classmate

Date 20. 1. 2020
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TRANSITION SYSTEM

SYSTEM

- state space X
- set of initial states X^0
- observables Y
- action U

DYNAMICS

subramanium
chandrashekhar

$\rightarrow \subseteq X \times U \times X$

VIEW

$h: X \longrightarrow Y$

ex 0 1 4 9 16 25

$s = i^2$

$s = H(i)$

$H: \mathbb{N} \rightarrow X$

$F(s) = (\sqrt{s} + 1)^2$

$F: X \rightarrow X$

ex $100 \xrightarrow{300} 400 \xrightarrow{-100} 300 \xrightarrow{500} 800$

bank balance transaction

let $S = \langle X_s, X_s^0, U_s, \xrightarrow[s]{}, Y_s, h_s \rangle$ be a TS

(1) a <u>finite run</u> originating at $x_0 \in X^0$ is a finite sequence

$$x_0 \xrightarrow[s]{u_0} x_1 \xrightarrow[s]{u_1} x_2 \xrightarrow[s]{u_2} \dots x_n$$

st. $x_i \xrightarrow[s]{u_i} x_{i+1} \quad \forall_i \{0 \dots n-1\}$

(2) $\langle x_0, x_1, \dots x_n \rangle$ is a <u>finite trajectory</u> iff

$\exists\ u_0, u_1, \dots u_{n-1}$ st.

$$x_0 \xrightarrow[s]{u_0} x_1 \xrightarrow[s]{u_1} x_2 \xrightarrow[s]{u_2} \dots x_n$$

is a finite run.

(3) $\langle y_0, y_1, \dots y_n \rangle$ is a <u>finite trace</u> iff

$\exists$ a finite trajectory $\langle x_0, x_1, \dots x_n \rangle$

and $y_i = h_s(x_i) \quad \forall_i \{0, \dots n\}$

(4) the finite behaviour of a system S =df=

union of all finite traces of S $\mathcal{B}(S)$

(5) the infinite behaviour of a system S =df=

union of all ∞ traces of S $\mathcal{B}^{\omega}(S)$

simulation &
bisimulation } { composition.