-0126-1

[110] Krishna Kumar Gupta and Sanjay Kumar. 2023. K-Means Clustering Based High Order Weighted Probabilistic Fuzzy Time Series Forecasting Method. *Cybern Syst* 54, 2 (2023), 197–219. DOI:https://doi.org/10.1080/01969722.2022.2058691

[111] Pankaj Gupta, Chin Teng Lin, Mukesh Kumar Mehlawat, and Nishtha Grover. 2016. A New Method for Intuitionistic Fuzzy Multiattribute Decision Making. *IEEE Trans Syst Man Cybern Syst* 46, 9 (2016), 1167–1179. DOI:https://doi.org/10.1109/TSMC.2015.2478401

[112] Petr Hajek. 2018. Predicting corporate investment/non-investment grade by using interval-valued fuzzy rule-based systems—A cross-region analysis. *Applied Soft Computing Journal* 62, (2018), 73–85. DOI:https://doi.org/10.1016/j.asoc.2017.10.037

[113] Qi Han, Weimin Li, Yanli Lu, Mingfa Zheng, Wen Quan, and Yafei Song. 2020. TOPSIS Method Based on Novel Entropy and Distance Measure for Linguistic Pythagorean Fuzzy Sets with Their Application in Multiple Attribute Decision Making. *IEEE Access* 8, (2020), 14401–14412. DOI:https://doi.org/10.1109/ACCESS.2019.2963261

[114] Zhinan Hao, Zeshui Xu, Hua Zhao, and Zhan Su. 2021. Optimized data manipulation methods for intensive hesitant fuzzy set with applications to decision making. *Inf Sci (N Y)* 580, (2021), 55–68. DOI:https://doi.org/10.1016/j.ins.2021.08.063

[115] Yan ping He. 2016. An approach to dual hesitant fuzzy soft set based on decision making. In *Advances in Intelligent Systems and Computing*, Springer Verlag, 339–349. DOI:https://doi.org/10.1007/978-3-319-19105-8\_31

[116] Zefang He, Zixue Guo, Peng Lin, and Fengxuan Song. 2020. A method for interval-valued intuitionistic fuzzy multiple attribute decision making based on fuzzy entropy. *JOURNAL OF INTELLIGENT \& FUZZY SYSTEMS* 38, 6, SI (2020), 7779–7785. DOI:https://doi.org/10.3233/JIFS-179847

[117] Sepehr Hendiani, Huchang Liao, Ruxue Ren, and Benjamin Lev. 2020. A likelihood-based multi-criteria sustainable supplier selection approach with complex preference information. *Inf Sci (N Y)* 536, (2020), 135–155. DOI:https://doi.org/10.1016/j.ins.2020.05.065

[118] Akshay Hinduja and Manju Pandey. 2019. An Integrated Intuitionistic Fuzzy MCDM Approach to Select Cloud-Based ERP System for SMEs. *Int J Inf Technol Decis Mak* 18, 6 (November 2019), 1875–1908. DOI:https://doi.org/10.1142/S0219622019500378

[119] W Homenda and W Pedrycz. 2004. Fuzzy computing unit. In *Annual Conference of the North American Fuzzy Information Processing Society - NAFIPS*, 611-616 Vol.2. DOI:https://doi.org/10.1109/NAFIPS.2004.1337371

[120] Wladyslaw Homenda, Agnieszka Jastrzebska, and Witold Pedrycz. 2016. Multicriteria decision making inspired by human cognitive processes. *Appl Math Comput* 290, (2016), 392–411. DOI:https://doi.org/https://doi.org/10.1016/j.amc.2016.05.041

[121] Wladyslaw Homenda and Witold Pedrycz. 2005. Balanced fuzzy computing unit. *International Journal of Uncertainty, Fuzziness and Knowlege-Based Systems* 13, 2 (April 2005), 117–138. DOI:https://doi.org/10.1142/S0218488505003357

[122] Ali Reza Hoseini, Seyed Farid Ghannadpour, and Roya Ghamari. 2020. Sustainable supplier selection by a new possibilistic hierarchical model in the context of Z-information. *J Ambient Intell Humaniz Comput* 11, 11 (November 2020), 4827–4853. DOI:https://doi.org/10.1007/s12652-020-01751-3

[123] Bing Huang, Wei Zhi Wu, Jinjiang Yan, Huaxiong Li, and Xianzhong Zhou. 2020. Inclusion measure-based multi-granulation decision-theoretic rough sets in multi-scale intuitionistic fuzzy information tables. *Inf Sci (N Y)* 507, (2020), 421–448. DOI:https://doi.org/10.1016/j.ins.2018.08.061

[124] Chao Huang, Mingwei Lin, and Zeshui Xu. 2020. Pythagorean fuzzy MULTIMOORA method based on distance measure and score function: its application in multicriteria decision making process. *Knowl Inf Syst* 62, 11 (2020), 4373–4406. DOI:https://doi.org/10.1007/s10115-020-01491-y

[125] Han Liang Huang and Yuting Guo. 2019. An improved correlation coefficient of intuitionistic fuzzy sets. *Journal of Intelligent Systems* 28, 2 (April 2019), 231–243. DOI:https://doi.org/10.1515/jisys-2017-0094

[126] Sharina Huang, Guoliang Zhao, Zhi Weng, and Shengyun Ma. 2022. Trapezoidal type-2 fuzzy inference system with tensor unfolding structure learning method. *Neurocomputing* 473, (2022), 54–67. DOI:https://doi.org/10.1016/j.neucom.2021.12.011

[127] Yanyong Huang, Tianrui Li, Chuan Luo, Hamido Fujita, and Shi jinn Horng. 2017. Matrix-based dynamic updating rough fuzzy approximations for data mining. *Knowl Based Syst* 119, (2017), 273–283. DOI:https://doi.org/10.1016/j.knosys.2016.12.015

[128] Mahmood Hussain and Dibya Jyotibora. 2018. An Analytical Study on Different Image Segmentation Techniques for Malaria Parasite Detection. *Proceedings of the 2018 3rd IEEE International Conference on Research in Intelligent and Computing in Engineering, RICE 2018* (2018). DOI:https://doi.org/10.1109/RICE.2018.8509068

[129] Esra Ilbahar and Cengiz Kahraman. 2018. Retail store performance measurement using a novel interval-valued Pythagorean fuzzy WASPAS method. *Journal of Intelligent and Fuzzy Systems* 35, 3 (2018), 3835–3846. DOI:https://doi.org/10.3233/JIFS-18730

[130] Jishu Jana and Sankar Kumar Roy. 2023. Linguistic Pythagorean hesitant fuzzy matrix game and its application in multi-criteria decision making. *Applied Intelligence* 53, 1 (January 2023), 1–22. DOI:https://doi.org/10.1007/s10489-022-03442-2

[131] Kesavan Janani, Kumarasamy Pradeepa Veerakumari, Krishnan Vasanth, and Rajan Rakkiyappan. 2022. Complex Pythagorean fuzzy einstein aggregation operators in selecting the best breed of Horsegram. *Expert Syst Appl* 187, (2022). DOI:https://doi.org/10.1016/j.eswa.2021.115990

[132] Jyun-Yu Jhang, Cheng-Jian Lin, and Kuu-Young Young. 2019. Cooperative Carrying Control for Multi-Evolutionary Mobile Robots in Unknown Environments. *Electronics (Basel)* 8, 3 (2019). DOI:https://doi.org/10.3390/electronics8030298

[133] Pu Ji, Hong yu Zhang, and Jian qiang Wang. 2018. A projection-based TODIM method under multi-valued neutrosophic environments and its application in personnel selection. *Neural Comput Appl* 29, 1 (January 2018), 221–234. DOI:https://doi.org/10.1007/s00521-016-2436-z

[134] Zexuan Ji, Yong Xia, Quansen Sun, and Guo Cao. 2014. Interval-valued possibilistic fuzzy C-means clustering algorithm. *Fuzzy Sets Syst* 253, (2014), 138–156. DOI:https://doi.org/10.1016/j.fss.2013.12.011

[135] Wenjuan Jia, Yingjie Deng, Chenyang Xin, Xiaodong Liu, and Witold Pedrycz. 2019. A classification algorithm with Linear Discriminant Analysis and Axiomatic Fuzzy Sets. *Mathematical Foundations of Computing* 2, 1 (2019), 73–81. DOI:https://doi.org/10.3934/mfc.2019006

[136] Fangju Jiang and Qinggong Ma. 2018. Multi-attribute group decision making under probabilistic hesitant fuzzy environment with application to evaluate the transformation efficiency. *Applied Intelligence* 48, 4 (April 2018), 953–965. DOI:https://doi.org/10.1007/s10489-017-1041-x

[137] Yuncheng Jiang. 2018. A general type-2 fuzzy model for computing with words. *International Journal of Intelligent Systems* 33, 4 (April 2018), 713–758. DOI:https://doi.org/10.1002/int.21952

[138] Bo Jin. 2015. ELECTRE method for multiple attributes decision making problem with hesitant fuzzy information. *JOURNAL OF INTELLIGENT \& FUZZY SYSTEMS* 29, 2 (2015), 463–468. DOI:https://doi.org/10.3233/IFS-131081

[139] Chuanxi Jin, Yan Ran, and Genbao Zhang. 2021. Interval-valued q-rung orthopair fuzzy FMEA application to improve risk evaluation process of tool changing manipulator. *Appl Soft Comput* 104, (2021). DOI:https://doi.org/10.1016/j.asoc.2021.107192

[140] Feifei Jin, Zhiwei Ni, Huayou Chen, Yaping Li, and Ligang Zhou. 2016. Multiple attribute group decision making based on interval-valued hesitant fuzzy information measures. *Comput Ind Eng* 101, (2016), 103–115. DOI:https://doi.org/10.1016/j.cie.2016.08.019

[141] Bhagawati Prasad Joshi and Alexander Gegov. 2020. Confidence levels q-rung orthopair fuzzy aggregation operators and its applications to MCDM problems. *International Journal of Intelligent Systems* 35, 1 (January 2020), 125–149. DOI:https://doi.org/10.1002/int.22203

[142] Deepa Joshi and Sanjay Kumar. 2018. Improved Accuracy Function for Interval-Valued Intuitionistic Fuzzy Sets and Its Application to Multi-Attributes Group Decision Making. *Cybern Syst* 49, 1 (2018), 64–76. DOI:https://doi.org/10.1080/01969722.2017.1412890

[143] Cengiz Kahraman, Da Ruan, and Ibrahim Doǧan. 2003. Fuzzy group decision-making for facility location selection. *Inf Sci (N Y)* 157, 1–4 (2003), 135–153. DOI:https://doi.org/10.1016/S0020-0255(03)00183-X

[144] Faruk Karaaslan. 2017. Correlation coefficients of single-valued neutrosophic refined soft sets and their applications in clustering analysis. *Neural Comput Appl* 28, 9 (September 2017), 2781–2793. DOI:https://doi.org/10.1007/s00521-016-2209-8

[145] Ali Karaşan, Eda Boltürk, and Cengiz Kahraman. 2019. A novel neutrosophic CODAS method: Selection among wind energy plant locations. *Journal of Intelligent and Fuzzy Systems* 36, 2 (2019), 1491–1504. DOI:https://doi.org/10.3233/JIFS-181255

[146] Kavita, Shiv Prasad Yadav, and Surendra Kumar. 2009. A multi-criteria interval-valued intuitionistic fuzzy group decision making for supplier selection with TOPSIS method. *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)* 5908 LNAI, (2009), 303–312. DOI:https://doi.org/10.1007/978-3-642-10646-0\_37

