

## ROUGHNESS AND SIMILARITY MEASURE OF ROUGH NEUTROSOPHIC MULTISSETS USING VECTORIAL MODEL OF INFORMATION

(Ukuran Kekasaran dan Keserupaan bagi Multiset Neutrosopik Kasar  
Menggunakan Model Maklumat Vektoran)

SURIANA ALIAS\*, DAUD MOHAMAD & ADIBAH SHUIB

### ABSTRACT

The roughness and similarity measure for two different information in the same universal set is useful in explaining the strength and completeness of the information given. Then, for rough neutrosophic multisets environment, the lower and upper approximation was a concerned property to study in explaining the roughness of the information needed. Meanwhile, the vectorial models of information which are cosine measure and dice measure represent the result for the similarity measure of rough neutrosophic multisets. The finding of this set theory gives a new generalization about similarity measure for multiple information involving indeterminacy information in the same environment. Besides that, the rough neutrosophic multisets theory also applicable set-in decision making for medical diagnosis. The comparison result showed that the roughness approximation of information is essential to get the best result in a close similarity measure.

*Keywords:* rough neutrosophic multisets; roughness; similarity measure

### ABSTRAK

Pengukuran kekasaran dan keserupaan untuk dua maklumat yang berbeza dalam set sejagat yang sama adalah penting untuk menjelaskan kekuatan dan kesempurnaan maklumat yang diberikan. Bagi multiset neutrosopik kasar, nilai penghampiran bawah dan atas adalah sifat yang bersangkutan dalam menjelaskan kekasaran maklumat yang diperlukan. Sementara itu, model maklumat vektoran, iaitu ukuran kosinus dan ukuran dadu mewakili keputusan untuk ukuran keserupaan multiset neutrosopik kasar. Penemuan teori set ini memberikan penjelmaan baharu mengenai ukuran keserupaan untuk pelbagai maklumat yang melibatkan maklumat ketidakpastian dalam set sejagat yang sama. Di samping itu, teori multiset neutrosopik kasar juga diaplikasikan dalam membuat keputusan untuk diagnosis perubatan. Hasil perbandingan menunjukkan bahawa penganggaran kekasaran maklumat adalah penting untuk mendapatkan hasil terbaik bagi ukuran keserupaan yang paling hampir.

*Kata kunci:* multiset neutrosopik kasar; kekasaran; ukuran keserupaan

### References

- Abdel-Baset M., Hezam I. M. & Smarandache F. 2016. Neutrosophic goal programming. *Journal of New Theory* **11**: 112-118.
- Al-Quran A. & Hassan N. 2016. Neutrosophic vague soft expert set theory. *Journal of Intelligent & Fuzzy Systems* **30**(6): 3691-3702.
- Ali M. & Smarandache F. 2016. Complex neutrosophic set. *Neural Computing and Applications* **3**: 1-18.
- Alias S., Mohamad D. & Shuib A. 2017. Rough neutrosophic multisets. *Neutrosophic Sets and Systems* **16**: 80-88.
- Alkhazaleh S. 2016. Time-neutrosophic soft set and its applications. *Journal of Intelligent & Fuzzy Systems* **30**(2): 1087-1098.
- Atanassov K.T. 1983. Intuitionistic fuzzy set. *Fuzzy Sets and Systems* **20**: 87-96
- Broumi S. & Smarandache F. 2014. Neutrosophic refined similarity measure based on cosine function. *neutrosophic*

---

The study reported in this paper was presented at the 27th National Symposium on Mathematical Sciences (SKSM27) at Hotel Tenera, Bangi, Selangor on 26 - 27 November 2019, organised by Department of Mathematics, Faculty of Science, Universiti Putra Malaysia.

