Review of: "Ternary instantaneous noise-based logic"

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In my opinion, the article should be enriched with a slightly more complete theoretical introduction, where the reader is explained some of the fundamental concepts necessary to understand the entire paper. For example, some questions related to the orthogonality of vectors, as well as some of the basic motivations of the formalism. Some of the theoretical issues presented in [1,2,3,4,5] should be included in the introduction of this article.

The benefits of using the “fourth” Non-existent bit value should be motivated and made more explicit. The use of TINBL should also be encouraged more. For example, it's not particularly clear to me how this logical formalism could benefit me. That is, what benefits does it have with respect to the large number of systems of three or more values that can model noise or uncertainty in the measurements (either input or output values). On the other hand, some minimal comparison of the TINBL formalism with non-deterministic N-matrix systems [6,7,8] would be very interesting for some readers. The Avron, Lev, Zemansky et al. N-matrices can also be applied to model noise or epistemic uncertainty (in addition to having very strong test theory and multiple applications). Another topic that could eventually enrich the text (or some future presentation) is to investigate possible links between TINBL and RST (Rough Set Theory) [9-15]. Rough set also have applications in these areas, in addition to having multiple specialized researchers. Logical connectives based on rough sets also model uncertainty.

In the framework of the NOT and XOR operators, it would be nice to introduce a few brief clarifications justifying why they are defined that way in TINBL so that the reader does not have to resort to references.

Small remark: in equation (2) there is a printing error in the conditions imposed on j, p.

References

[1] L.B. Kish, Noise-based logic: binary, multi-valued, or fuzzy, with optional superposition of logic states, Physics Letters A 373 (2009) 911–918 ; arXiv:0808.3162.

[2] L.B. Kish, S. Khatri, S. Sethuraman, Noise-based logic hyperspace with the superposition of 2^N states in a single wire, Physics Letters A 373 (2009) 1928–1934 ; arXiv:0901.3947.

[3] L.B. Kish, S. Khatri, F. Peper, Instantaneous noise-based logic, Fluct. Noise Lett. 9 (2010) 323–330 ; arXiv:1004.2652

[4] F.Peper, L.B. Kish, Instantaneous, non-squeezed, noise-based logic, Fluct. Noise Lett. 10 (2011) 231–237. Open access.

[5] H.Wen, L.B. Kish, Noise-based logic: Why noise? A comparative study of the necessity of randomness out of orthogonality, Fluct. Noise Lett. 11 (2012) 1250021/1–1250021/7 ; arXiv:1204.2545

[6] Avron, A. (2007). Non-deterministic semantics for families of paraconsistent logics. School of Computer Science. Tel Aviv University.

[7] Avron, A. and I. Lev, I. (2005). Non-deterministic Multiple-valued Structures. Journal of Logic and Computation, 15(3):241–261.

[8] Avron, A. and Konikowska, B. (2004). Proof systems for logics based on non-deterministic multiple-valued structures. Prace Instytutu Podstaw Informatyki Polskiej Akademii Nauk, pages 1–26.

[9] Pawlak, Z. (1982). Rough sets. International Journal of Computer Information Sciences, 11(1):341–356.

[10] Pawlak, Z. (1986). On rough relations. Bulletin of the Polish Academy of Sciences, 34(9):587–590.

[11] Pawlak, Z. (1987). On rough functions. Bulletin of the Polish Academy of Sciences, 35(5-6):250–252.

[12] Pawlak, Z. and Skowron, A. (2007a). Rough sets and boolean reasoning. Information Sciences, 177(1):41–73. Zdzis?aw Pawlak life and work (1926–2006).

[13] Pawlak, Z. and Skowron, A. (2007b). Rough sets: Some extensions. Information Sciences, 177(1):28–40. Zdzis?aw Pawlak life and work (1926–2006).

[14] Pawlak, Z. and Skowron, A. (2007c). Rudiments of rough sets. Inf. Sci., 177:3–27.

[15] Pedrycz, W., Han, L., Peters, J., Ramanna, S., and Zhai, R. (2001). Calibration of software quality: Fuzzy neural and rough neural computing approaches. Neurocomputing, 36(1):149–170. Rough neurocomputing.