

Supplementary Material for “Normative Requirements Operationalization with Large Language Models”

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1 SEMANTICS OF SLEEC RELATIONS

Let σ be a sequence of states $(\mathcal{E}_1, \mathbb{M}_1, \delta_1), (\mathcal{E}_2, \mathbb{M}_2, \delta_2), \dots, (\mathcal{E}_n, \mathbb{M}_n, \delta_n)$ where \mathcal{E}_i , \mathbb{M}_i , and δ_i are the occurrence of events, valuation of measures, and the clock time of state i , respectively. The semantics of SLEEC relationship are defined on σ in Tab. 1

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$\sigma \models e_a$ hypernym e_b	iff	$f\forall(\mathcal{E}_i, \mathbb{M}_i, \delta_i) \in \sigma \cdot e_a \in E_i \Rightarrow e_b \in E_i$
$\sigma \models e_a$ isContradictoryWith e_b	iff	$\forall(\mathcal{E}_i, \mathbb{M}_i, \delta_i) \in \sigma \cdot \neg(e_a \in E_i \wedge e_b \in E_i)$
$\sigma \models e_a$ happenBefore e_b	iff	$\exists(\mathcal{E}_i, \mathbb{M}_i, \delta_i) \in \sigma \cdot (e_a \in E_i \wedge \forall(\mathcal{E}_j, \mathbb{M}_j, \delta_j) \in \sigma \cdot (e_b \in E_j \Rightarrow i > j))$
$\sigma \models e_a$ equal e_b	iff	$\sigma \models e_a$ hypernym $e_b \wedge \models e_b$ hypernym e_a
$\sigma \models p_a$ imply p_b	iff	$\forall(\mathcal{E}_i, \mathbb{M}_i, \delta_i) \in \sigma \cdot m_i(p_a \Rightarrow p_b) = \top$
$\sigma \models p_a$ mutualExc p_b	iff	$\forall(\mathcal{E}_i, \mathbb{M}_i, \delta_i) \in \sigma \cdot m_i(p_a \wedge p_b) = \perp$
$\sigma \models p_a$ opposite p_b	iff	$\forall(\mathcal{E}_i, \mathbb{M}_i, \delta_i) \in \sigma \cdot m_i(p_a \Longleftrightarrow p_b) = \perp$
$\sigma \models p_a$ equal p_b	iff	$\forall(\mathcal{E}_i, \mathbb{M}_i, \delta_i) \in \sigma \cdot m_i(p_a \Longleftrightarrow p_b) = \top$
$\sigma \models p_a$ fobids p_b	iff	$\forall(\mathcal{E}_i, \mathbb{M}_i, \delta_i) \in \sigma \cdot e_a \in E_i \Rightarrow M_i(p_j) = \perp$
$\sigma \models p_a$ indu p_b	iff	$\forall(\mathcal{E}_i, \mathbb{M}_i, \delta_i) \in \sigma \cdot e_a \in E_i \Rightarrow M_i(p_j) = \top$
$\sigma \models$ when e_a then p_b until e_c	iff	$\forall(\mathcal{E}_i, \mathbb{M}_i, \delta_i) \cdot e_a \in E_i \Rightarrow (\exists(\mathcal{E}_j, \mathbb{M}_j, \delta_j \cdot e_b \in \mathcal{E}_j \wedge \forall k \in [i, j] \cdot \mathbb{M}_{p_b} = \top) \vee \forall(\mathcal{E}_j, \mathbb{M}_j, \delta_j) \in \sigma \cdot j \geq i \Rightarrow \mathbb{M}_{p_b} = \perp)$
$\sigma \models$ when e_a then p_b for t	iff	$\forall(\mathcal{E}_i, \mathbb{M}_i, \delta_i) \cdot e_a \in E_i \Rightarrow \forall(\mathcal{E}_j, \mathbb{M}_j, \delta_j) \in \sigma \cdot (\delta_j \in [\delta_i, \delta_i + \mathbb{M}_i(t)]) \Rightarrow \mathbb{M}_{p_b} = \perp$

Figure 1: The semantics of DSL relations defined on a trace $\sigma = (\mathcal{E}_1, \mathbb{M}_1, \delta_1), (\mathcal{E}_2, \mathbb{M}_2, \delta_2), \dots, (\mathcal{E}_n, \mathbb{M}_n, \delta_n)$.