[147] Ku Muhammad Naim Ku Khalif, Alexander Gegov, Ahmad Syafadhli Abu Bakar, and Noor Zuraidin Mohd Safar. 2020. Interval Type-2 Fuzzy Multi Criteria Decision Making Based on Intuitive Multiple Centroid. In *Advances in Intelligent Systems and Computing*, Springer International Publishing, 211–221. DOI:https://doi.org/10.1007/978-3-030-36056-6\_21

[148] Muhammad Jabir Khan, Muhammad Irfan Ali, Poom Kumam, Wiyada Kumam, and Ahmad N. Al-Kenani. 2021. Q-Rung Orthopair Fuzzy Modified Dissimilarity Measure Based Robust VIKOR Method and its Applications in Mass Vaccination Campaigns in the Context of COVID-19. *IEEE Access* 9, (2021), 93497–93515. DOI:https://doi.org/10.1109/ACCESS.2021.3091179

[149] Muhammad Jabir Khan, Poom Kumam, Meshal Shutaywi, and Wiyada Kumam. 2021. Improved knowledge measures for q-rung orthopair fuzzy sets. *International Journal of Computational Intelligence Systems* 14, 1 (2021), 1700–1713. DOI:https://doi.org/10.2991/IJCIS.D.210531.002

[150] Muhammad Sajjad Ali Khan, Saleem Abdullah, Asad Ali, Nasir Siddiqui, and Fazli Amin. 2017. Pythagorean hesitant fuzzy sets and their application to group decision making with incomplete weight information. *Journal of Intelligent and Fuzzy Systems* 33, 6 (2017), 3971–3985. DOI:https://doi.org/10.3233/JIFS-17811

[151] Muhammad Sajjad Ali Khan, Saleem Abdullah, and Peide Lui. 2020. Gray Method for Multiple Attribute Decision Making with Incomplete Weight Information under the Pythagorean Fuzzy Setting. *Journal of Intelligent Systems* 29, 1 (January 2020), 858–876. DOI:https://doi.org/10.1515/jisys-2018-0099

[152] Muhammad Sajjad Ali Khan, Chiranjibe Jana, Muhammad Tahir Khan, Waqas Mahmood, Madhumangal Pal, and Wali Khan Mashwani. 2022. Extension of GRA method for multiattribute group decision making problem under linguistic Pythagorean fuzzy setting with incomplete weight information. *International Journal of Intelligent Systems* 37, 11 (November 2022), 9726–9749. DOI:https://doi.org/10.1002/int.23003

[153] Muhammad Sajjad Ali Khan, Amir Sultan Khan, Israr Ali Khan, Wali Khan Mashwani, and Fawad Hussain. 2021. Linguistic interval-valued q-rung orthopair fuzzy TOPSIS method for decision making problem with incomplete weight. *JOURNAL OF INTELLIGENT \& FUZZY SYSTEMS* 40, 3 (2021), 4223–4235. DOI:https://doi.org/10.3233/JIFS-200845

[154] Murat Kirişci, Ibrahim Demir, and Necip Şimşek. 2022. Fermatean fuzzy ELECTRE multi-criteria group decision-making and most suitable biomedical material selection. *Artif Intell Med* 127, (2022). DOI:https://doi.org/10.1016/j.artmed.2022.102278

[155] Jari Kortelainen. 1997. Modifiers connect L-fuzzy sets to topological spaces. *Fuzzy Sets Syst* 89, 2 (1997), 267–273. DOI:https://doi.org/10.1016/S0165-0114(96)00101-7

[156] Todor Kostadinov and Veselina Bureva. 2022. Interval-Valued Intuitionistic Fuzzy Estimations of an Ultrasonic Image for Recognition Purposes. In *Lecture Notes in Networks and Systems*, Springer International Publishing, 263–268. DOI:https://doi.org/10.1007/978-3-030-96638-6\_28

[157] R. Krishankumar, K. S. Ravichandran, Peide Liu, Samarjit Kar, and Amir H. Gandomi. 2021. A decision framework under probabilistic hesitant fuzzy environment with probability estimation for multi-criteria decision making. *Neural Comput Appl* 33, 14 (July 2021), 8417–8433. DOI:https://doi.org/10.1007/s00521-020-05595-y

[158] Kamal Kumar and Shyi-Ming Chen. 2022. Multiple attribute group decision making based on advanced linguistic intuitionistic fuzzy weighted averaging aggregation operator of linguistic intuitionistic fuzzy numbers. *Inf Sci (N Y)* 587, (2022), 813–824. DOI:https://doi.org/10.1016/j.ins.2021.11.014

[159] Tufan Kumbasar. 2017. Revisiting Karnik-Mendel Algorithms in the framework of Linear Fractional Programming. *INTERNATIONAL JOURNAL OF APPROXIMATE REASONING* 82, (2017), 1–21. DOI:https://doi.org/10.1016/j.ijar.2016.11.019

[160] Tufan Kumbasar and Hani Hagras. 2014. Big Bang-Big Crunch optimization based interval type-2 fuzzy PID cascade controller design strategy. *Inf Sci (N Y)* 282, (2014), 277–295. DOI:https://doi.org/10.1016/j.ins.2014.06.005

[161] R. J. Kuo, T. C. Lin, F. E. Zulvia, and C. Y. Tsai. 2018. A hybrid metaheuristic and kernel intuitionistic fuzzy c-means algorithm for cluster analysis. *Applied Soft Computing Journal* 67, (2018), 299–308. DOI:https://doi.org/10.1016/j.asoc.2018.02.039

[162] Dinesh Kumar Kushwaha, Dilbagh Panchal, and Anish Sachdeva. 2022. Intuitionistic fuzzy modelling-based integrated framework for performance analysis of juice clarification unit. *Appl Soft Comput* 124, (2022). DOI:https://doi.org/10.1016/j.asoc.2022.109056

[163] F. Kutlu Gündoğdu and Cengiz Kahraman. 2019. A novel fuzzy TOPSIS method using emerging interval-valued spherical fuzzy sets. *Eng Appl Artif Intell* 85, (2019), 307–323. DOI:https://doi.org/10.1016/j.engappai.2019.06.003

[164] Fatma Kutlu Gündoğdu and Cengiz Kahraman. 2020. A novel spherical fuzzy analytic hierarchy process and its renewable energy application. *Soft comput* 24, 6 (March 2020), 4607–4621. DOI:https://doi.org/10.1007/s00500-019-04222-w

[165] Han Lai, Huchang Liao, Yilu Long, and Edmundas Kazimieras Zavadskas. 2022. A Hesitant Fermatean Fuzzy CoCoSo Method for Group Decision-Making and an Application to Blockchain Platform Evaluation. *International Journal of Fuzzy Systems* (2022). DOI:https://doi.org/10.1007/s40815-022-01319-7

[166] Marcin Lawnik and Arkadiusz Banasik. 2021. The Applications of Z-numbers in the Delphi Method. In *Communications in Computer and Information Science*, Springer Science and Business Media Deutschland GmbH, 241–250. DOI:https://doi.org/10.1007/978-3-030-88304-1\_19

[167] Chang Shing Lee, Meng Jhen Wu, Mei Hui Wang, Olivier Teytaud, Hui Min Wang, and Shi Jim Yen. 2013. T2FML-based adaptive assessment system for computer game of Go. In *IEEE International Conference on Fuzzy Systems*. DOI:https://doi.org/10.1109/FUZZ-IEEE.2013.6622501

[168] Ming Chang Lee and To Chang. 2011. Rule extraction based on rough fuzzy sets in fuzzy information systems. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 115–127. DOI:https://doi.org/10.1007/978-3-642-19968-4\_6

[169] Bingyang Li, Jianmei Xiao, and Xihuai Wang. 2018. Interval-valued dual hesitant fuzzy rough set over two universes and its application. *JOURNAL OF INTELLIGENT \& FUZZY SYSTEMS* 35, 3 (2018), 3195–3211. DOI:https://doi.org/10.3233/JIFS-171626

[170] Chengdong Li, Jianqiang Yi, Guiqing Zhang, and Ming Wang. 2014. Construction of slope-consistent trapezoidal interval type-2 fuzzy sets for simplifying the perceptual reasoning method. In *IEEE International Conference on Fuzzy Systems*, 1261–1267. DOI:https://doi.org/10.1109/FUZZ-IEEE.2014.6891626

[171] Chunshien Li and Chia Hao Tu. 2019. Complex neural fuzzy system and its application on multi-class prediction — A novel approach using complex fuzzy sets, IIM and multi-swarm learning. *Applied Soft Computing Journal* 84, (2019). DOI:https://doi.org/10.1016/j.asoc.2019.105735

[172] Deng Feng Li. 2004. Some measures of dissimilarity in intuitionistic fuzzy structures. *J Comput Syst Sci* 68, 1 (2004), 115–122. DOI:https://doi.org/10.1016/j.jcss.2003.07.006

[173] Deng Feng Li. 2010. Linear programming method for MADM with interval-valued intuitionistic fuzzy sets. *Expert Syst Appl* 37, 8 (2010), 5939–5945. DOI:https://doi.org/10.1016/j.eswa.2010.02.011

[174] Deng Feng Li and Jia Cai Liu. 2015. A Parameterized Nonlinear Programming Approach to Solve Matrix Games with Payoffs of I-Fuzzy Numbers. *IEEE Transactions on Fuzzy Systems* 23, 4 (2015), 885–896. DOI:https://doi.org/10.1109/TFUZZ.2014.2333065

[175] Deng Feng Li and Jiang Xia Nan. 2009. A nonlinear programming approach to matrix games with payoffs of atanassov’s intuitionistic fuzzy sets. *International Journal of Uncertainty, Fuzziness and Knowlege-Based Systems* 17, 4 (August 2009), 585–607. DOI:https://doi.org/10.1142/S0218488509006157

[176] Han Xiong Li, Xian Xia Zhang, and Shao Yuan Li. 2007. A three-dimensional fuzzy control methodology for a class of distributed parameter systems. *IEEE Transactions on Fuzzy Systems* 15, 3 (2007), 470–481. DOI:https://doi.org/10.1109/TFUZZ.2006.889962

[177] Hongxu Li, Yang Yang, and Songyi Yin. 2020. Two λ-correlation coefficients of q-rung orthopair fuzzy sets and their application to clustering analysis. *Journal of Intelligent and Fuzzy Systems* 39, 1 (2020), 581–591. DOI:https://doi.org/10.3233/JIFS-191553

[178] Hongyi Li, Yingnan Pan, Peng Shi, and Yan Shi. 2016. Switched Fuzzy Output Feedback Control and Its Application to a Mass-Spring-Damping System. *IEEE TRANSACTIONS ON FUZZY SYSTEMS* 24, 6 (2016), 1259–1269. DOI:https://doi.org/10.1109/TFUZZ.2015.2505332

[179] Hui Li, Fuli Wang, and Hongru Li. 2019. Integrating expert knowledge for Bayesian network structure learning based on intuitionistic fuzzy set and Genetic Algorithm. *Intelligent Data Analysis* 23, 1 (2019), 41–56. DOI:https://doi.org/10.3233/IDA-183877

[180] Huimin Li, Lelin Lv, Feng Li, Lunyan Wang, and Qing Xia. 2020. A novel approach to emergency risk assessment using FMEA with extended MULTIMOORA method under interval-valued Pythagorean fuzzy environment. *International Journal of Intelligent Computing and Cybernetics* 13, 1 (May 2020), 41–65. DOI:https://doi.org/10.1108/IJICC-08-2019-0091

[181] Peng Li, Ju Liu, Cuiping Wei, and Jian Liu. 2022. A new EDAS method based on prospect theory for Pythagorean fuzzy set and its application in selecting investment projects for highway. *Kybernetes* 51, 8 (July 2022), 2636–2651. DOI:https://doi.org/10.1108/K-01-2021-0066

