Algorithm 1 Generating analysis space

INPUT: $E = (S_E, A, \Delta_E, s_{0E}), T_\Phi = \{T_\phi = (S_{T_\phi}, A, \Delta_{T_\phi}, s_{0T_\phi} | \phi \in \Phi)\}, \Phi$
OUTPUT $E_{\|'_*} = (S_a, A, \Delta_a, s_{0a}, \Phi, v_a : \Delta \times \Phi)$
$s_{0a} \leftarrow \{(s_{0E}, s_{0T_{\phi_1}}, s_{0T_{\phi_2}}, ...)\}$ such that $\forall |\Phi| \geq i \geq 1, \phi_i \in \Phi$
$S_a \leftarrow \{s_{0a}\}$
$stack_{\|'_*} \leftarrow \{s_{0a}\}$
while $stack_{\|'_*} \neq \emptyset$ **do**
  for all $s_{\|'_*} \in stack_{\|'_*}$ **do**
    for all $a \in A | s_E \in s_{\|'_*} \cap S_E, (s_E, a, s'_E) \in \Delta_E$ **do**
      $n_\Phi \leftarrow \{\}$
      for all $s_{T_{\phi_i}} \in s_{\|'_*} | \phi_i \in \Phi, |\Phi| \geq i \geq 1$ **do**
        if $\exists \delta_{T_{\phi_i}} \in \Delta_{T_{\phi_i}} | \delta_{T_{\phi_i}} = (s_{T_{\phi_i}}, a, s'_{T_{\phi_i}})$ **then**
          $s'_{T_{\phi_i}} \leftarrow \delta_{T_{\phi_i}}(s_{T_{\phi_i}}, a)$
          if $v_{T_{\phi_i}}(s'_{T_{\phi_i}}) = \{\neg\phi_i\}$ **then**
            $s'_{T_{\phi_i}} = *_{T_{\phi_i}}$
            $n_\Phi \leftarrow n_\Phi \cup \{\neg\phi_i\}$
          end if
        else
          $s'_{T_{\phi_i}} = s_{T_{\phi_i}}$
        end if
      end for
      $s'_{\|'_*} \leftarrow (s'_E, s'_{T_{\phi_1}}, s'_{T_{\phi_2}}, ..)$
      if $\exists s = getMergiableState(s'_{\|'_*}, S_a)$ **then**
        $s'_{\|'_*} \leftarrow s$
      else
        for all $s'_{T_{\phi_i}} \in s'_{\|'_*} | s'_{T_{\phi_i}} = *_{T_{\phi_i}}$ **do**
          $s'_{T_{\phi_i}} \leftarrow s_{0T_{\phi_i}}$
        end for
        $stack_{\|'_*} \leftarrow stack_{\|'_*} \cup s'_{\|'_*}$
      end if
      $\delta_a = (s_{\|'_*}, a, s'_{\|'_*})$
      $\Delta_a \leftarrow \Delta_a \cup \{\delta_a\}$
      $v_a(\delta_a) \leftarrow n_\Phi$
    end for
  end for
end while
return $(S_a, A, \Delta_a, s_{0a}, \Phi, v_a)$