

dtmc

module ManagedComponents

z : **Z** **init** z_0 ;

[**action**₁] **t**=1 \wedge $\text{guard}_1^Z(\mathbf{z}, \mathbf{c}) \rightarrow e_{11}^Z : (\mathbf{z}' = z_{11}) + \dots + e_{1N_1}^Z : (\mathbf{z}' = z_{1N_1})$;

[**action**₂] **t**=1 \wedge $\text{guard}_2^Z(\mathbf{z}, \mathbf{c}) \rightarrow e_{21}^Z : (\mathbf{z}' = z_{21}) + \dots + e_{2N_2}^Z : (\mathbf{z}' = z_{2N_2})$;

...

endmodule

module EnvironmentMonitorWithDNNPerception

k : [**K**] **init** k_0 ;

$\hat{\mathbf{k}}$: [**K**] **init** k_0 ;

v : \mathbb{B}^n **init** (true, true, ..., true);

[**monitor**] **t**=2 \wedge $\text{guard}_1^K(\mathbf{z}, \mathbf{k}) \rightarrow \sum_{\hat{k}' \in [K]} \sum_{v' \in \mathbb{B}^n} \left(e_{11}^K p_{1\hat{k}'v'} : (\mathbf{k}' = 1 \ \& \ \hat{\mathbf{k}}' = \hat{k}' \ \& \ \mathbf{v} = v') \right) + \dots + \sum_{\hat{k}' \in [K]} \sum_{v' \in \mathbb{B}^n} \left(e_{1K}^K p_{K\hat{k}'v'} : (\mathbf{k}' = K \ \& \ \hat{\mathbf{k}}' = \hat{k}' \ \& \ \mathbf{v} = v') \right)$;

[**monitor**] **t**=2 \wedge $\text{guard}_2^K(\mathbf{z}, \mathbf{k}) \rightarrow \sum_{\hat{k}' \in [K]} \sum_{v' \in \mathbb{B}^n} \left(e_{21}^K p_{1\hat{k}'v'} : (\mathbf{k}' = 1 \ \& \ \hat{\mathbf{k}}' = \hat{k}' \ \& \ \mathbf{v} = v') \right) + \dots + \sum_{\hat{k}' \in [K]} \sum_{v' \in \mathbb{B}^n} \left(e_{2K}^K p_{K\hat{k}'v'} : (\mathbf{k}' = K \ \& \ \hat{\mathbf{k}}' = \hat{k}' \ \& \ \mathbf{v} = v') \right)$;

...

endmodule

module DNNPerceptionController

c : **C** **init** c_0 ;

[**decide**] **t**=3 \wedge $\text{guard}_1^C(\mathbf{z}, \hat{\mathbf{k}}, \mathbf{c}) \wedge \mathbf{v} = (\text{false}, \text{false}, \dots, \text{false}) \rightarrow \sum_{c' \in C} \left(x_{\hat{\mathbf{k}}\mathbf{v}\mathbf{c}'} : (\mathbf{c}' = c') \right)$;

...

[**decide**] **t**=3 \wedge $\text{guard}_1^C(\mathbf{z}, \hat{\mathbf{k}}, \mathbf{c}) \wedge \mathbf{v} = (\text{true}, \text{true}, \dots, \text{true}) \rightarrow \sum_{c' \in C} \left(x_{\hat{\mathbf{k}}\mathbf{v}\mathbf{c}'} : (\mathbf{c}' = c') \right)$;

[**decide**] **t**=3 \wedge $\text{guard}_2^C(\mathbf{z}, \hat{\mathbf{k}}, \mathbf{c}) \wedge \mathbf{v} = (\text{false}, \text{false}, \dots, \text{false}) \rightarrow \sum_{c' \in C} \left(x_{\hat{\mathbf{k}}\mathbf{v}\mathbf{c}'} : (\mathbf{c}' = c') \right)$;

...

[**decide**] **t**=3 \wedge $\text{guard}_2^C(\mathbf{z}, \hat{\mathbf{k}}, \mathbf{c}) \wedge \mathbf{v} = (\text{true}, \text{true}, \dots, \text{true}) \rightarrow \sum_{c' \in C} \left(x_{\hat{\mathbf{k}}\mathbf{v}\mathbf{c}'} : (\mathbf{c}' = c') \right)$;

...

endmodule

module Turn

t : [1..3] **init** 1;

[**action** _{α}] **true** $\rightarrow 1 : (\mathbf{t}' = 2)$;

[**action** _{β}] **true** $\rightarrow 1 : (\mathbf{t}' = 2)$;

...

[**monitor**] **true** $\rightarrow 1 : (\mathbf{t}' = 3)$;

[**decide**] **true** $\rightarrow 1 : (\mathbf{t}' = 1)$;

endmodule