[182] Qiang Li, Qin Yu Chen, Zheng Liu, and Hu Chen Liu. 2021. Public transport customer satisfaction evaluation using an extended thermodynamic method: a case study of Shanghai, China. *Soft comput* 25, 16 (August 2021), 10901–10914. DOI:https://doi.org/10.1007/s00500-021-05790-6

[183] Zedong Li, Xiaodong Duan, Qingling Zhang, Cunrui Wang, Yuangang Wang, and Wanquan Liu. 2017. Multi-ethnic facial features extraction based on axiomatic fuzzy set theory. *Neurocomputing* 242, (2017), 161–177. DOI:https://doi.org/10.1016/j.neucom.2017.02.070

[184] Decui Liang and Wen Cao. 2019. q-Rung orthopair fuzzy sets-based decision-theoretic rough sets for three-way decisions under group decision making. *International Journal of Intelligent Systems* 34, 12 (December 2019), 3139–3167. DOI:https://doi.org/10.1002/int.22187

[185] Decui Liang, Yuanyuan Fu, Zeshui Xu, and Wanting Tang. 2022. Loss Function Information Fusion and Decision Rule Deduction of Three-Way Decision by Constructing Interval-Valued q-Rung Orthopair Fuzzy Integral. *IEEE Transactions on Fuzzy Systems* 30, 9 (2022), 3645–3660. DOI:https://doi.org/10.1109/TFUZZ.2021.3119758

[186] Decui Liang, Zeshui Xu, and Dun Liu. 2017. A New Aggregation Method-Based Error Analysis for Decision-Theoretic Rough Sets and Its Application in Hesitant Fuzzy Information Systems. *IEEE Transactions on Fuzzy Systems* 25, 6 (2017), 1685–1697. DOI:https://doi.org/10.1109/TFUZZ.2016.2632745

[187] Ruxia Liang and Jian qiang Wang. 2019. A Linguistic Intuitionistic Cloud Decision Support Model with Sentiment Analysis for Product Selection in E-commerce. *International Journal of Fuzzy Systems* 21, 3 (April 2019), 963–977. DOI:https://doi.org/10.1007/s40815-019-00606-0

[188] Huchang Liao and Zeshui Xu. 2014. Multi-criteria decision making with intuitionistic fuzzy PROMETHEE. *Journal of Intelligent and Fuzzy Systems* 27, 4 (2014), 1703–1717. DOI:https://doi.org/10.3233/IFS-141137

[189] Ningna Liao, Guiwu Wei, and Xudong Chen. 2022. TODIM Method Based on Cumulative Prospect Theory for Multiple Attributes Group Decision Making Under Probabilistic Hesitant Fuzzy Setting. *INTERNATIONAL JOURNAL OF FUZZY SYSTEMS* 24, 1 (2022), 322–339. DOI:https://doi.org/10.1007/s40815-021-01138-2

[190] Chee Kau Lim and Chee Seng Chan. 2015. A weighted inference engine based on interval-valued fuzzy relational theory. *Expert Syst Appl* 42, 7 (2015), 3410–3419. DOI:https://doi.org/10.1016/j.eswa.2014.12.025

[191] Jerry Chun Wei Lin, Xianbiao Lv, Philippe Fournier-Viger, Tsu Yang Wu, and Tzung Pei Hong. 2016. Efficient mining of fuzzy frequent itemsets with type-2 membership functions. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, Springer Verlag, 191–200. DOI:https://doi.org/10.1007/978-3-662-49390-8\_18

[192] Mingwei Lin, Xinmei Li, and Lifei Chen. 2020. Linguistic q-rung orthopair fuzzy sets and their interactional partitioned Heronian mean aggregation operators. *International Journal of Intelligent Systems* 35, 2 (February 2020), 217–249. DOI:https://doi.org/10.1002/int.22136

[193] Aijun Liu, Yan Zhang, Hui Lu, Sang Bing Tsai, Chao Feng Hsu, and Chien Hung Lee. 2019. An Innovative Model to Choose E-Commerce Suppliers. *IEEE Access* 7, (2019), 53956–53976. DOI:https://doi.org/10.1109/ACCESS.2019.2908393

[194] Donghai Liu, Dan Peng, and Zaiming Liu. 2020. Multiple criteria decision making with hesitant interval-valued fuzzy sets based on hesitance degree and least common multiple principle. *JOURNAL OF INTELLIGENT \& FUZZY SYSTEMS* 38, 4 (2020), 4159–4172. DOI:https://doi.org/10.3233/JIFS-190445

[195] Guilong Liu. 2009. Lattice structures of rough fuzzy sets. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 253–260. DOI:https://doi.org/10.1007/978-3-642-10646-0\_31

[196] Peide Liu, Zeeshan Ali, and Tahir Mahmood. 2021. Some cosine similarity measures and distance measures between complex q-rung orthopair fuzzy sets and their applications. *International Journal of Computational Intelligence Systems* 14, 1 (2021), 1653–1671. DOI:https://doi.org/10.2991/IJCIS.D.210528.002

[197] Peide Liu, Hui Gao, and Jianhua Ma. 2019. Novel green supplier selection method by combining quality function deployment with partitioned Bonferroni mean operator in interval type-2 fuzzy environment. *Inf Sci (N Y)* 490, (2019), 292–316. DOI:https://doi.org/10.1016/j.ins.2019.03.079

[198] Peide Liu, Qaisar Khan, and Tahir Mahmood. 2019. Some single-valued neutrosophic power muirhead mean operators and their application to group decision making. *Journal of Intelligent and Fuzzy Systems* 37, 2 (2019), 2515–2537. DOI:https://doi.org/10.3233/JIFS-182774

[199] Peide Liu, Tahir Mahmood, and Zeeshan Ali. 2022. The cross-entropy and improved distance measures for complex q-rung orthopair hesitant fuzzy sets and their applications in multi-criteria decision-making. *Complex and Intelligent Systems* 8, 2 (April 2022), 1167–1186. DOI:https://doi.org/10.1007/s40747-021-00551-2

[200] Peide Liu and Lanlan Shi. 2015. The generalized hybrid weighted average operator based on interval neutrosophic hesitant set and its application to multiple attribute decision making. *Neural Comput Appl* 26, 2, SI (2015), 457–471. DOI:https://doi.org/10.1007/s00521-014-1736-4

[201] Peide Liu, Baoying Zhu, Peng Wang, and Mengjiao Shen. 2020. An approach based on linguistic spherical fuzzy sets for public evaluation of shared bicycles in China. *Eng Appl Artif Intell* 87, (2020). DOI:https://doi.org/10.1016/j.engappai.2019.103295

[202] Sen Liu, Xiaojun He, Felix T.S. Chan, and Zhiyong Wang. 2022. An extended multi-criteria group decision-making method with psychological factors and bidirectional influence relation for emergency medical supplier selection. *Expert Syst Appl* 202, (2022). DOI:https://doi.org/10.1016/j.eswa.2022.117414

[203] Sen Liu, Yanan Hu, Xiao Zhang, Yanfeng Li, and Ling Liu. 2020. Blockchain Service Provider Selection Based on an Integrated BWM-Entropy-TOPSIS Method under an Intuitionistic Fuzzy Environment. *IEEE Access* 8, (2020), 104148–104164. DOI:https://doi.org/10.1109/ACCESS.2020.2999367

[204] Sen Liu, Jinxin Zhang, Ben Niu, Ling Liu, and Xiaojun He. 2022. A novel hybrid multi-criteria group decision-making approach with intuitionistic fuzzy sets to design reverse supply chains for COVID-19 medical waste recycling channels. *Comput Ind Eng* 169, (2022). DOI:https://doi.org/10.1016/j.cie.2022.108228

[205] Zhongming Liu, Mingming Kong, and Li Yan. 2020. Novel Transformation Methods among Intuitionistic Fuzzy Models for Mixed Intuitionistic Fuzzy Decision Making Problems. *IEEE Access* 8, (2020), 100596–100607. DOI:https://doi.org/10.1109/ACCESS.2020.2998134

[206] Tahir Mahmood and Zeeshan Ali. 2021. A novel approach of complex q-rung orthopair fuzzy hamacher aggregation operators and their application for cleaner production assessment in gold mines. *J Ambient Intell Humaniz Comput* 12, 9 (September 2021), 8933–8959. DOI:https://doi.org/10.1007/s12652-020-02697-2

[207] Tarun Maini, Abhishek Kumar, Rakesh Kumar Misra, and Devender Singh. 2019. Intelligent fuzzy rough set based feature selection using swarm algorithms with improved initialization. *JOURNAL OF INTELLIGENT \& FUZZY SYSTEMS* 37, 1 (2019), 1155–1164. DOI:https://doi.org/10.3233/JIFS-182606

[208] Dariusz Małyszko and Jarosław Stepaniuk. 2009. Fuzzy Rough Entropy Clustering Algorithm Parametrization. . 239–246. DOI:https://doi.org/10.1007/978-3-642-00563-3\_24

[209] J. Y. Man, Z Chen, and S. Dick. 2007. Towards inductive learning of complex fuzzy inference systems. In *Annual Conference of the North American Fuzzy Information Processing Society - NAFIPS*, 415–420. DOI:https://doi.org/10.1109/NAFIPS.2007.383875

[210] Monica Matzenauer, Renata Reiser, Helida Santos, and Benjamin Bedregal. 2020. Typical hesitant fuzzy sets - evaluating strategies in GDM applying consensus measures. In *Proceedings of the 11th Conference of the European Society for Fuzzy Logic and Technology, EUSFLAT 2019*, 438–445. DOI:https://doi.org/10.2991/eusflat-19.2019.61

[211] Mônica Matzenauer, Renata Reiser, Hélida Santos, Benjamín Bedregal, and Humberto Bustince. 2021. Strategies on admissible total orders over typical hesitant fuzzy implications applied to decision making problems. *International Journal of Intelligent Systems* 36, 5 (May 2021), 2144–2182. DOI:https://doi.org/10.1002/int.22374

[212] Monica Matzenauer, Hélida Santos, Benjamín Bedregal, Humberto Bustince, and Renata Reiser. 2022. On admissible total orders for typical hesitant fuzzy consensus measures. *International Journal of Intelligent Systems* 37, 1 (January 2022), 264–286. DOI:https://doi.org/10.1002/int.22624

[213] Jerry M. Mendel. 2007. Advances in type-2 fuzzy sets and systems. *Inf Sci (N Y)* 177, 1 (2007), 84–110. DOI:https://doi.org/10.1016/j.ins.2006.05.003

[214] Fanyong Meng, Jie Tang, and Cunlin Li. 2018. Uncertain linguistic hesitant fuzzy sets and their application in multi-attribute decision making. *International Journal of Intelligent Systems* 33, 3 (March 2018), 586–614. DOI:https://doi.org/10.1002/int.21957

[215] Fanyong Meng, Jie Tang, and Yongliang Zhang. 2019. Programming model-based group decision making with multiplicative linguistic intuitionistic fuzzy preference relations. *Comput Ind Eng* 136, (2019), 212–224. DOI:https://doi.org/10.1016/j.cie.2019.07.019

[216] Ivan Mezzomo, Benjamín Bedregal, and Thadeu Milfont. 2018. Moore continuous n-dimensional interval fuzzy negations. *IEEE International Conference on Fuzzy Systems* 2018-July, (2018). DOI:https://doi.org/10.1109/FUZZ-IEEE.2018.8491450

[217] L. De Miguel, M Sesma-Sara, M Elkano, M. Asiain, and H. Bustince. 2017. An algorithm for group decision making using n-dimensional fuzzy sets, admissible orders and OWA operators. *Information Fusion* 37, (2017), 126–131. DOI:https://doi.org/10.1016/j.inffus.2017.01.007

[218] L. De Miguel, M. Sesma-Sara, M. Elkano, M. Asiain, and H. Bustince. 2017. An algorithm for group decision making using n-dimensional fuzzy sets, admissible orders and OWA operators. *Information Fusion* 37, (2017), 126–131. DOI:https://doi.org/10.1016/j.inffus.2017.01.007

