Complete Relationship Chart

Let k = (G, M, I) is a formal context and X $\subseteq$ G. Here the consequences are represented as lower and upper approximation class of values. The casing based lower approximation indicated with $\underline{R}$ (X) and upper approximation indicated with $\overline{R}$ (X) of X is expressed as:

$$\text{Lower Approximation} = \underline{R}(X) = \{x \in G ; N(x) \subseteq X\} = \{x \in G ; \{x\}\uparrow\downarrow \subseteq X\}$$

$$\text{Upper Approximation } \overline{R}(X) = \overline{R}(X) = \{x \in G; N(x) \cap X \neq \emptyset\} \ \square \ \{x \in G; \{x\}\uparrow\downarrow \cap X \neq \emptyset\}$$

$$WCR\tilde{} \leftarrow \underline{R}(X)$$

$$SCR\tilde{} \leftarrow \overline{R}(X)$$

Figure 5. Complete relationships (CR˜ ← WR˜ ∗ SR˜)

The accuracy computation degree $ACD_c(X)$ of X which is expressed as

$$ACD_c(X) = \left|\frac{\underline{R}(X)}{\overline{R}(X)}\right| = \left|\frac{WCR\tilde{}}{SCR\tilde{}}\right|$$

The concern properties of the operators of $\underline{R}$ (X) and $\overline{R}$ (X) counting for the execution based on the considered sample data set which is consisting the uncertainty data of rough set.

Table 4: Complete relationship based fuzzy implicated FCA for deriving the Weak-conjunction-relationship (WCR˜) and strong-conjunction-relationship (SCR˜) based on StD1, StD2, Fuzzy-FCA-SCR˜ and Fuzzy-FCA-WCR˜

*	a	b	c	d	e	f	g	h	i	j	k	l	m	StD1	StD2	Fuzzy-FCA-SCR˜	Fuzzy-FCA-WCR˜
X_1	0	1	0.9	0	0	0.8	0.7	0	0.6	0	0	0.4	0.5	0.4	0.7	(X_1, b), (X_1, c), (X_1, f), (X_1, g),	(X_1, i), (X_1, l), (X_1, m)
X_2	1	0	0.9	0	0.8	0	0.7	0	0.6	0	0	0.5	0	0.3	0.75	(X_2, a), (X_2, c), (X_2, e), (X_2, g),	(X_2, i), (X_2, l),
X_3	1	0	0	0	0.9	0	0.8	0	0.7	0.6	0	0.5	0	0.3	0.75	(X_3, a), (X_3, e), (X_3, g), (X_3, i),	(X_3, j), (X_3, l),
X_4	1	0	0	0.9	0.8	0	0.7	0	0.6	0	0	0.5	0	0.3	0.75	(X_4, a), (X_4, d), (X_4, e), (X_4, g),	(X_4, i), (X_4, l),
X_5	1	0	0.5	0.9	0	0.8	0.7	0	0.6	0	0	0	0	0.3	0.75	(X_5, a), (X_5, c), (X_5, d), (X_5, g),	(X_5, i), (X_5, c),
X_6	1	0	0.5	0	0.9	0	0.8	0	0.7	0	0	0.6	0	0.3	0.75	(X_6, a), (X_6, e), (X_6, g), (X_6, i),	(X_6, l), (X_6, c),
X_7	1	0	0	0	0.6	0	0.9	0.8	0	0	0.7	0	0	0.3	0.8	(X_7, a), (X_7, g), (X_7, h),	(X_7, e), (X_7, k),
X_8	0	0	1	0	0	0.9	0.8	0	0.7	0	0	0.6	0	0.3	0.8	(X_8, c), (X_8, f), (X_8, g),	(X_8, i), (X_8, l),
X_9	0	1	0	0	0	0.7	0.8	0	0	0	0.9	0	0	0.3	0.85	(X_9, b), (X_9, k),	(X_9, f), (X_9, g),
X_{10}	1	0	0.9	0.8	0	0	0.6	0.7	0.5	0.3	0	0.4	0	0.4	0.65	(X_{10}, a), (X_{10}, c), (X_{10}, d), (X_{10}, h),	(X_{10}, g), (X_{10}, i), (X_{10}, j), (X_{10}, l),

CONCLUSION

Formal concept analysis is a statistical based computational replica and best proficient environment used for knowledge processing, data analysis, reasoning and retrieval based operational innovations like knowledge management of data mining, robotics, big data, IOT and so on. Majorly the FCA is hybridized with fuzzy logic based decision making futures implicated for managing the imprecision and uncertainty data. This paper describes the in-depth festivities of fuzzy implicated FCA functionalities for the identification of Weak and strong conjunction relationship in vagueness data which is helpful to reduce the complex problems in handling the uncertainty data and it described the mixed inventions of fuzzy-FCA-fuzzy implications

REFERENCES

[1] Prem Kumar Singh , Cherukuri Aswani Kumar , Abdullah Gani, A comprehensive survey on formal concept analysis, its research trends and applications, International Journal of Applied Mathematics and Computer Science, Pp. 495-516, Feb 2016.

[2] Belohlavek, R., Chlupova, M., Vychodil, V.: Implications from data with fuzzy attributes. In: AISTA'04. (2004)

[3] Bobillo, F., Delgado, M., Gómez-Romero, J., Straccia, U.: Fuzzy description logics under Gödel semantics. Int. J. of Approx. Reasoning 50(3) (2009) 494–514

[4] Felix Distel, Adapting Fuzzy Formal Concept Analysis for Fuzzy Description Logics, Institute of Theoretical Computer Science, Technische Universität Dresden, Dresden, Germany

[5] Belohlavek, R., Vychodil, V, Attribute implications in a fuzzy setting. In: ICFCA'06. Springer (2006) 45–60

[6] Radim Bˇelohlˊavek and Vilˊem Vychodil, What is a fuzzy concept lattice, Radim Bˇelohlˊavek, Vˊaclav Snˊaˇsel (Eds.): CLA 2005, pp. 34–45, ISBN 80–248–0863–3, Czech Republic.

