

Refutation of Kent algebras on rough set concept analysis

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Abstract: We use modal logic to evaluate definitions for Kent algebras, as presented for rough set concept analysis. Some definitions are *not* tautologous, hence refuting Kent algebras on rough sets.

We assume the method and apparatus of Meth8/VL4 with Tautology as the designated *proof* value, **F** as contradiction, **N** as truthity (non-contingency), and **C** as falsity (contingency). The 16-valued truth table is row-major and horizontal. The 16-valued truth table is row-major and horizontal, or repeating fragments of 128-tables for more variables. (See ersatz-systems.com.)

LET $p, q: a, b;$
 \sim Not; $+$ Or ; $\&$ And; $>$ Imply, greater than; $<$ Not Imply, lesser than; $=$ Equivalent;
 $\%$ possibility, for one or some; $\#$ necessity, for all or every;
 $(p=p)$ Tautology; $\sim(y<x)$ ($x\leq y$).

From: Gredo, G.; Jipsen, P.; Manoorkar, K.; Palmigiano, A.; Tzimoulis, A. (2018). Logics for rough concept analysis. arxiv.org/pdf/1811.07149.pdf pippigreco@gmail.com

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Remark 4: We present the p,q equations below, ending n.2, as keyed to the a,b equations in the text, ending n.1. For clarity, we also ignore subscript notations for the lozenge and box symbols of the modal operators.

$$\sim(p<\#p) = (p=p) ; \quad \text{TNTN TNTN TNTN TNTN} \quad (12.1.2)$$

$$\sim(p<\% \#p) = (p=p) ; \quad \text{TNTN TNTN TNTN TNTN} \quad (15.2.2)$$

$$\sim(p<\% \#p) = (p=p) ; \quad \text{TNTN TNTN TNTN TNTN} \quad (15.4.2)$$

$$(\sim(\#q<\#p)\&\sim(\%q<\%p))>\sim(q<p) ; \quad \text{TTNT TTNT TTNT TTNT} \quad (19.2)$$

$$(\sim(\#q<\#p)\&\sim(\%q<\%p))>\sim(q<p) ; \quad \text{TTNT TTNT TTNT TTNT} \quad (20.2)$$

We group Eqs. 12, 15 and 19, 20 because of the different truth table results, which are *not* tautologous. This means Kent algebras are refuted. What follows is that rough set analysis for concept analysis is suspicious.