[219] Laura De Miguel, Regivan Santiago, Christian Wagner, Jonathan M. Garibaldi, Zdenko Takac, Antonio Francisco Roldan Lopej De Hierro, and Humberto Bustince. 2022. Extension of Restricted Equivalence Functions and Similarity Measures for Type-2 Fuzzy Sets. *IEEE Transactions on Fuzzy Systems* 30, 9 (2022), 4005–4016. DOI:https://doi.org/10.1109/TFUZZ.2021.3136349

[220] Fu Ming, Lifang Wang, and Jian Zhou. 2020. The identification of poverty alleviation targets based on the multiple hybrid decision-making algorithms. *IEEE Access* 8, (2020), 169585–169593. DOI:https://doi.org/10.1109/ACCESS.2020.3022807

[221] Seyed Ali Mirnezami, Seyed Meysam Mousavi, and Vahid Mohagheghi. 2020. A new interval type-2 fuzzy approach for multi-scenario project cash flow assessment based on alternative queuing method and dependency structure matrix with a case study. *Eng Appl Artif Intell* 95, (2020). DOI:https://doi.org/10.1016/j.engappai.2020.103815

[222] V. Mohagheghi, S. M. Mousavi, B. Vahdani, and M. R. Shahriari. 2017. R&D project evaluation and project portfolio selection by a new interval type-2 fuzzy optimization approach. *Neural Comput Appl* 28, 12 (December 2017), 3869–3888. DOI:https://doi.org/10.1007/s00521-016-2262-3

[223] M. N. Mokhtarian, S. Sadi-Nezhad, and A. Makui. 2014. A new flexible and reliable interval valued fuzzy VIKOR method based on uncertainty risk reduction in decision making process: An application for determining a suitable location for digging some pits for municipal wet waste landfill. *Comput Ind Eng* 78, (2014), 213–233. DOI:https://doi.org/10.1016/j.cie.2014.09.008

[224] Kalyan Mondal, Surapati Pramanik, and Bibhas C. Giri. 2018. Single valued neutrosophic hyperbolic sine similarity measure based MADM strategy. *Neutrosophic Sets and Systems* 20, (2018), 3–11. Retrieved March 23, 2023 from https://www.google.com/books?hl=lt&lr=&id=w-aaDwAAQBAJ&oi=fnd&pg=PA3&dq=Single+Valued+Neutrosophic+Hyperbolic+Sine+Similarity+Measure+Based+MADM+Strategy&ots=E\_GoLLK3Qc&sig=c7aQVV8nhP7S8-xXBflg1muT8Ng

[225] Javier Montero, Daniel Gómez, Tinguaro Rodríguez, and Camilo Franco. 2016. Paired fuzzy sets and other opposite-based models. In *2016 IEEE International Conference on Fuzzy Systems, FUZZ-IEEE 2016*, 118–121. DOI:https://doi.org/10.1109/FUZZ-IEEE.2016.7737676

[226] Seyed Meysam Mousavi. 2021. Group decision on the evaluation of outsourcing for information systems employing interval-valued hesitant fuzzy modeling. *Neural Comput Appl* 33, 7 (2021), 2183–2194. DOI:https://doi.org/10.1007/s00521-020-05059-3

[227] Muhammad Munir, Tahir Mahmood, and Azmat Hussain. 2021. Algorithm for T-spherical fuzzy MADM based on associated immediate probability interactive geometric aggregation operators. *Artif Intell Rev* 54, 8 (December 2021), 6033–6061. DOI:https://doi.org/10.1007/s10462-021-09959-1

[228] Mansoureh Naderipour, Susan Bastani, Mohammad Fazel Zarandi, and Burhan Turksen. 2017. A fuzzy classification using a Type-2 fuzzy model in social networks. In *Annual Conference of the North American Fuzzy Information Processing Society - NAFIPS*. DOI:https://doi.org/10.1109/NAFIPS.2016.7851632

[229] Khalid Naeem and Bijan Divvaz. 2022. Information measures for MADM under m-polar neutrosophic environment. *Granular Computing* (2022). DOI:https://doi.org/10.1007/s41066-022-00340-3

[230] Khalid Naeem, Muhammad Riaz, and Deeba Afzal. 2020. Fuzzy neutrosophic soft σ-algebra and fuzzy neutrosophic soft measure with applications. *Journal of Intelligent and Fuzzy Systems* 39, 1 (2020), 277–287. DOI:https://doi.org/10.3233/JIFS-191062

[231] Muhammad Naeem, Muhammad Ali Khan, Saleem Abdullah, Muhammad Qiyas, and Saifullah Khan. 2021. Extended TOPSIS method based on the entropy measure and probabilistic hesitant fuzzy information and their application in decision support system. *Journal of Intelligent and Fuzzy Systems* 40, 6 (2021), 11479–11490. DOI:https://doi.org/10.3233/JIFS-202700

[232] Amir Hossein Nafei, Amir Javadpour, Hadi Nasseri, and Wenjun Yuan. 2021. Optimized score function and its application in group multiattribute decision making based on fuzzy neutrosophic sets. *International Journal of Intelligent Systems* 36, 12 (December 2021), 7522–7543. DOI:https://doi.org/10.1002/int.22597

[233] Premchand S. Nair. 2009. Consolidation operator for intuitionistic fuzzy set. *Annual Conference of the North American Fuzzy Information Processing Society - NAFIPS* (2009). DOI:https://doi.org/10.1109/NAFIPS.2009.5156483

[234] Hashem Namvar and Shahrooz Bamdad. 2021. Efficiency Assessment of Resilience Engineering in Process Industries Using Data Envelopment Analysis Based on Type-2 Fuzzy Sets. *IEEE Access* 9, (2021), 883–895. DOI:https://doi.org/10.1109/ACCESS.2020.3044888

[235] Jiang Xia Nan, Deng Feng Li, and Jing Jing An. 2017. Solving bi-matrix games with intuitionistic fuzzy goals and intuitionistic fuzzy payoffs. *Journal of Intelligent and Fuzzy Systems* 33, 6 (2017), 3723–3732. DOI:https://doi.org/10.3233/JIFS-17595

[236] Nancy and Harish Garg. 2019. A novel divergence measure and its based TOPSIS method for multi criteria decision-making under single-valued neutrosophic environment. *Journal of Intelligent and Fuzzy Systems* 36, 1 (2019), 101–115. DOI:https://doi.org/10.3233/JIFS-18040

[237] Tran Thi Ngan, Luong Thi Hong Lan, Mumtaz Ali, Dan E Tamir, Le Hoang Son, Tran Manh Tuan, Naphtali Rishe, and Abraham Kandel. 2018. Logic connectives of complex fuzzy sets. *Romanian Journal of Information Science and Technology* 21, (2018), 344–357.

[238] Long Thanh Ngo and Binh Huy Pham. 2012. A type-2 fuzzy subtractive clustering algorithm. In *Advances in Intelligent and Soft Computing*, 395–402. DOI:https://doi.org/10.1007/978-3-642-27329-2\_54

[239] Haruhiko Nishimura, Masayuki Kambe, Kaoru Futagami, Kazuhiko Morishita, and Tokuo Tsubokura. 1991. Fuzzy realization in clinical test database system. *Int J Biomed Comput* 28, 4 (1991), 289–296. DOI:https://doi.org/10.1016/0020-7101(91)90082-P

[240] Hajime Nobuhara, Barnabás Bede, and Kaoru Hirota. 2006. On various eigen fuzzy sets and their application to image reconstruction. *Inf Sci (N Y)* 176, 20 (2006), 2988–3010. DOI:https://doi.org/10.1016/j.ins.2005.11.008

[241] Hajime Nobuhara, Eduarde Masato Iyoda, Barnabas Bede, and Kaoru Hirota. 2004. A solution for generalized eigen fuzzy sets equations by genetic algorithms and its application to image analysis. In *2004 2nd International IEEE Conference “Intelligent Systems” - Proceedings*, 208–212. DOI:https://doi.org/10.1109/is.2004.1344668

[242] Oktay Nusratov, Asker Almasov, and Aytakin Mammadova. 2017. Positional-binary recognition of cyclic signals by fuzzy analyses of their informative attributes. In *Procedia Computer Science*, 446–453. DOI:https://doi.org/10.1016/j.procs.2017.11.262

[243] Irem Otay and Miguel Jaller. 2020. Multi-expert disaster risk management \& response capabilities assessment using interval-valued intuitionistic fuzzy sets. *JOURNAL OF INTELLIGENT \& FUZZY SYSTEMS* 38, 1 (2020), 835–852. DOI:https://doi.org/10.3233/JIFS-179452

[244] Yue Ou, Liangzhong Yi, Bin Zou, and Zheng Pei. 2018. The linguistic intuitionistic fuzzy set TOPSIS method for linguistic multi-criteria decision makings. *International Journal of Computational Intelligence Systems* 11, 1 (2018), 120–132. DOI:https://doi.org/10.2991/ijcis.11.1.10

[245] Yuchen Ouyang, Hong Mo, Fan Peng, and Dan Tan. 2014. A model to forecast the matched-degree between staffs and jobs. In *ICCSS 2014 - Proceedings: 2014 International Conference on Informative and Cybernetics for Computational Social Systems*, 112–117. DOI:https://doi.org/10.1109/ICCSS.2014.6961826

[246] Şerif Özlü. 2023. Generalized Dice measures of single valued neutrosophic type-2 hesitant fuzzy sets and their application to multi-criteria decision making problems. *International Journal of Machine Learning and Cybernetics* 14, 1 (January 2023), 33–62. DOI:https://doi.org/10.1007/s13042-021-01480-9

[247] Basar Oztaysi, Sezi Cevik Onar, Sukran Seker, and Cengiz Kahraman. 2019. Water treatment technology selection using hesitant Pythagorean fuzzy hierachical decision making. *Journal of Intelligent and Fuzzy Systems* 37, 1 (2019), 867–884. DOI:https://doi.org/10.3233/JIFS-181538

[248] Shivani Pant and Sanjay Kumar. 2022. IFS and SODA based computational method for fuzzy time series forecasting. *Expert Syst Appl* 209, (2022). DOI:https://doi.org/10.1016/j.eswa.2022.118213

[249] Juan Juan Peng and Chao Tian. 2018. Multi-valued neutrosophic distance-based QUALIFLEX method for treatment selection. *Information (Switzerland)* 9, 12 (2018). DOI:https://doi.org/10.3390/info9120327

[250] Juan juan Peng, Jian qiang Wang, and Xiao hui Wu. 2017. An extension of the ELECTRE approach with multi-valued neutrosophic information. *Neural Comput Appl* 28, (December 2017), 1011–1022. DOI:https://doi.org/10.1007/s00521-016-2411-8

[251] Juan juan Peng, Jian qiang Wang, and Wu E. Yang. 2017. A multi-valued neutrosophic qualitative flexible approach based on likelihood for multi-criteria decision-making problems. *Int J Syst Sci* 48, 2 (January 2017), 425–435. DOI:https://doi.org/10.1080/00207721.2016.1218975

[252] Juanjuan J. Peng, Jian qiang Wang, Xiao hui Wu, Jing Wang, and Xiao hong Chen. 2015. Multi-valued Neutrosophic Sets and Power Aggregation Operators with Their Applications in Multi-criteria Group Decision-making Problems. *International Journal of Computational Intelligence Systems* 8, 2 (March 2015), 345–363. DOI:https://doi.org/10.1080/18756891.2015.1001957

[253] Juan-juan Peng, Jian-qiang Wang, Hong-yu Zhang, and Xiao-hong Chen. 2014. An outranking approach for multi-criteria decision-making problems with simplified neutrosophic sets. *Appl Soft Comput* 25, (2014), 336–346. DOI:https://doi.org/https://doi.org/10.1016/j.asoc.2014.08.070

