Formal methods - ch 05 symbolic CTL model Checking

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1 Symbolic representation of systems part 2

1.1 Symbolic representation of systems

Symbolic representation a set of state as their characteristic function (boolean formula). **Example** three state variables x_1, x_2, x_3: 000, 001, 010, 011 represented as $\neg x$. $\xi(s)$ is the formula representing the state $s \in S$

1.2 Pre-image

The most important slide: the symbolic representation of the pre-image.
Theoretic view:

$$PreImage(P, R) := \{s | for some s' \in P, (s, s') \in R\}$$

Logical view:

$$\xi(PreImage(P, R)) := \exists V'.(\xi(P)[V'] \wedge \xi(R)[V, V'])$$

Symbolic CTL model checking $\xi([\phi_i])$ computed directly, without computing $[\phi_i]$ explicitly!

$$PreImage(X) \rightarrow \exists V'.(X[V'] \wedge \xi(R)[V, V'])$$

$$Check\_EG(X) \rightarrow Y' = Y \wedge PreImage(Y);$$

$$Check\_EU(X_1, X_2) \rightarrow Y' = X_2 \rightarrow Y' = Y \vee (X_1 \wedge PreImage(Y));$$