Model Checking

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Order the states $s_1, s_2 \ldots s_n$ such that: $V_n(s_1) \leq V_n(s_2) \leq \ldots \leq V_n(s_m)$.
Then find index j such that

- All states indexed $< s_j$ get the lower bound as transition value,
- All states indexed $> s_j$ get the upper bound as transition value,
- State s_j gets a value in $[P(s_j), P(s_j)]$ such that we have a valid distribution.

In the *inner maximization problem*, nature is cooperative and gives us the transition function with the highest probablity of going to a desired states. States are ordered according to 'desirability'.

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a

$$P(s, a, s_1) = \frac{1}{6}$$
$$P(s, a, s_2) = \frac{1}{2}$$
$$P(s, a, s_3) = 0$$
$$P(s, a, s_4) = \frac{1}{3}$$

b

$$
\begin{aligned}
\epsilon &= 0.01 \\
\epsilon_M &= 0.01/8 = 0.00125 \\
\delta_M &= \sqrt{\frac{\log(\frac{2}{0.00125})}{2 \cdot 12}} \approx 0.6660 \\
\underline{P}(s,a,s_1) &= \frac{1}{6} - \delta_M \equiv 0 \\
\bar{P}(s,a,s_1) &= \frac{1}{6} + \delta_M \approx 0.8326 \\
\underline{P}(s,a,s_1) &= \frac{1}{2} - \delta_M \equiv 0 \\
\bar{P}(s,a,s_1) &= \frac{1}{2} + \delta_M \equiv 1 \\
\underline{P}(s,a,s_1) &= 0 - \delta_M \equiv 0 \\
\bar{P}(s,a,s_1) &= 0 + \delta_M \approx 0.6660 \\
\underline{P}(s,a,s_1) &= \frac{1}{3} - \delta_M \equiv 0 \\
\bar{P}(s,a,s_1) &= \frac{1}{3} + \delta_M \approx 0.9993
\end{aligned}
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