A Tableau algorithm for \mathcal{ALCSCC}

Ryny Khy

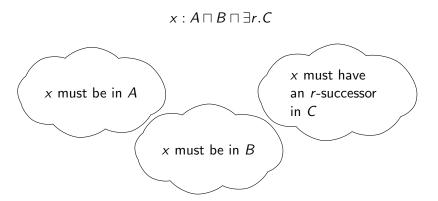
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Introduction

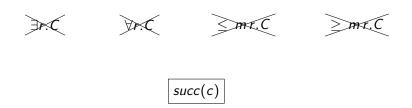
2 Tableau for ALCSCC

Tableau Algorithm

Main Idea:



ALCSCC: successors



c: set constraint or a cardinality constraint

ALCSCC: constraints

set constraint:

- \circ $r \subseteq s$
- $C \cap r \subseteq D$
- $succ(C \cap r) \subseteq succ(D)$

cardinality constraint

- 2 *dvd* |*r*|
- $|C \cap r| \leq |D|$
- $|succ(C \cap r)| \leq |succ(D)|$

$$x: succ(|s|>1) \sqcap succ(|r|=|s|) \sqcap succ(|r|>|s|)$$
 s-successors r -successors 0

$$x: \underline{succ(|s|>1)} \ \sqcap \ succ(|r|=|s|) \ \sqcap \ succ(|r|>|s|)$$
 s-successors r -successors 0

$$x: succ(|s|>1) \sqcap \underline{succ(|r|=|s|)} \sqcap succ(|r|>|s|)$$
 s-successors r -successors 1

$$x: succ(|s|>1) \sqcap succ(|r|=|s|) \sqcap \underline{succ(|r|>|s|)}$$
 s-successors r -successors 2

Problem with blocking

$$x : succ(2 \cdot |r| \le 5 \cdot |s|) \sqcap succ(5 \cdot |s| \le 2 \cdot |r|) \sqcap succ(|r| > 1)$$

s-successors

r-successors





Problem with blocking

$$x: succ(2 \cdot |r| \leq 5 \cdot |s|) \ \sqcap \ succ(5 \cdot |s| \leq 2 \cdot |r|) \ \sqcap \ succ(|r| > 1)$$

s-successors

r-successors



Problem with blocking

$$x: \mathit{succ}(2 \cdot |r| \leq 5 \cdot |s|) \ \sqcap \ \mathit{succ}(5 \cdot |s| \leq 2 \cdot |r|) \ \sqcap \ \mathit{succ}(|r| > 1)$$

s-successors

r-successors





QFBAPA formula and solver

$$x : succ(2 \cdot |r| \le 5 \cdot |s|) \cap succ(5 \cdot |s| \le 2 \cdot |r|) \cap succ(|r| > 1)$$

QFBAPA formula and solver

$$\begin{aligned} x: succ(2 \cdot |r| \leq 5 \cdot |s|) &\sqcap succ(5 \cdot |s| \leq 2 \cdot |r|) &\sqcap succ(|r| > 1) \\ \downarrow \\ 2 \cdot |X_r| \leq 5 \cdot |X_s| \wedge 5 \cdot |X_s| \leq 2 \cdot |X_r| \wedge |X_r| > 1 \end{aligned}$$

QFBAPA formula and solver

$$x: succ(2 \cdot |r| \le 5 \cdot |s|) \sqcap succ(5 \cdot |s| \le 2 \cdot |r|) \sqcap succ(|r| > 1)$$

$$\downarrow$$

$$2 \cdot |X_r| \le 5 \cdot |X_s| \land 5 \cdot |X_s| \le 2 \cdot |X_r| \land |X_r| > 1$$

$$\downarrow$$

$$|X_r| = 5 \text{ and } |X_s| = 2$$