Digest 2020.04.21.03

Abstract: We evaluate these topics using the Meth8/VŁ4 modal logic model checker:

Direct numeric analysis of Markov chain simulation

New approach: Most of the papers we evaluate are found as titles at a private preprint system of Cornell Library. Since 2017 we found so many mistakes that now we opt to streamline our approach. For the instant refutation digest title above, we list artifacts in the abstract section above. The respective from-reference, text block, and remarks then follow beginning on separate pages. Conjectures refuted form 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   ~ Not, ¬ ; + Or, ∨, ∪, ⊔ ; - Not Or; & And, ∧, ∩, ⊓, ·, ∘, ⊗ ; \ Not And;
> Imply, greater than, →, ⇒ , ↦, >, ⊃, ↠ ; < Not Imply, less than, ∈, ≺, ⊂, ⊬, ≸, ←, ≲ ;
= Equivalent, ≡, :=, ⇔, ↔, ≜, ≈, ≃ ; @ Not Equivalent, ≠, ⊕;
% possibility, for one or some, ∃, ∃!, ◊, M; # necessity, for every or all, ∀, □, L;
(z=z) T as tautology, ⊤, ordinal 3; (z@z) **F** as contradiction, Ø, Null, ⊥ , zero;
(%z>#z) N as non-contingency, Δ, ordinal 1; (%z<#z) C as contingency, ∇, ordinal 2;
~(y < x) (x ≤ y), (x ⊆ y), (x ⊑ y); (A=B) (A~B).
Note for clarity, we usually distribute quantifiers onto each designated variable.

From: Darwiche, A. (2009). Modeling and reasoning with Bayesian networks.
epdf.pub_modeling-and-reasoning-with-bayesian-networks.pdf darwiche@cs.ucla.edu

15.7 Markov chain simulation
Figure 15.13: Simulating a Gibbs chain, text page 406   (15.13.1)
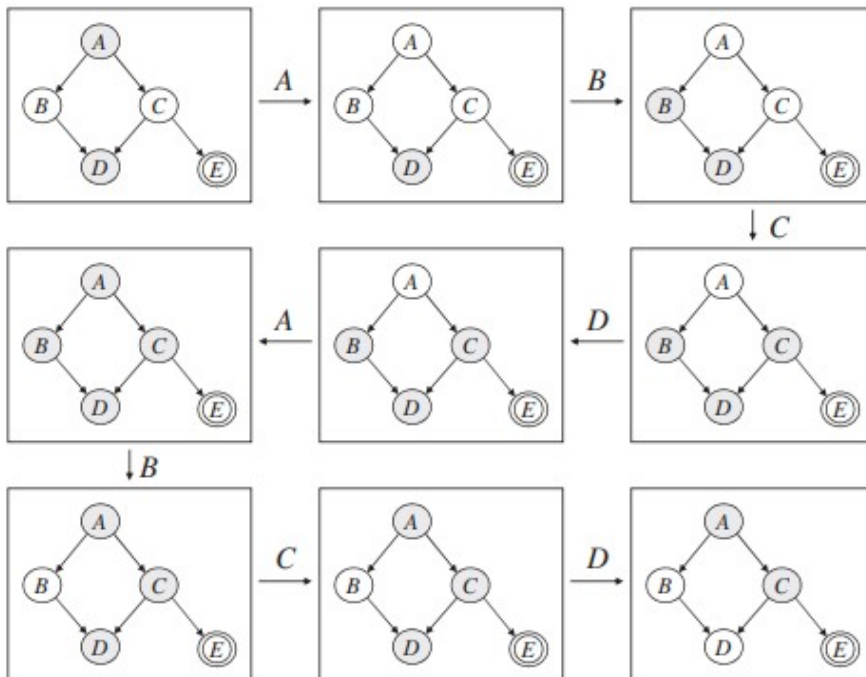
```
LET p, q, r, s, t:
    A, B, C, D, E.
```

```
p>((q>s)+(r>(s+t))) ;          TTTT TTTF TTTT TTTT}64
                               TTTT TTTT TTTT TTTT}          (15.13.2)
```

Remark 15.13.2: Eq. 15.13.2 as rendered is *not* tautologous. Note that the result consists of 128 16-valued truth tables presented horizontally, row-major, to save space. Hence there are a total number of 2048 logical values above for 64 **F** and 1984 T.

Our approach to map Fig. 15.13 into probabilities is arbitrarily assigning the **F**CNT logic values as based on a scale of 4, to avoid zero as an explosive multiplier, presuming contradiction and tautology are respectively the least and most desirable statistical states.

4-valued logic:	**F** {00} contradiction	C {10} falsity	N {01} truthity	T {11} tautology
Probability:	1/4	2/4	3/4	4/4

Therefore the P of Eq. 15.13.2 is calculated as 1984*(4/4) / 2048 = 0.969.

For another schema of that same value such as

```
                    TTTT TTTT TTTT TTTT}64
                    TTTT TTTT TTTT TTTF}          (15.14.2)
```

to sort the schemata in ascending order is 15.13.2 followed by 15.14.2 as based on the bit values of the truth table result with most significant bit on the left of the leading row.