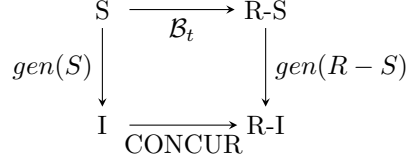


1 Consistency



Rules have the following shape:

$$r : t \rightarrow t' \text{ if } \overline{eq}_n$$

where \overline{eq}_n is a sequence of equational conditions that we use to define which transitions are possible and which are not.

Rules are defined by using variables so that with a finite amount of rules we can capture infinite possible scenarios.

Now we proceed to show how concrete instances can be generated starting from the schemas. First some notation.

Definition 1 (Ground Terms). For a given signature $\Sigma = \langle \text{Sorts}, \text{Operations} \rangle$ the set of ground terms T_Σ is inductively defined as follows:

- a. All constants of sorts S in Operations are ground terms of sort S .
- b. For every function symbol $f : S_1, \dots, S_n \rightarrow S$ in Operations, if t_1, \dots, t_n are ground terms of sorts S_1, \dots, S_n , respectively, then $f(t_1, \dots, t_n)$ is a ground term of sort S where $S_1, \dots, S_n \in \text{Sorts}$

With T_Σ^n we indicate all the ground terms up to the n -nth iteration of the inductive definition. For example, T_Σ^0 is the set of constant symbols, T_Σ^1 is the set of ground terms given by all the possible applications of the operators to T_Σ^0 , and so on.

With $T_{\Sigma, S}^n$ we indicate the ground terms of sort S up to the n -nth iteration.

Algorithm 1 $\text{getInstances}(\Sigma, r, E, n)$

$\langle \text{Sorts}, \text{Operators} \rangle \leftarrow \Sigma$
 $V \leftarrow \text{vars}(r)$ \triangleright Get vars used by the rule
 $S = \{\{v\} \times T_{\Sigma, \text{type}(v)}^n \mid v \in V\}$
 $\text{ConcInst} = S_{v_1} \times \dots \times S_{v_m}$
 $\text{ConcRules} \leftarrow \emptyset$
for each $i \in \text{ConcInst}$ **do**
 $CR \leftarrow \text{instantiate}(i, r)$
 $t' \rightarrow t'$ **if** $\bar{e}q_l \leftarrow CR$
 if $E \vdash \bar{e}q_l$ **then**
 $\text{ConcRules} \leftarrow \text{ConcRules} \cup \{t \rightarrow t'\}$
 end if
end for
return $\text{ConcRules} \cup \text{getInstances}(\Sigma, r, E, n + 1)$
