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Applications of Neutrosophic Set Theory in an Industry for Distribution of Projects and Its Maple Implementation

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Abstract: In this paper, we proposed the average composition relation method (ACRM) using the notion of neutrosophic set (NFS) operations and composition relations to identify the suitable contractors for allotment of projects. Identifying suitable contractors in any industry is not only based on bid price. Before allowing the bid price, we want to ensure the prequalification criteria, which affect non-price related factors like design, quality, time management, experience, and financial problems. We cannot measure these factors qualitatively in classical mathematics because it is imprecise, vague and uncertain in nature. The expectations of the selection of contractors and the project criteria are recorded via a neutrosophic set and the projects' allotment is effectively done in two stages. The proposed algorithm is validated through a case study. The implementation of the proposed algorithm in Maple is also discussed and sample computations are presented.

Keywords: neutrosophic sets; neutrosophic relations; composition relations; maple programming; fuzzy approach methods; distribution of projects in industry; applications of neutrosophic set theory; multi-criteria decision making.

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References:

[1]. Atanassov, K.: Intuitionistic Fuzzy Sets, Fuzzy Sets and Systems 20, (1986) 87-96.
[2]. Ahmet calik: A Multi-Criteria Evaluation for Sustainable Supplier Selection Based on Fuzzy Sets, Business and Economics Research Journal 10 (1), 2019, 95-113.
[3]. Deli, I.; Toktas, Y; Broumi, S.: Neutrosophic Parameterized Soft Relations and Their Applications, Neutrosophic Sets and Systems, 4 (2014), 25-34.
[4]. Kolekar, P. B.; Kanade, G. N.: Project Allotment in Any Industry using Fuzzy-Logic System, International Journal of Engineering Research \& Technology, 3 (1) (2014), 1-9.
[5]. Shanmugasundaram, P.; Seshaiah, C. V.; Rathi, K.Revised Max-Min Average Composition Method for Decision Making Using Intuitionistic Fuzzy Soft Matrix Theory. Advances in Fuzzy Systems. ID 864074 (2014), 5 Pages.
[6]. Smarandache, F.: Neutrosophic set-a generalization of the intuitionistic fuzzy set, International Journal of Pure and Applied Mathematics, 24(3) (2005), 287-297.
[7]. Wang, H.; Smarandache, F.; Zhang, Y. Q.; Sunderraman. R.: Single valued neutrosophic sets. Multispace and Multistructure, 4 (2010), 410-413.
[8]. Yildiray Celik: A Model for Medical Diagnosis via Fuzzy Neutrosophic Soft Sets, Asian Journal of Mathematics and Computer Research, 10(1) (2016), 60-68.

[9]. Smarandache, F.: A Unifying Field in Logics. Neutrosophy: Neutrosophic Probability, Set and Logic. Rehoboth: American Research Press (1999).

[10]. Hatush; Zedan; Skitmore; Martin, R: Criteria for contractor selection. Construction Management and Economics 15(1) (1997), 19-38.

[11]. Ekambaram, P.; Kumaraswamy, M.: Contractor selection for design/build projects, Journal of construction engineering and management, 126 (5) (2000), 331-339.

[12]. Gholipour, R.; Jandaghi, G.; Rajaei, R.: Contractor selection in MCDM context using fuzzy AHP, Iranian Journal of Management Studies, 7 (1) (2014), 151-173.

[13]. Erdogan, S. A.; Saparauskas, J.; Turskis, Z.: A Multi-Criteria Decision-Making Model to Choose the Best Option for Sustainable Construction Management,MDPI journal of Sustainability, 11 (2019), 22-39.

[14]. Zadeh, L. A.: Fuzzy sets, Information and Control, 8 (1965), 338-353.

[15]. Kumar, S. S.; Raja, P.; Shanmugasundram, P.; Thota, S: A New Method to Solving Generalized Fuzzy Transportation Problem-Harmonic Mean Method, International journal of Chemistry, Mathematics and Physics, 4 (3) (2020), 51-56.

[16]. Thota, S; Raja, P:New Method for Finding an Optimal Solution of Generalized Fuzzy Transportation Problems, Asian Journal of Mathematical Sciences, 4 (2) (2020), 19-24.

[17]. Samuel, A. E.; Raja, P.; Thota, S.: A New Technique for Solving Unbalanced Intuitionistic Fuzzy Transportation Problems, Applied Mathematics & Information Sciences, 14 (3) (2020), 459-465.