

---

# THE HYBRID DECISION-MAKING MODEL WITH THE NEW FERMATEAN FUZZY ENTROPY MEASURE

---

Murat Kirisci<sup>1,\*</sup>

<sup>1</sup>*Istanbul University-Cerrahpasa, Department of Biostatistics and Medical Informatics, Istanbul, Türkiye*

## ABSTRACT

This paper proposes a new Fermatean fuzzy entropy for Fermatean fuzzy sets. Fermatean fuzzy entropy determines the quantity of information in the Fermatean fuzzy set. Thus, the proposed entropy provides a new, flexible, valuable tool in complex multi-criteria problems where uncertain data and inaccurate information are considered. In this study, an integrated multi-criteria decision-making method consisting of entropy, the "Pivot Pairwise Relative Criteria Importance Assessment", and "Measurement of Alternatives and Ranking according to Compromise Solution" methods based on a Fermatean fuzzy set is presented.

**Keywords** Entropy · Fermatean fuzzy set · decision-making

## References

- [1] Aytakin A., Gorcun O.F., Ecer F., Pamucar D., Karamasa C. Evaluation of the pharmaceutical distribution and warehousing companies through an integrated Fermatean fuzzy entropy-WASPAS approach, *Kybernetes*, 52:5561–5592, 2022
- [2] Chang K.-H., Chung H.-Y., Wang C.-N., Lai Y.-D., Wu, C.-H. A New Hybrid Fermatean Fuzzy Set and Entropy Method for Risk Assessment. *Axioms* 12:58, 2023.
- [3] Gandotra N., Kizielewicz B., Anand A., Baczkiewicz A., Shekhovtsov A., Watrobski J., Rezai A., Salabun W. New Pythagorean Entropy Measure with Application in Multi-Criteria Decision Analysis, *Entropy*, 23:1600, 2021.
- [4] Kirisci M. MedicalWaste Management Based on an Interval-Valued Fermatean Fuzzy Decision-Making Method, *Journal of Mathematical Sciences and Modelling*, 7(3):127–144, 2024.
- [5] Kirisci M. Fermatean fuzzy type a three-way correlation coefficients. In: Gayoso Martinez, V., Yilmaz, F., Queiruga-Dios, A., Rasteiro, D.M., Martin-Vaquero, J., Mierlus, Mazilu, I. (eds) *Mathematical Methods for Engineering Applications, ICMASE 2023. Springer Proceedings in Mathematics & Statistics*, 499:325–338, 2024

---

\*Corresponding Author's E-mail: [murat.kirisci@iuc.edu.tr](mailto:murat.kirisci@iuc.edu.tr)