# Rough n,m-Rung Orthopair Fuzzy Sets

**Fatih Karamaz[[1]](#footnote-1)\***

**Department of Mathematics, Faculty of Sciences, Çankırı Karatekin University, 18100, Çankırı, Turkey**

**0000-0002-4184-1848**

**Faruk Karaaslan**

**Department of Mathematics, Faculty of Sciences, Çankırı Karatekin University, 18100, Çankırı, Turkey**

**0000-0002-0836-6264**

|  |
| --- |
| **ABSTRACT**  A rough set approximates a subset of a universal set based on some binary relation and is significant for the reduction of attributes in an information system. An n,m-Rung orthopair fuzzy set provides information about the extent of truthness and falsity of a statement. Both of these theories deal with different forms of uncertainty and can be combined to get their combined benefits. In this paper, we define the concept of rough n,m-Rung orthopair fuzzy sets by combining rough sets and n,m-Rung orthopair fuzzy sets. We also discuss some relationships related to the defined concept. This model can encapsulate two distinct types of uncertainties that appear in imprecise available data through the approximation of n,m-Rung orthopair fuzzy sets in crisp approximation space.  **References:**  [1] Zadeh, L. A. (1965). Fuzzy Sets. *Information and Control*, 8, 338-353.  [2] Pawlak, Z. (1982). Rough sets. *International Journal of Computer and Information Science*, 11, 341-356.  [3] Yager, R. R. (2016). Generalized Orthopair Fuzzy Sets. *IEEE Transactions on Fuzzy Systems*, 99, 1-11.  [4] Ibrahim, H. Z. and Alshammari, I. (2022). n,m-Rung Orthopair Fuzzy Sets With Applications to Multicriteria Decision Making. *IEEE Access*, 10, 99562-99572.  [5] Sarwar, M. (2022). A theoretical investigation based on the rough approximations of hypergraphs. *Journal of Mathematics*, 2022, 1540004.  [6] Skowron, A., and Dutta, S. (2018). Rough sets: past, present and future. *Natural Computing*, 17, 855-876.  [7] Tsumoto, S. (1998). Automated extraction of medical expert system rules from clinical databases based on rough set theory. *Information Sciences*, 112, 67-84.  [8] Zhang, Q., Xie, Q., and Wang, G. (2016). A survey on rough set theory and its applications. *CAAI Transactions on Intelligence and Technology*, 1, 323-333.  [9] Atanassov, K.T. (1986). Intuitionistic fuzzy sets. *Fuzzy Sets Syst.*, 20(1), 87-96.  [10] Yager, R.R. (2013). Pythagorean fuzzy subsets. *In: Proceedings of Joint IFSA World Congress and NAFIPS Annual Meeting*, Edmonton, Canada, 57--61. |

# Keywords: Rough n,m-Rung orthopair fuzzy set, n,m-Rung orthopair fuzzy set, Rough set, q-Rung orthopair fuzzy set, Fuzzy set

1. \* Corresponding author. *e-mail address: karamaz@karamaz.com* [↑](#footnote-ref-1)