

Refutation of probabilistic approximate logic (PALO) and logical imagination engine

© Copyright 2019 by Colin James III All rights reserved.

Abstract: A key property of probabilistic approximate logic (PALO) as one form of inference (of many) is evaluated as *not* tautologous. This refutes its semantics of the logical imagination engine and forms a *non* tautologous fragment of the universal logic VŁ4.

We assume the method and apparatus of Meth8/VŁ4 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, or repeating fragments of 128-tables, sometimes with table counts, for more variables. (See ersatz-systems.com.)

LET \sim Not, \neg ; + Or, \vee , \cup , \sqcup ; - Not Or; & And, \wedge , \cap , \square , \cdot , \otimes ; \ Not And;
 > Imply, greater than, \rightarrow , \Rightarrow , \mapsto , $>$, \supset , \rightarrow ; < Not Imply, less than, \in , $<$, \subset , \neq , \neq , \ll , \lesssim ;
 = Equivalent, \equiv , $:=$, \Leftrightarrow , \leftrightarrow , $\stackrel{\Delta}{\approx}$, \approx , \simeq ; @ Not Equivalent, \neq , \oplus ;
 % possibility, for one or some, \exists , \diamond , **M**; # necessity, for every or all, \forall , \square , **L**;
 (z=z) **T** as tautology, **T**, ordinal 3; (z@z) **F** as contradiction, \emptyset , Null, \perp , zero;
 (%z>#z) **N** as non-contingency, Δ , ordinal 1; (%z<#z) **C** as contingency, ∇ , ordinal 2;
 $\sim(y < x)$ ($x \leq y$), ($x \subseteq y$), ($x \sqsubseteq y$); (A=B) (A~B).
 Note for clarity, we usually distribute quantifiers onto each designated variable.

From: Stehr, M-O.; Kim, M. (2019). Probabilistic approximate logic and its implementation in the logical imagination engine. arxiv.org/pdf/1907.11321.pdf

Abstract: In this note, we introduce Probabilistic Approximate Logic (PALO) as a logic based on the notion of mean approximate probability to overcome conceptual and computational difficulties inherent to strictly probabilistic logics...

3.2 Approximate probability semantics

A key property identified in.. that also holds in PALO in spite of the lack of idempotence is

$$[\psi] = [\varphi \vee \psi] - 1 + [\varphi \Rightarrow \psi] \geq [\varphi] - (1 - [\varphi \Rightarrow \psi]) \tag{3.2.1.1}$$

which allows a limited form of modus ponens in the sense that it enforces a lower bound for $[\psi]$ given $[\varphi]$ and $[\varphi \Rightarrow \psi]$, but as we will see this is only one form of inference that can take place in PALO which unlike most deductive systems does not favor any particular direction of execution.

LET p, s: φ , ψ .

$$q = (((p+q) - (\%s>\#s)) + (\sim(p > (p>q)) - ((\%s>\#s) - (p>q)))) ; \tag{3.2.1.2}$$

F T T T F T T T F T T T F T T T

Remark 3.2.1.2: Eq. 3.2.1.2 produces the same result with ordinal 1 as (s=s) or (%s>#s).

Eq. 3.2.1.2 as rendered is *not* tautologous and refutes one form of inference (of many) that can take place in PALO. What follows is refutation of the semantics of the logical imagination engine.