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Prob. Modelling for Computer Scientists

Exercise/Lecture Notes

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① Repetition of slides of previous lecture

Notation $\Diamond$ ~ F (Finally / Eventually)

$\Box$ ~ G (Globally)

② PROOF

$\Box\Diamond S' = \{ s_0 s_1 s_2 \ldots \mid \forall i \geq 0 \, \exists j \geq i \;\; s_j \in S' \}$ is measurable

$\Diamond\Box S' = \{ s_0 s_1 s_2 \ldots \mid \exists i \geq 0 \, \forall j \geq i \;\; s_j \in S' \}$

$= \bigcup_{i=0}^{\infty} \left(\bigcap_{j=1}^{\infty} \{ s_0 s_1 \ldots s_i \ldots \mid s_j \in S' \} \right)$

$\{ s_0 s_1 \ldots s_i \ldots \mid s_j \in S' \} = Cyl(\underbrace{* * * * s_j}_{s \in S'})$

set

G is noted by S' to not confuse with Global operator

F is noted by $\hat{S}$ to not confuse with Future operator

$S_? T$

③ Reachability computation →

→ I. Multiply Transition Matrix

II. Recursive computation $\left(\sum P(s,t) \cdot x_t + \sum P(s,u) \right)$

III. Linear eq. solution + pruning

PRUNING $S = \hat{S} \cup S' \cup S_?$

④ Constrained reachability → I. → III. with pruning the states from $\hat{S}$

$Pr(\hat{S} \cup S')$

with Transient computations $P^n(s,t) \Leftrightarrow Pr(X_{m+n} = t \mid X_m = s) = P$

$= /$ something < SOMETHING

↳ $Pr^{\mathcal{D}}(\Diamond^{\leq n} S') = Pr^{\mathcal{D}[G]}(\Diamond^{=n} S') =$ I. something

↳ initial distr.

⑤ quiz (ask Matej if you did not know answer)

⑥ try assignment 3 Excercise 1