[254] Xindong Peng and Wenquan Li. 2019. Algorithms for Interval-Valued Pythagorean Fuzzy Sets in Emergency Decision Making Based on Multiparametric Similarity Measures and WDBA. *IEEE ACCESS* 7, (2019), 7419–7441. DOI:https://doi.org/10.1109/ACCESS.2018.2890097

[255] Xindong Peng and Chong Liu. 2017. Algorithms for neutrosophic soft decision making based on EDAS, new similarity measure and level soft set. *Journal of Intelligent and Fuzzy Systems* 32, 1 (2017), 955–968. DOI:https://doi.org/10.3233/JIFS-161548

[256] Xindong Peng and Lin Liu. 2019. Information measures for q-rung orthopair fuzzy sets. *International Journal of Intelligent Systems* 34, 8 (August 2019), 1795–1834. DOI:https://doi.org/10.1002/int.22115

[257] Pramod Kumar Pisharady, Prahlad Vadakkepat, and Loh Ai Poh. 2014. Computational intelligence in multi-feature visual pattern recognition: Hand posture and face recognition using biologically inspired approaches. *Studies in Computational Intelligence* 556, (2014). DOI:https://doi.org/10.1007/978-981-287-056-8

[258] Dhanasekaran Ponnialagan, Jeevaraj Selvaraj, and Lakshmana Gomathi Nayagam Velu. 2018. A complete ranking of trapezoidal fuzzy numbers and its applications to multi-criteria decision making. *Neural Comput Appl* 30, 11 (December 2018), 3303–3315. DOI:https://doi.org/10.1007/s00521-017-2898-7

[259] Francesc Prats, Llorenç Roselló, Mónica Sánchez, and Núria Agell. 2014. Using L-fuzzy sets to introduce information theory into qualitative reasoning. *Fuzzy Sets Syst* 236, (2014), 73–90. DOI:https://doi.org/10.1016/j.fss.2013.06.013

[260] Guohua Qu, Qianying An, Weihua Qu, Feihu Deng, and Tianjiao Li. 2019. Multiple attribute decision making based on bidirectional projection measures of dual hesitant fuzzy set. *Journal of Intelligent and Fuzzy Systems* 37, 5 (2019), 7087–7102. DOI:https://doi.org/10.3233/JIFS-181970

[261] Guohua Qu, Weihua Qu, Junmei Wang, Haisheng Zhou, and Zengliang Liu. 2018. Factorial-Quality Scalar and an Extension of ELECTRE in Intuitionistic Fuzzy Sets. *Int J Inf Technol Decis Mak* 17, 1 (January 2018), 183–207. DOI:https://doi.org/10.1142/S0219622017500389

[262] Guohua Qua, Yuejiao Lia, Weihua Qub, and Chunhua Lia. 2017. Some new Shapley dual hesitant fuzzy Choquet aggregation operators and their applications to multiple attribute group decision making-based TOPSIS. *Journal of Intelligent and Fuzzy Systems* 33, 4 (2017), 2463–2483. DOI:https://doi.org/10.3233/JIFS-17649

[263] Saifur Rahman. 2016. On cuts of Atanassov’s intuitionistic fuzzy sets with respect to fuzzy connectives. *Inf Sci (N Y)* 340–341, (2016), 262–278. DOI:https://doi.org/https://doi.org/10.1016/j.ins.2016.01.028

[264] A. B. Ramos-Guajardo, A. Colubi, and G. González-Rodríguez. 2014. Inclusion and exclusion hypothesis tests for the fuzzy mean. *Fuzzy Sets Syst* 243, (2014), 70–83. DOI:https://doi.org/10.1016/j.fss.2013.06.015

[265] Ana Belén Ramos-Guajardo, María Asunción Lubiano, and Gil González-Rodríguez. 2013. Bootstrap comparison of statistics for testing the homoscedasticity of random fuzzy sets. In *Advances in Intelligent Systems and Computing*, Springer Verlag, 125–133. DOI:https://doi.org/10.1007/978-3-642-33042-1\_14

[266] Ling Gang Ran. 2021. Models for multiple attribute decision making with dual hesitant pythagorean fuzzy information. *International Journal of Knowledge-Based and Intelligent Engineering Systems* 25, 4 (2021), 413–427. DOI:https://doi.org/10.3233/KES-210085

[267] Pratibha Rani, Arunodaya Raj Mishra, Mohd Dilshad Ansari, and Jabir Ali. 2021. Assessment of performance of telecom service providers using intuitionistic fuzzy grey relational analysis framework (IF-GRA). *Soft comput* 25, 3 (February 2021), 1983–1993. DOI:https://doi.org/10.1007/s00500-020-05269-w

[268] Congjun Rao, Xinping Xiao, Mark Goh, Junjun Zheng, and Jianghui Wen. 2017. Compound mechanism design of supplier selection based on multi-attribute auction and risk management of supply chain. *Comput Ind Eng* 105, (2017), 63–75. DOI:https://doi.org/10.1016/j.cie.2016.12.042

[269] Qun Ren, Luc Baron, and Marek Balazinski. 2008. High order type-2 TSK fuzzy logic system. In *Annual Conference of the North American Fuzzy Information Processing Society - NAFIPS*. DOI:https://doi.org/10.1109/NAFIPS.2008.4531215

[270] Muhammad Riaz, Bijan Davvaz, Atiqa Fakhar, and Atiqa Firdous. 2020. Hesitant fuzzy soft topology and its applications to multi-attribute group decision-making. *Soft comput* 24, 21 (2020), 16269–16289. DOI:https://doi.org/10.1007/s00500-020-04938-0

[271] Muhammad Riaz, Harish Garg, Muhammad Tahir Hamid, and Deeba Afzal. 2022. Modelling uncertainties with TOPSIS and GRA based on q-rung orthopair m-polar fuzzy soft information in COVID-19. *Expert Syst* 39, 5 (June 2022). DOI:https://doi.org/10.1111/exsy.12940

[272] Muhammad Riaz, Khalid Naeem, Muhammad Aslam, Deeba Afzal, Fuad Ali Ahmed Almahdi, and Sajjad Shaukat Jamal. 2020. Multi-criteria group decision making with Pythagorean fuzzy soft topology. *Journal of Intelligent and Fuzzy Systems* 39, 5 (2020), 6703–6720. DOI:https://doi.org/10.3233/JIFS-190854

[273] Yuan Rong, Zheng Pei, and Yi Liu. 2020. Linguistic pythagorean einstein operators and their application to decision making. *Information (Switzerland)* 11, 1 (2020). DOI:https://doi.org/10.3390/info11010046

[274] Jeevaraj S. 2021. Ordering of interval-valued Fermatean fuzzy sets and its applications. *Expert Syst Appl* 185, (2021), 115613. DOI:https://doi.org/10.1016/j.eswa.2021.115613

[275] Sheriff Sadiqbatcha, Saeed Jafarzadeh, and Yiannis Ampatzidis. 2017. Particle Swarm Optimization for Solving a Class of Type-1 and Type-2 Fuzzy Nonlinear Equations. In *2017 IEEE INTERNATIONAL CONFERENCE ON FUZZY SYSTEMS (FUZZ-IEEE)* (IEEE International Conference on Fuzzy Systems), IEEE, 345 E 47TH ST, NEW YORK, NY 10017 USA.

[276] Sriparna Saha, Rimita Lahiri, Amit Konar, Anca L. Ralescu, and Atulya K. Nagar. 2018. Implementation of gesture driven virtual reality for car racing game using back propagation neural network. In *2017 IEEE Symposium Series on Computational Intelligence, SSCI 2017 - Proceedings*, 1–8. DOI:https://doi.org/10.1109/SSCI.2017.8280839

[277] Rdvan Şahin and Peide Liu. 2017. Some approaches to multi criteria decision making based on exponential operations of simplified neutrosophic numbers. *Journal of Intelligent and Fuzzy Systems* 32, 3 (2017), 2083–2099. DOI:https://doi.org/10.3233/JIFS-161695

[278] Rıdvan Şahin. 2017. Cross-entropy measure on interval neutrosophic sets and its applications in multicriteria decision making. *Neural Comput Appl* 28, 5 (2017), 1177–1187. DOI:https://doi.org/10.1007/s00521-015-2131-5

[279] Rıdvan Şahin. 2018. Normal neutrosophic multiple attribute decision making based on generalized prioritized aggregation operators. *Neural Comput Appl* 30, 10 (November 2018), 3095–3115. DOI:https://doi.org/10.1007/s00521-017-2896-9

[280] Rıdvan Şahin and Hong yu Zhang. 2018. Induced simplified neutrosophic correlated aggregation operators for multi-criteria group decision-making. *Journal of Experimental and Theoretical Artificial Intelligence* 30, 2 (March 2018), 279–292. DOI:https://doi.org/10.1080/0952813X.2018.1430857

[281] Muhammad Saqlain, Naveed Jafar, Sana Moin, Muhammad Saeed, and Said Broumi. 2020. Single and Multi-valued Neutrosophic Hypersoft set and Tangent Similarity Measure of Single valued Neutrosophic Hypersoft Sets. *Neutrosophic Sets and Systems* 32, (2020), 317–329. DOI:https://doi.org/10.5281/zenodo.3723165

[282] Arun Sarkar and Animesh Biswas. 2020. Development of Archimedean t-norm and t-conorm-based interval-valued dual hesitant fuzzy aggregation operators with their application in multicriteria decision making. *ENGINEERING REPORTS* 2, 2 (2020). DOI:https://doi.org/10.1002/eng2.12106

[283] Biswajit Sarkar and Animesh Biswas. 2021. Linguistic Einstein aggregation operator-based TOPSIS for multicriteria group decision making in linguistic Pythagorean fuzzy environment. *International Journal of Intelligent Systems* 36, 6 (June 2021), 2825–2864. DOI:https://doi.org/10.1002/int.22403

[284] Biswajit Sarkar and Animesh Biswas. Multicriteria decision making approach for strategy formulation using Pythagorean fuzzy MULTIMOORA. *Expert Syst*. DOI:https://doi.org/10.1111/exsy.12802

[285] Mijanur Rahaman Seikh and Utpal Mandal. 2021. Intuitionistic fuzzy Dombi aggregation operators and their application to multiple attribute decision-making. *Granular Computing* 6, 3 (July 2021), 473–488. DOI:https://doi.org/10.1007/s41066-019-00209-y

[286] Ganeshsree Selvachandran, Shio Gai Quek, Le Hoang Son, Pham Huy Thong, Bay Vo, Tahani A Abdusalam Hawari, and Abdul Razak Salleh. 2022. Relations and compositions between interval-valued complex fuzzy sets and applications for analysis of customers’ online shopping preferences and behavior. *Appl Soft Comput* 114, (2022), 108082. DOI:https://doi.org/https://doi.org/10.1016/j.asoc.2021.108082

[287] Yang Shanghong and Yanbing Ju. 2015. A GRA method for investment alternative selection under dual hesitant fuzzy environment with incomplete weight information. *Journal of Intelligent and Fuzzy Systems* 28, (2015), 1533–1543. DOI:https://doi.org/10.3233/IFS-141436

[288] Yanli Shi and Jinxing Zhao. 2020. The Semantic Classification Approach Base on Neural Networks. *IEEE Access* 8, (2020), 14573–14578. DOI:https://doi.org/10.1109/ACCESS.2020.2966227

[289] Akanksha Singh and Sanjay Kumar. 2021. Picture fuzzy Choquet integral-based VIKOR for multicriteria group decision-making problems. *Granular Computing* 6, 3 (July 2021), 587–601. DOI:https://doi.org/10.1007/s41066-020-00218-2

