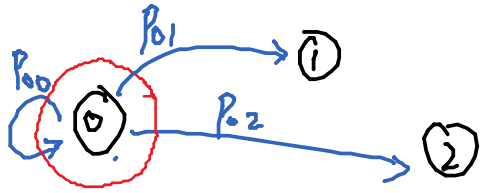
Wednesday, October 21, 2015 12:00 PM

discrete-time MC:



P: $\mathbf{P} = [P_{ij}]$

$$\begin{aligned} \pi &= \pi P, \\ \pi \mathbf{1} &= 1 \end{aligned}$$

Balance EQ:

$\pi_0(P_{01} + P_{02}) = \pi_1 \cdot P_{10} + \pi_2 \cdot P_{20}$

$\hookrightarrow \pi_0(1 - P_{00}) = \pi_1 P_{10} + \pi_2 P_{20}$

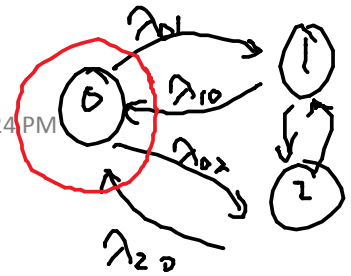
$\Rightarrow \pi_0 = \pi_0 P_{00} + \pi_1 P_{10} + \pi_2 P_{20}$

$\Rightarrow \pi = \pi \cdot P$

$P_{00} + P_{01} + P_{02} = 1$

$\pi = [\pi_0 \ \pi_1 \ \pi_2]$

$\pi_0 + \pi_1 + \pi_2 = 1$



$$P(X_{t+h}=0 \mid X_t=0)$$
$$= 1 - P(X_{t+h}=1 \mid X_t=0) - P(X_{t+h}=2 \mid X_t=0)$$
$$\simeq 1 - \lambda_{01}h - \lambda_{02}h + o(h)$$

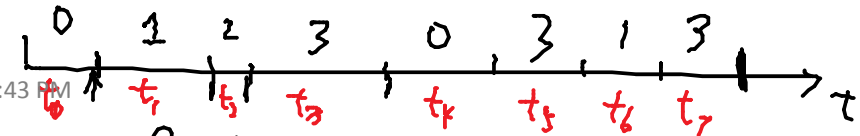
$$P(X(t+h)=j \mid X(t)=i) = \lambda_{ij}h + o(h)$$

$$\pi_0\lambda_{01} + \pi_0\lambda_{02} = \pi_1\lambda_{10} + \pi_2\lambda_{20}$$
$$\Rightarrow \quad 0 = \pi_0(-\lambda_{01}-\lambda_{02}) + \pi_1\lambda_{10} + \pi_2\lambda_{20}$$

$$\pi Q = 0$$
$$\pi 1 = 1$$

$$Q = \begin{bmatrix} -(\lambda_{01}+\lambda_{02}) & \lambda_{01} & \lambda_{02} \\ \lambda_{10} & -(\lambda_{10}+\lambda_{12}) & \lambda_{12} \\ \lambda_{20} & \lambda_{21} & -(\lambda_{20}+\lambda_{21}) \end{bmatrix}$$

$$[0\ 0\ 0]$$



discrete-time MC & discrete time $\pi_1' = \frac{2}{8}$

$$\pi_1 = \frac{t_1 + t_6}{\sum_{i=0}^{7} t_i}$$

0 1 1 0 0 1 1 1 0 . .

S R S R

"pop"