Refutation of temporal logic via instant- and interval/period-based models of time

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Abstract: The basic properties in seven equations are not tautologous. This refutes temporal logic via instant- and interval/period-based models of time and forms it as 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.)

2.1 Instant-based models of the flow of time

Some further basic properties … can be expressed with first-order sentences as follows:

reflexivity: \( \forall x(x \prec x) \) (2.1.1.1)

\[
\text{LET } p, q, r: x, y, z \\
#p<#p ; \quad FFFFF FFFFF FFFFF FFFFF (2.1.1.2)
\]

density (between every two precedence-related instants there is an instant):
\( \forall x \forall y(x < y \rightarrow \exists z(x < z \land z < y)) \) (2.1.2.1)

\[
(#p<#q)\left((#p<%r)\&(%r<#q)\right) ; \quad TCTT TCTT TCTT TCTT (2.1.2.2)
\]

no beginning: \( \forall x \exists y(y < x) \land \forall x \exists y(y < x) \) (2.1.3.1)

\[
%q<#q ; \quad CTCC CTCC CTCC CTCC (2.1.3.2)
\]

no end: \( \forall x \exists y(x < y) \) (2.1.4.1)

\[
#p<%q ; \quad FNFF FNFF FNFF FNFF (2.1.4.2)
\]

every instant has an immediate successor:
\( \forall x \exists y(x < y \land \exists z(x < z \rightarrow y \leq z)) \land \forall x \exists y(x < y \land \forall z(x < z \rightarrow y \leq z)) \) (2.1.5.1)
\[(\#p<\%q) \& ((\#p<\#r) \rightarrow (\#r<\%q)) ; \quad \text{FNFF FFFF FFFF FFFF} \quad (2.1.5.2)\]

\textit{every instant has an immediate} predecessor:
\[\forall x \exists y(y < x \land \forall z(z < x \rightarrow z \leq y)) \quad (2.1.6.1)\]

\[(\%q<\#p) \& ((\#r<\#p) \rightarrow (\%q<\#r)) ; \quad \text{CCTC CCTC CCTC CCTC} \quad 2.1.6.2)\]

2.2 Interval/period based models of time

Some natural basic properties of such interval-based relations and models include:

\textit{atomicity of} \(\subseteq\) \textit{for discrete time}:
\[\forall x \exists y(y \subseteq x \land \forall z(z \subseteq y \rightarrow z = y)) \quad (2.2.1.1)\]

\[\neg (\#p<\%q) \& (\neg (\%q<\#r) \rightarrow (\#r=\%q)) ; \quad \text{TCTT CCTT TCTT CCTT} \quad (2.2.1.2)\]

Basic properties in these seven equations are \textit{not} tautologous. This refutes temporal logic via instant- and interval/period-based models of time.