[290] Prem Kumar Singh. 2018. Three-way n-valued neutrosophic concept lattice at different granulation. *International Journal of Machine Learning and Cybernetics* 9, 11 (November 2018), 1839–1855. DOI:https://doi.org/10.1007/s13042-018-0860-3

[291] Prem Kumar Singh. 2019. Granular-based decomposition of complex fuzzy context and its analysis. *Progress in Artificial Intelligence* 8, 2 (2019), 181–193. DOI:https://doi.org/10.1007/s13748-018-00170-y

[292] Prem Kumar Singh. 2019. Complex Fuzzy Concept Lattice. *Neural Process Lett* 49, 3 (June 2019), 1511–1526. DOI:https://doi.org/10.1007/s11063-018-9884-7

[293] Prem Kumar Singh. 2019. Object and attribute oriented m-polar fuzzy concept lattice using the projection operator. *Granular Computing* 4, 3 (July 2019), 545–558. DOI:https://doi.org/10.1007/s41066-018-0117-2

[294] Surender Singh and Abdul Haseeb Ganie. 2022. Some novel q-rung orthopair fuzzy correlation coefficients based on the statistical viewpoint with their applications. *J Ambient Intell Humaniz Comput* 13, 4 (April 2022), 2227–2252. DOI:https://doi.org/10.1007/s12652-021-02983-7

[295] Surender Singh and Sumita Lalotra. 2018. Generalized correlation coefficients of the hesitant fuzzy sets and the hesitant fuzzy soft sets with application in group decision-making. *JOURNAL OF INTELLIGENT \& FUZZY SYSTEMS* 35, 3 (2018), 3821–3833. DOI:https://doi.org/10.3233/JIFS-18719

[296] Mariya A. Sodenkamp, Madjid Tavana, and Debora Di Caprio. 2018. An aggregation method for solving group multi-criteria decision-making problems with single-valued neutrosophic sets. *Applied Soft Computing Journal* 71, (2018), 715–727. DOI:https://doi.org/10.1016/j.asoc.2018.07.020

[297] Cayetano Solana-Cipres, Luis Benitez, Juan García, Luis Linares, and Gerardo Fernández-Escribano. 2009. Real-Time Segmentation of Moving Objects in H.264 Compressed Domain with Dynamic Design of Fuzzy Sets. 19–24.

[298] Chenyang Song, Zeshui Xu, and Hua Zhao. 2019. New Correlation Coefficients Between Probabilistic Hesitant Fuzzy Sets and Their Applications in Cluster Analysis. *International Journal of Fuzzy Systems* 21, 2 (March 2019), 355–368. DOI:https://doi.org/10.1007/s40815-018-0578-0

[299] Evdokia Sotirova, Todor Petkov, and Maciej Krawczak. 2018. Generalized net modelling of the intuitionistic fuzzy evaluation of the quality assurance in universities. *Advances in Intelligent Systems and Computing* 643, (2018), 341–347. DOI:https://doi.org/10.1007/978-3-319-66827-7\_31

[300] Dragisa Stanujkic, Darjan Karabasevic, Edmundas Zavadskas, Florentin Smarandache, and Willem Brauers. 2019. A Bipolar Fuzzy Extension of the MULTIMOORA Method. (March 2019). DOI:https://doi.org/10.15388/Informatica.2019.201

[301] Bing Zhen Sun and Zeng Tai Gong. 2007. The fuzzy description of the boundary region in rough sets and its applications. In *Proceedings of the Sixth International Conference on Machine Learning and Cybernetics, ICMLC 2007*, 3648–3652. DOI:https://doi.org/10.1109/ICMLC.2007.4370779

[302] Bingzhen Sun, Weimin Ma, and Yuhua Qian. 2017. Multigranulation fuzzy rough set over two universes and its application to decision making. *Knowl Based Syst* 123, (2017), 61–74. DOI:https://doi.org/10.1016/j.knosys.2017.01.036

[303] Qiuye Sun, Zhongxu Li, Jianguo Zhou, and Xue Liang. 2011. Fault diagnosis for smart grid with uncertainty information based on data. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 66–75. DOI:https://doi.org/10.1007/978-3-642-21090-7\_8

[304] Chunfeng Suo, Yongming Li, and Zhihui Li. 2021. A series of information measures of hesitant fuzzy soft sets and their application in decision making. *Soft comput* 25, 6 (2021), 4771–4784. DOI:https://doi.org/10.1007/s00500-020-05485-4

[305] Guolin Tang, Francisco Chiclana, and Peide Liu. 2020. A decision-theoretic rough set model with q-rung orthopair fuzzy information and its application in stock investment evaluation. *Applied Soft Computing Journal* 91, (2020). DOI:https://doi.org/10.1016/j.asoc.2020.106212

[306] Roengchai Tansuchat, Uyen Pham, and Chon Van Le. 2021. On soft computing with random fuzzy sets in econometrics and machine learning. *Soft comput* 25, 12 (June 2021), 7745–7751. DOI:https://doi.org/10.1007/s00500-020-05154-6

[307] Reza Tavakkoli-Moghaddam, Alireza Sotoudeh-Anvari, and Ali Siadat. 2015. A multi-criteria group decision-making approach for facility location selection using PROMETHEE under a fuzzy environment. In *Lecture Notes in Business Information Processing*, Springer Verlag, 145–156. DOI:https://doi.org/10.1007/978-3-319-19515-5\_12

[308] Nguyen Xuan Thao and Florentin Smarandache. 2019. A new fuzzy entropy on Pythagorean fuzzy sets. *Journal of Intelligent and Fuzzy Systems* 37, 1 (2019), 1065–1074. DOI:https://doi.org/10.3233/JIFS-182540

[309] Caichuan Wang and Jiajun Li. 2022. Project investment decision based on VIKOR interval intuitionistic fuzzy set. *JOURNAL OF INTELLIGENT \& FUZZY SYSTEMS* 42, 2 (2022), 623–631. DOI:https://doi.org/10.3233/JIFS-189735

[310] Huidong Wang, Xiaohong Pan, and Shifan He. 2019. A New Interval Type-2 Fuzzy VIKOR Method for Multi-attribute Decision Making. *International Journal of Fuzzy Systems* 21, 1 (February 2019), 145–156. DOI:https://doi.org/10.1007/s40815-018-0527-y

[311] Huidong Wang, Xiaohong Pan, Chuanchao Song, Rong Zhuang, and Honghai Wang. 2017. An Extended VIKOR Method for Multi Attribute Decision Making Under Interval Type-2 Fuzzy Sets Environment. In *2017 INTERNATIONAL CONFERENCE ON FUZZY THEORY AND ITS APPLICATIONS (IFUZZY)* (International Conference on Fuzzy Theory and Its Applications), IEEE, 345 E 47TH ST, NEW YORK, NY 10017 USA.

[312] Jian-Qiang Wang, Su-Min Yu, Jing Wang, Qing-Hui Chen, Hong-Yu Zhang, and Xiao-Hong Chen. 2015. An Interval Type-2 Fuzzy Number Based Approach for Multi-Criteria Group Decision-Making Problems. *INTERNATIONAL JOURNAL OF UNCERTAINTY FUZZINESS AND KNOWLEDGE-BASED SYSTEMS* 23, 4 (2015), 565–588. DOI:https://doi.org/10.1142/S0218488515500257

[313] Jie Wang, Hui Gao, and Guiwu Wei. 2019. The generalized Dice similarity measures for Pythagorean fuzzy multiple attribute group decision making. *International Journal of Intelligent Systems* 34, 6 (June 2019), 1158–1183. DOI:https://doi.org/10.1002/int.22090

[314] Lanjing Wang and Pratibha Rani. 2022. Sustainable supply chains under risk in the manufacturing firms: an extended double normalization-based multiple aggregation approach under an intuitionistic fuzzy environment. *Journal of Enterprise Information Management* 35, 4–5 (June 2022), 1067–1099. DOI:https://doi.org/10.1108/JEIM-05-2021-0222

[315] Ping Wang. 2012. Managing service reputation with vague sets. *Proceedings - 9th IEEE International Conference on E-Business Engineering, ICEBE 2012* (2012), 103–110. DOI:https://doi.org/10.1109/ICEBE.2012.25

[316] Tao Wang, Gexiang Zhang, and Mario J. Pérez-Jiménez. 2015. Fuzzy membrane computing: Theory and applications. *International Journal of Computers, Communications and Control* 10, 6 (2015), 904–935. DOI:https://doi.org/10.15837/ijccc.2015.6.2080

[317] Weiming Wang, Weiwei Lin, Yiming Wen, Xiaozheng Lai, Peng Peng, Yi Zhang, and Keqin Li. 2023. An interpretable intuitionistic fuzzy inference model for stock prediction. *Expert Syst Appl* 213, (2023). DOI:https://doi.org/10.1016/j.eswa.2022.118908

[318] Weizhong Wang, Xinwang Liu, and Jindong Qin. 2019. Risk priorization for failure modes with extended MULTIMOORA method under interval type-2 fuzzy environment. *JOURNAL OF INTELLIGENT \& FUZZY SYSTEMS* 36, 2 (2019), 1417–1429. DOI:https://doi.org/10.3233/JIFS-181007

[319] Yuangang Wang, Xiaodong Duan, Xiaodong Liu, Cunrui Wang, and Zedong Li. 2018. A spectral clustering method with semantic interpretation based on axiomatic fuzzy set theory. *Applied Soft Computing Journal* 64, (2018), 59–74. DOI:https://doi.org/10.1016/j.asoc.2017.12.004

[320] Zhe Wang, Fuyuan Xiao, and Weiping Ding. 2022. Interval-valued intuitionistic fuzzy jenson-shannon divergence and its application in multi-attribute decision making. *APPLIED INTELLIGENCE* 52, 14 (2022), 16168–16184. DOI:https://doi.org/10.1007/s10489-022-03347-0

[321] G. W. Wei. 2009. Some geometric aggregation functions and their application to dynamic multiple attribute decision making in the intuitionistic fuzzy setting. *International Journal of Uncertainty, Fuzziness and Knowlege-Based Systems* 17, 2 (April 2009), 179–196. DOI:https://doi.org/10.1142/S0218488509005802

[322] Guiwu Wei. 2017. Some Cosine Similarity Measures for Picture Fuzzy Sets and Their Applications to Strategic Decision Making. *Informatica (Netherlands)* 28, 3 (2017), 547–564. DOI:https://doi.org/10.15388/Informatica.2017.144

[323] Guiwu Wei, Hui Gao, and Yu Wei. 2018. Some q-rung orthopair fuzzy Heronian mean operators in multiple attribute decision making. *International Journal of Intelligent Systems* 33, 7 (July 2018), 1426–1458. DOI:https://doi.org/10.1002/int.21985

[324] Dongrui Wu. 2014. A reconstruction decoder for computing with words. *Inf Sci (N Y)* 255, (2014), 1–15. DOI:https://doi.org/10.1016/j.ins.2013.08.050

[325] Dongrui Wu and Jerry M. Mendel. 2010. Computing with words for hierarchical decision making applied to evaluating a weapon system. *IEEE Transactions on Fuzzy Systems* 18, 3 (2010), 441–460. DOI:https://doi.org/10.1109/TFUZZ.2010.2043439

[326] Mei Qin Wu, Ting You Chen, and Jian Ping Fan. 2020. Similarity measures of T-Spherical fuzzy sets based on the cosine function and their applications in pattern recognition. *IEEE Access* 8, (2020), 98181–98192. DOI:https://doi.org/10.1109/ACCESS.2020.2997131

[327] Mei Qin Wu, Can Hui Zhang, Xiao Na Liu, and Jian Ping Fan. 2019. Green Supplier Selection Based on DEA Model in Interval-Valued Pythagorean Fuzzy Environment. *IEEE Access* 7, (2019), 108001–108013. DOI:https://doi.org/10.1109/ACCESS.2019.2932770