[7] J.L. Yang, K.Y. Qin, Uncertain Concepts in a Formal Context, International Conference on Artificial Intelligence and Industrial Engineering (AIIE 2015), pp. 514-517.

[8] R.Wille, Restructuring lattice theory: an approach based on hierarchies of concepts, In: I.Rival(Ed.): Ordered Sets, Reidel, Dordrecht-Boston,445-470, 1982.

[9] G.Gediga, R.Wille, Formal Concept Analysis. Mathematic Foundations. Springer, Berlin, 1999.

[10] K.Y.Hu, C.Y.Lu, C.Y.Shi, Advances in concept lattice and its application, Journal of Tsinghua University (Science and Technology) 40(9), 77-81, 2000.

[11] T.B.Ho, An approach to concept formation based on formal concept analysis, IEICE Trans. Information and Systems E782D (5), 553-559,1995.

[12] G.D.Oosthuizen, The application of concept lattice to machine learning, Technical Report, University of Pretoria, South Africa, 1996.

[13] W.X.Zhang, L.Wei, J.J.Qi, Attribute reduction theory and approach to concept lattice, Science in China, Ser. F Information Sciences 6(48), 713-726, 2005.

[14] R.Godin, Incremental concept formation algorithm based on Galois (concept) lattices, Computational Intelligence 11(2), 246-267, 1995.

[15] Y.Y.Yao, Concept lattices in rough set theory, In Proceedings of 2004 Annual Meeting of the North American Fuzzy Information Processing Society (NAFIPS 2004)(eds. S.Dick, L.Kurgan., W.Pedrycz, et al.), IEEE Catalog Number: 04TH8736, June 27-30, 796-801, 2004.

[16] G.D.Oosthuizen, Rough sets and concept lattices, in: Rough Sets, and Fuzzy Sets and Knowledge Discovery (RSKD93) (ed. W.P.Ziarko), London: Springer-Verlag, 24-31, 1994.

[17] P.Tonella, Using a concept lattice of decomposition slices for program understanding and impact analysis, IEEE Transactions on Software Engineering 29(6), 495-509, 2003.

[18] P.A.Grigoriev, S.A.Yevtushenko, Elements of an agile discovery environment, In Proc.6th International Conference on Discovery Science (eds. G.Grieser, Y.Tanaka, A.Yamamoto), Lecture Notes in Artificial Intelligence 2843, 309-316, 2003.

[19] P.Burmeister, R.Holzer,Treating incomplete knowledge in formal concepts analysis, In: B.Ganter, G.Stumme,R. Wille(eds.) Formal Concept Analysis, LNCS(LNAI),vol.3626, Springer, Heidelberg, 114-126, 2005.

[20] A.Burusco, R.G.Fuentes, The study of the L-fuzzy concept lattice, Mathware and Soft Computing 3,209-218, 1994.

[21] A.Burusco, R.G.Fuentes, Construction of the L-fuzzy concept lattice, Fuzzy Sets and Systems 97(1), 109-114, 1998.

[22] S.Q.Fan, W.X.Zhang, J.M.Ma, Fuzzy inference based on fuzzy concept lattice, Fuzzy Sets and Systems 157(24), 3177-3187, 2006.

[23] Doerfel, S., Jaschke, R. and Stumme, G. (2012). Publication analysis of the formal concept analysis community, in F. Domenach et al. (Eds.), Formal Concept Analysis, Lecture Notes in Computer Science, Vol. 7278, Springer, Berlin/Heidelberg, pp. 77–95.

[24] Poelmans, J., Ignatov, D.I., Kuznetsov, S.O. and Dedene, G. (2014). Fuzzy and rough formal concept analysis: A survey, International Journal of General Systems 43(2): 105–134.

[25] Kuznetsov, S.O. and Obiedkov, S.A. (2002). Comparing performance of algorithms for generating concept lattices, Journal of Experimental and Theoretical Artificial Intelligence14(2–3): 189–216.

[26] Kuznetsov, S.O. and Poelmans, J. (2013). Knowledge representation and processing with formal concept analysis, Wiley Interdisciplinary Reviews: Data Miningand Knowledge Discovery 3(3): 200–215.

[27] Li, J., Mei, C., Aswani Kumar, Ch. and Lv, Y. (2013b). On rule acquisition in decision formal contexts, International Journalof Machine Learning and Cybernetics 4(6): 721–731.

[28] Singh, P.K. and Aswani Kumar. Ch, Bipolar fuzzy graph representation of concept lattice, Information Sciences, 288: 437–448, 2014

[29] Sarmah, A.K., Hazarika, S.M. and Sinha, S.K, Formal concept analysis: Current trends and directions, Artificial Intelligence Review 44: 47–86, DOI:10.1007/s10462-013-9404-0, 2015.

[30] Dias, S.M. and Vieira, N.J., Concept lattices reduction: Definition, analysis and classification, Expert Systems with Applications 42(20): 7084–7097, DOI: 10.1016/j.eswa.2015.04.044, 2015.

[31] Poelmans, J., Kuznetsov, S.O., Ignatov, D.I. and Dedene, G. (2013b). Formal concept analysis in knowledge processing: A survey on applications, Expert Systems with Applications 40(16): 6538–6560.

[32] Yan, H., Zou, C., Liu, J. and Wang, Z. (2015). Formal concept analysis and concept lattice: Perspectives and challenges, International Journal of Autonomous and Adaptive Communications Systems 8(1): 81–96.