- sets and systems. *Global Journal of Advanced Research* **6**: 4-10.
- Broumi S., Smarandache F. & Dhar M. 2014. Rough neutrosophic sets. *Italian Journal of Pure and Applied Mathematics* **32**: 493-502.
- Broumi S., Talea M., Bakali A. & Smarandache F. 2016. On bipolar single valued neutrosophic graph. *Journal of New Theory* **11**: 84-102
- Dubois D. & Prade H. 1990. Rough fuzzy sets and fuzzy rough sets. *International Journal of General Systems* **17**(2-3): 191-209.
- Karaaslan F. 2015. Multicriteria decision making method based on similarity measures under single-valued neutrosophic refined and interval neutrosophic refined environments. *International Journal of Intelligent Systems* **33**(5): 928-952.
- Maji P.K. 2013. Neutrosophic soft set. *Annals of Fuzzy Mathematics and Informatics* **5**(1): 157-168.
- Mandal D. 2015. Comparative study of intuitionistic and generalized neutrosophic soft sets. *International Journal of Mathematical, Computational, Natural and Physical Engineering* **9**(2): 111-114.
- Miyamoto S. 2001. Fuzzy multisets and their generalizations. Presented at Workshop on Multiset Processing, Romania, 21-25 August 2000.
- Mondal K. & Pramanik S. 2015a. Neutrosophic refined similarity measure based on cotangent function and its application to multi-attribute decision making. *Journal of New Theory* **8**: 41-50.
- Mondal K. & Pramanik S. 2015b. Neutrosophic refined similarity measure based on cotangent function and its application to multi-attribute decision making. *Global Journal of Engineering Science and Research Management* **8**: 486-496.
- Pawlak Z. 1982. Rough sets. *International Journal of Computer & Information Sciences* **11**(5): 341-356.
- Pramanik S., Banerjee D. & Giri B.C. 2016. Multi -criteria group decision making model in neutrosophic refined set and its application. *Global Journal of Engineering Science and Research Management* **3**(6): 12-18.
- Rizvi S., Naqvi H.J. & Nadeem D. 2002. Rough intuitionistic fuzzy sets. *Journal of Computers and Information Systems* **2**: 80-87.
- Shinoj T.K. & John S.J. 2012. Intuitionistic fuzzy multisets and its application in medical diagnosis. *World Academy of Science, Engineering and Technology* **6**(1): 1418-1421.
- Smarandache F. 1999. *A Unifying Field in Logics: Neutrosophic Logic, Neutrosophy, Neutrosophic Set, Neutrosophic Probability*. 2nd Ed. Rehoboth: American Research Press.
- Wang H., Smarandache F., Zhang Y. & Sunderraman R. 2012. Single valued neutrosophic sets. *Technical Sciences and Applied Mathematics* **6**: 66-70.
- Yager R.R. 1986. On the theory of bags. *International Journal of General System* **13**(1): 23-37.
- Yao Y. 2010. Notes on rough set approximations and associated measures of two definitions of rough set approximations. *Journal of Zhejiang Ocean University (Natural Science)* **29**(5): 399-410.
- Ye J. 2015. Improved cosine similarity measures of simplified neutrosophic sets for medical diagnoses. *Artificial Intelligence in Medicine* **63**(3): 171-179.
- Ye J. & Smarandache F. 2016. Similarity measure of refined single-valued neutrosophic sets and its multicriteria decision making method. *Neutrosophic Sets and Systems* **12**: 41-44.
- Ye S. & Ye J. 2014. Dice similarity measure between single valued neutrosophic multisets and its application in medical diagnosis. *Neutrosophic Sets and Systems* **6**: 48-53.
- Zadeh L.A. 1965. Fuzzy sets. *Information and Control* **8**(3): 338-353.

*Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA Kelantan  
Bukit Ilmu, 18500 Machang, Kelantan DN, MALAYSIA  
E-mail: suria588@uitm.edu.my\**

*Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA Shah Alam  
40450 Shah Alam, Selangor DE, MALAYSIA  
E-mail: daud@tmsk.uitm.edu.my, adibah@tmsk.uitm.edu.my*

Received: 5 April 2020

Accepted: 13 September 2020

---

\*Corresponding author