[328] Min Chao Wu, Jun Jun Mao, Ai Ting Yao, and Tao Wu. 2021. The novel entropy measurements of Z+-numbers and their application on multi-attribute decision making problem. *Journal of Intelligent and Fuzzy Systems* 40, 1 (2021), 131–148. DOI:https://doi.org/10.3233/JIFS-190300

[329] Wei Zhi Wu, Yee Leung, and Wen Xiu Zhang. 2006. On generalized rough fuzzy approximation operators. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, Springer Verlag, 263–284. DOI:https://doi.org/10.1007/11847465\_13

[330] Wei Zhi Wu and Lei Zhou. 2011. On intuitionistic fuzzy topologies based on intuitionistic fuzzy reflexive and transitive relations. *Soft comput* 15, 6 (June 2011), 1183–1194. DOI:https://doi.org/10.1007/s00500-010-0576-0

[331] Xiao hui Wu, Jian qiang Wang, Juan juan Peng, and Xiao hong Chen. 2016. Cross-Entropy and Prioritized Aggregation Operator with Simplified Neutrosophic Sets and Their Application in Multi-Criteria Decision-Making Problems. *International Journal of Fuzzy Systems* 18, 6 (December 2016), 1104–1116. DOI:https://doi.org/10.1007/s40815-016-0180-2

[332] Yizhang Xie, Yue Peng, Serhat Yuksel, Hasan Dincer, Gulsum Sena Uluer, Cagatay Caglayan, and Yi Li. 2020. Consensus-based public acceptance and mapping of nuclear energy investments using spherical and pythagorean fuzzy group decision making approaches. *IEEE Access* 8, (2020), 206248–206263. DOI:https://doi.org/10.1109/ACCESS.2020.3037344

[333] Changlin Xu and Juhong Shen. 2021. Multi-criteria decision making and pattern recognition based on similarity measures for Fermatean fuzzy sets. *JOURNAL OF INTELLIGENT \& FUZZY SYSTEMS* 41, 6 (2021), 5847–5863. DOI:https://doi.org/10.3233/JIFS-201557

[334] Abdul Malek Yaakob, Alexander Gegov, and Siti Fatimah Abdul Rahman. 2018. Selection of alternatives using fuzzy networks with rule base aggregation. *Fuzzy Sets Syst* 341, (2018), 123–144. DOI:https://doi.org/10.1016/j.fss.2017.05.027

[335] Jilin Yang and Yiyu Yao. 2021. A three-way decision based construction of shadowed sets from Atanassov intuitionistic fuzzy sets. *Inf Sci (N Y)* 577, (March 2021). DOI:https://doi.org/10.1016/j.ins.2021.06.065

[336] Jinxin Yang, Dongxiao Gu, Shanlin Yang, Kongchun Mei, and Yunxia Cao. 2022. MAGDM in hesitant interval-valued Pythagorean linguistic Z-number based on combined score function and entropy. *International Journal of Machine Learning and Cybernetics* 13, 10 (October 2022), 3173–3198. DOI:https://doi.org/10.1007/s13042-022-01587-7

[337] Wei Yang, Jiarong Shi, Yongfeng Pang, and Xiuyun Zheng. 2018. Linear assignment method for interval neutrosophic sets. *Neural Comput Appl* 29, 9, SI (2018), 553–564. DOI:https://doi.org/10.1007/s00521-016-2575-2

[338] Xiaopeng Yang, Khizar Hayat, Muhammad Saeed Raja, Naveed Yaqoob, and Chiranjibe Jana. 2022. Aggregation and Interaction Aggregation Soft Operators on Interval-Valued q-Rung Orthopair Fuzzy Soft Environment and Application in Automation Company Evaluation. *IEEE Access* 10, (2022), 91424–91444. DOI:https://doi.org/10.1109/ACCESS.2022.3202211

[339] Xiaoping Yang, Tongjun Li, and Anhui Tan. 2020. Three-way decisions in fuzzy incomplete information systems. *International Journal of Machine Learning and Cybernetics* 11, 3 (March 2020), 667–674. DOI:https://doi.org/10.1007/S13042-019-01025-1

[340] Yu Yang, Jian-Qiang Qiang Jing Wang, and Jian-Qiang Qiang Jing Wang. 2020. A VIKOR-based framework to optimize the location of fast-charging stations with proportional hesitant fuzzy information. *JOURNAL OF INTELLIGENT \& FUZZY SYSTEMS* 39, 3 (2020), 2581–2596. DOI:https://doi.org/10.3233/JIFS-190156

[341] Zaoli Yang and Jinping Chang. 2020. Interval-Valued Pythagorean Normal Fuzzy Information Aggregation Operators for Multi-Attribute Decision Making. *IEEE Access* 8, (2020), 51295–51314. DOI:https://doi.org/10.1109/ACCESS.2020.2978976

[342] Ozgur Yanmaz, Yakup Turgut, Emine Nisa Can, and Cengiz Kahraman. 2020. Interval-valued Pythagorean Fuzzy EDAS method: An Application to Car Selection Problem. *Journal of Intelligent & Fuzzy Systems* 38, 4 (2020), 4061–4077. DOI:https://doi.org/10.3233/jifs-182667

[343] Jun Ye. 2014. A multicriteria decision-making method using aggregation operators for simplified neutrosophic sets. *Journal of Intelligent and Fuzzy Systems* 26, 5 (2014), 2459–2466. DOI:https://doi.org/10.3233/IFS-130916

[344] Jun Ye. 2014. Improved correlation coefficients of single valued neutrosophic sets and interval neutrosophic sets for multiple attribute decision making. *Journal of Intelligent and Fuzzy Systems* 27, 5 (2014), 2453–2462. DOI:https://doi.org/10.3233/IFS-141215

[345] Jun Ye. 2014. Multiple attribute group decision-making method with completely unknown weights based on similarity measures under single valued neutrosophic environment. *Journal of Intelligent and Fuzzy Systems* 27, 6 (2014), 2927–2935. DOI:https://doi.org/10.3233/IFS-141252

[346] Jun Ye. 2015. Improved cosine similarity measures of simplified neutrosophic sets for medical diagnoses. *Artif Intell Med* 63, 3 (2015), 171–179. DOI:https://doi.org/10.1016/j.artmed.2014.12.007

[347] Jun Ye. 2016. Correlation Coefficients of Interval Neutrosophic Hesitant Fuzzy Sets and Its Application in a Multiple Attribute Decision Making Method. *INFORMATICA* 27, 1 (2016), 179–202. DOI:https://doi.org/10.15388/Informatica.2016.81

[348] Mojtaba Yeganejou and Scott Dick. 2017. Inductive learning of classifiers via complex fuzzy sets and logic. In *IEEE International Conference on Fuzzy Systems*. DOI:https://doi.org/10.1109/FUZZ-IEEE.2017.8015687

[349] Chen Yiyan, Li Ye, and Li Cunjin. 2020. Research on the multiple fuzzy parametric fuzzy sets and its framework of clustering algorithm. *Evol Intell* 13, 2 (June 2020), 159–183. DOI:https://doi.org/10.1007/s12065-020-00354-3

[350] Yuji Yoshida. 1998. The recurrence of dynamic fuzzy systems. *Fuzzy Sets Syst* 95, 3 (1998), 319–332. DOI:https://doi.org/https://doi.org/10.1016/S0165-0114(96)00252-7

[351] Bin Yu, Lankun Guo, and Qingguo Li. 2019. A characterization of novel rough fuzzy sets of information systems and their application in decision making. *Expert Syst Appl* 122, (2019), 253–261. DOI:https://doi.org/10.1016/j.eswa.2019.01.018

[352] Dejian Yu. 2014. Some generalized dual hesistant fuzzy geometric aggregation operators and applications. *International Journal of Uncertainty, Fuzziness and Knowlege-Based Systems* 22, 3 (2014), 367–384. DOI:https://doi.org/10.1142/S0218488514500184

[353] Dejian Yu. 2015. Archimedean Aggregation Operators Based on Dual Hesitant Fuzzy Set and Their Application to GDM. *International Journal of Uncertainty, Fuzziness and Knowlege-Based Systems* 23, 5 (October 2015), 761–780. DOI:https://doi.org/10.1142/S0218488515500336

[354] Xiujiu Yuan, Jiang Li, and Xuejun Zhao. 2017. Typical Interval-valued Hesitant Fuzzy Probability. In *2017 13TH INTERNATIONAL CONFERENCE ON NATURAL COMPUTATION, FUZZY SYSTEMS AND KNOWLEDGE DISCOVERY (ICNC-FSKD)*, IEEE, 345 E 47TH ST, NEW YORK, NY 10017 USA.

[355] Chuan Yue. 2019. An interval-valued intuitionistic fuzzy projection-based approach and application to evaluating knowledge transfer effectiveness. *Neural Comput Appl* 31, 11 (2019), 7685–7706. DOI:https://doi.org/10.1007/s00521-018-3571-5

[356] Yuqi Zang, Wei Sun, and Siying Han. 2017. Grey relational projection method for multiple attribute decision making with interval-valued dual hesitant fuzzy information. *JOURNAL OF INTELLIGENT \& FUZZY SYSTEMS* 33, 2 (2017), 1053–1066. DOI:https://doi.org/10.3233/JIFS-162422

[357] Yuqi Zang, Xiaodong Zhao, and Shiyong Li. 2018. Interval-Valued Dual Hesitant Fuzzy Heronian Mean Aggregation Operators and their Application to Multi-Attribute Decision Making. *Int J Comput Intell Appl* 17, 1 (2018). DOI:https://doi.org/10.1142/S1469026818500050

[358] Rosana Zanotelli, Bruno Moura, Renata Reiser, and Benjamin Bedregal. 2022. On the residuation principle of n-dimensional R-implications. *Soft comput* 26, 17 (September 2022), 8403–8426. DOI:https://doi.org/10.1007/s00500-022-07221-6

[359] Jia Zeng and Zhi Qiang Liu. 2004. Type-2 fuzzy hidden Markov models to phoneme recognition. In *Proceedings - International Conference on Pattern Recognition*, 192–195. DOI:https://doi.org/10.1109/icpr.2004.1334056

[360] Shouzhen Zeng, Jianping Chen, and Xingsen Li. 2016. A hybrid method for pythagorean fuzzy multiple-criteria decision making. *Int J Inf Technol Decis Mak* 15, 2 (March 2016), 403–422. DOI:https://doi.org/10.1142/S0219622016500012

[361] Wenyi Zeng, Deqing Li, and Qian Yin. 2016. Distance and similarity measures between hesitant fuzzy sets and their application in pattern recognition. *Pattern Recognit Lett* 84, (2016), 267–271. DOI:https://doi.org/10.1016/j.patrec.2016.11.001

[362] Wenyi Zeng, Deqing Li, and Qian Yin. 2018. Distance and similarity measures of Pythagorean fuzzy sets and their applications to multiple criteria group decision making. *International Journal of Intelligent Systems* 33, 11 (November 2018), 2236–2254. DOI:https://doi.org/10.1002/int.22027

[363] Daoyuan Zhai and Jerry M. Mendel. 2011. Computing the centroid of a general type-2 fuzzy set by means of the centroid-flow algorithm. *IEEE Transactions on Fuzzy Systems* 19, 3 (2011), 401–422. DOI:https://doi.org/10.1109/TFUZZ.2010.2103076

[364] Junhai Zhai and Sufang Zhang. 2018. Three-way decisions model based on rough fuzzy set. *Journal of Intelligent and Fuzzy Systems* 34, 3 (2018), 2051–2059. DOI:https://doi.org/10.3233/JIFS-17888

[365] Junhai Zhai, Yao Zhang, and Hongyu Zhu. 2017. Three-way decisions model based on tolerance rough fuzzy set. *International Journal of Machine Learning and Cybernetics* 8, 1 (February 2017), 35–43. DOI:https://doi.org/10.1007/s13042-016-0591-2

[366] Chao Zhang, Deyu Li, Xiangping Kang, Dong Song, Arun Kumar Sangaiah, and Said Broumi. 2020. Neutrosophic fusion of rough set theory: An overview. *Comput Ind* 115, (2020). DOI:https://doi.org/10.1016/j.compind.2019.07.007

[367] Chao Zhang, Deyu Li, Yanhui Zhai, and Yuanhao Yang. 2019. Multigranulation rough set model in hesitant fuzzy information systems and its application in person-job fit. *INTERNATIONAL JOURNAL OF MACHINE LEARNING AND CYBERNETICS* 10, 4 (2019), 717–729. DOI:https://doi.org/10.1007/s13042-017-0753-x

[368] Chonghui Zhang, Chao Chen, Dalia Streimikiene, and Tomas Balezentis. 2019. Intuitionistic fuzzy MULTIMOORA approach for multi-criteria assessment of the energy storage technologies. *Applied Soft Computing Journal* 79, (2019), 410–423. DOI:https://doi.org/10.1016/j.asoc.2019.04.008

[369] Geng Zhang and Han Xiong Li. 2011. An unified intelligent inference framework for complex modeling and classification. In *Conference Proceedings - IEEE International Conference on Systems, Man and Cybernetics*, 1837–1842. DOI:https://doi.org/10.1109/ICSMC.2011.6083938

[370] Geng Zhang and Han Xiong Li. 2012. An efficient configuration for probabilistic fuzzy logic system. *IEEE Transactions on Fuzzy Systems* 20, 5 (2012), 898–909. DOI:https://doi.org/10.1109/TFUZZ.2012.2188897

[371] Geng Zhang, Han Xiong Li, and Min Gan. 2012. Design a wind speed prediction model using probabilistic fuzzy system. *IEEE Trans Industr Inform* 8, 4 (2012), 819–827. DOI:https://doi.org/10.1109/TII.2012.2205392

[372] Haidong Zhang and Yanping He. 2018. A rough set-based method for dual hesitant fuzzy soft sets based on decision making. *Journal of Intelligent and Fuzzy Systems* 35, 3 (2018), 3437–3450. DOI:https://doi.org/10.3233/JIFS-17456

[373] Lishi Zhang. 2017. A Novel Similarity Measure and Its Application in Medical Diagnosis under Intuitionistic Fuzzy Settings. *Proceedings of the 2016 7th International Conference on Education, Management, Computer and Medicine (EMCM 2016)* 59, (2017). DOI:https://doi.org/10.2991/emcm-16.2017.87

[374] Peiwen Zhang, Zhifu Tao, Jinpei Liu, Feifei Jin, and Junting Zhang. 2020. An ELECTRE TRI-based outranking approach for multi-attribute group decision making with picture fuzzy sets. *Journal of Intelligent & Fuzzy Systems* 38, 4 (2020), 4855–4868. DOI:https://doi.org/10.3233/jifs-191540

[375] Qiang Zhang, Junhua Hu, Jinfu Feng, and An Liu. 2020. Multiple criteria decision making method based on the new similarity measures of Pythagorean fuzzy set. *Journal of Intelligent and Fuzzy Systems* 39, 1 (2020), 809–820. DOI:https://doi.org/10.3233/JIFS-191723

[376] Shanshan Zhang, Guiwu Wei, Rui Lin, and Xudong Chen. 2022. Cumulative prospect theory integrated CRITIC and TOPSIS methods for intuitionistic fuzzy multiple attribute group decision making. *Journal of Intelligent and Fuzzy Systems* 43, 6 (2022), 7793–7806. DOI:https://doi.org/10.3233/JIFS-220638

[377] Wenkai Zhang, Yanbing Ju, and Xiaoyue Liu. 2017. Multiple criteria decision analysis based on Shapley fuzzy measures and interval-valued hesitant fuzzy linguistic numbers. *Comput Ind Eng* 105, (2017), 28–38. DOI:https://doi.org/10.1016/j.cie.2016.12.046

[378] Xian Xia Zhang, Jiajia Li, Ye Jiang, Baili Su, Chenkun Qi, and Tao Zou. 2012. Fuzzy clustering based spatiotemporal fuzzy logic controller design. In *Proceedings of the World Congress on Intelligent Control and Automation (WCICA)*, 3167–3172. DOI:https://doi.org/10.1109/WCICA.2012.6358417

[379] Xianxia Zhang, Shaoyuan Li, and Hanxiong Li. 2010. Structure and BIBO stability of a three-dimensional fuzzy two-term control system. *Math Comput Simul* 80, 10 (2010), 1985–2004. DOI:https://doi.org/10.1016/j.matcom.2010.02.009

[380] Xianxia Zhang, Meng Sun, and Guitao Cao. 2010. BIBO stability of spatial-temporal fuzzy control system. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 313–323. DOI:https://doi.org/10.1007/978-3-642-15621-2\_35

[381] Xiaolu Zhang and Zeshui Xu. 2014. The Extended TOPSIS Method for Multi-criteria Decision Making Based on Hesitant Heterogeneous Information. DOI:https://doi.org/10.2991/sekeie-14.2014.19

[382] Xinrui Zhang and Bingzhen Sun. 2022. Inclusion degree-based multigranulation rough fuzzy set over heterogeneous preference information and application to multiple attribute group decision making. *Soft comput* 26, 15 (August 2022), 7355–7375. DOI:https://doi.org/10.1007/s00500-022-07027-6

[383] Yangjingyu Zhang, Guiwu Wei, Yanfeng Guo, and Cun Wei. 2021. TODIM method based on cumulative prospect theory for multiple attribute group decision-making under 2-tuple linguistic Pythagorean fuzzy environment. *International Journal of Intelligent Systems* 36, 6 (June 2021), 2548–2571. DOI:https://doi.org/10.1002/int.22393

[384] Z Zhang, C Wu - Knowledge-Based Systems, and undefined 2014. On the use of multiplicative consistency in hesitant fuzzy linguistic preference relations. *Elsevier*. Retrieved March 10, 2023 from https://www.sciencedirect.com/science/article/pii/S0950705114003268?casa\_token=Dn75F5ig4fAAAAAA:2aWCJz-O-SDCcc79GkMXMArIkjpv33362lxO-VJm2vHVobK3yoXD5oKOzt22\_VuOobrWEeTR

[385] Zhiming Zhang. 2020. Maclaurin symmetric means of dual hesitant fuzzy information and their use in multi-criteria decision making. *GRANULAR COMPUTING* 5, 2 (2020), 251–275. DOI:https://doi.org/10.1007/s41066-018-00152-4

[386] Zhiming Zhang, Chao Wang, Dazeng Tian, and Kai Li. 2014. Induced generalized hesitant fuzzy operators and their application to multiple attribute group decision making. *Comput Ind Eng* 67, 1 (2014), 116–138. DOI:https://doi.org/10.1016/j.cie.2013.10.011

[387] Feng Zhao, Hao Hao, and Hanqiang Liu. 2022. Robust intuitionistic fuzzy clustering with bias field estimation for noisy image segmentation. *Intelligent Data Analysis* 26, 5 (2022), 1403–1426. DOI:https://doi.org/10.3233/IDA-216058

[388] Hao Zhao, Jian-Xin You, and Hu-Chen Liu. 2017. Failure mode and effect analysis using MULTIMOORA method with continuous weighted entropy under interval-valued intuitionistic fuzzy environment. *Soft comput* 21, 18, SI (2017), 5355–5367. DOI:https://doi.org/10.1007/s00500-016-2118-x

[389] Yu Jun Zheng, Wei Guo Sheng, Xing Ming Sun, and Sheng Yong Chen. 2017. Airline Passenger Profiling Based on Fuzzy Deep Machine Learning. *IEEE Trans Neural Netw Learn Syst* 28, 12 (2017), 2911–2923. DOI:https://doi.org/10.1109/TNNLS.2016.2609437

[390] Jianlan Zhong, Xuelong Hu, Serhat Yuksel, Hasan Dincer, and Gozde Gulseven Ubay. 2020. Analyzing the Investments Strategies for Renewable Energies Based on Multi-Criteria Decision Model. *IEEE ACCESS* 8, (2020), 118818–118840. DOI:https://doi.org/10.1109/ACCESS.2020.3005064

[391] Yanru Zhong, Xiuyan Guo, Hong Gao, Yuchu Qin, Meifa Huang, and Xiaonan Luo. 2019. A new multi-criteria decision-making method based on Pythagorean hesitant fuzzy Archimedean Muirhead mean operators. *Journal of Intelligent and Fuzzy Systems* 37, 4 (2019), 5551–5571. DOI:https://doi.org/10.3233/JIFS-190704

[392] Huan Zhou, Jian Qiang Wang, Hong Yu Zhang, and Xiao Hong Chen. 2016. Linguistic hesitant fuzzy multi-criteria decision-making method based on evidential reasoning. *Int J Syst Sci* 47, 2 (January 2016), 314–327. DOI:https://doi.org/10.1080/00207721.2015.1042089

[393] Lei Zhou and Wei Zhi Wu. 2008. On generalized intuitionistic fuzzy rough approximation operators. *Inf Sci (N Y)* 178, 11 (2008), 2448–2465. DOI:https://doi.org/10.1016/j.ins.2008.01.012

[394] Lei Zhou, Wei Zhi Wu, and Wen Xiu Zhang. 2009. On characterization of intuitionistic fuzzy rough sets based on intuitionistic fuzzy implicators. *Inf Sci (N Y)* 179, 7 (2009), 883–898. DOI:https://doi.org/10.1016/j.ins.2008.11.015

[395] Chuanxi Zhu, Li Zhu, and Xiaozhi Zhang. 2016. Linguistic hesitant fuzzy power aggregation operators and their applications in multiple attribute decision-making. *Inf Sci (N Y)* 367, (2016), 809–826. DOI:https://doi.org/10.1016/j.ins.2016.07.011

[396] Jianghong Zhu, Rui Wang, and Yanlai Li. 2018. Failure mode and effects analysis considering consensus and preferences interdependence. *Algorithms* 11, 4 (2018). DOI:https://doi.org/10.3390/a11040034

[397] S. Zolfaghari and S. Meysam Mousavi. 2018. Construction-project risk assessment by a new decision model based on De-Novo multi-approaches analysis and hesitant fuzzy sets under uncertainty. *Journal of Intelligent and Fuzzy Systems* 35, 1 (2018), 639–649. DOI:https://doi.org/10.3233/JIFS-162013

[398] Wen Zou, Chaoshun Li, and Nan Zhang. 2018. A T-S Fuzzy Model Identification Approach Based on a Modified Inter Type-2 FRCM Algorithm. *IEEE Transactions on Fuzzy Systems* 26, 3 (2018), 1104–1113. DOI:https://doi.org/10.1109/TFUZZ.2017.2704542

[399] Rana Muhammad Zulqarnain, Xiao Long Xin, Harish Garg, and Rifaqat Ali. 2021. Interaction aggregation operators to solve multi criteria decision making problem under pythagorean fuzzy soft environment. *Journal of Intelligent and Fuzzy Systems* 41, 1 (2021), 1151–1171. DOI:https://doi.org/10.3233/JIFS-210098

[400] Rana Muhammad Zulqarnain, Xiao Long Xin, Harish Garg, and Waseem Asghar Khan. 2021. Aggregation operators of Pythagorean fuzzy soft sets with their application for green supplier chain management. *Journal of Intelligent and Fuzzy Systems* 40, 3 (2021), 5545–5563. DOI:https://doi.org/10.3233/JIFS-202781