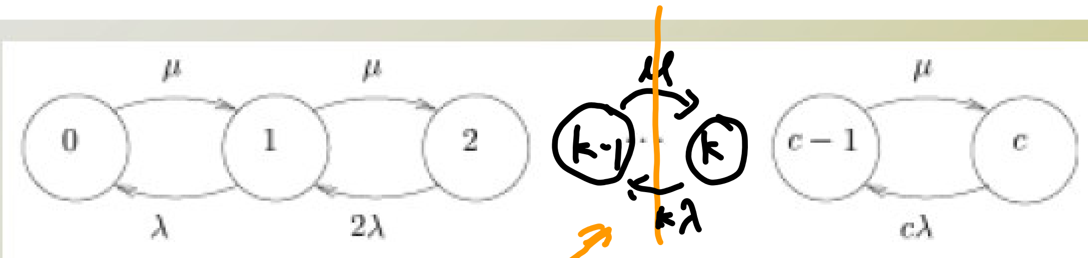
CDA6530 lecture 18

Note Title 10/17/2013



$$\pi_{k-1}\mu = k\lambda\pi_k$$

$$\begin{cases} \pi_k = \dfrac{1}{k!}\left(\dfrac{\mu}{\lambda}\right)^k \pi_0 \\ \sum_{i=0}^{c} \pi_i = 1 \end{cases}$$

$\pi_0 \mu = \lambda \pi_1 \Rightarrow \pi_1 = \frac{\mu}{\lambda}\pi_0$

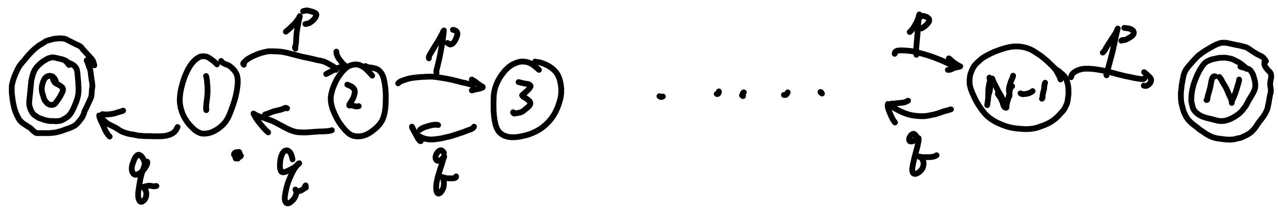
$\pi_1 \mu = 2\lambda\pi_2$

$\Rightarrow \pi_2 = \frac{1}{2}\frac{\mu}{\lambda}\pi_1$

$= \frac{1}{2}\left(\frac{\mu}{\lambda}\right)^2 \pi_0$

$\pi_3 = \frac{1}{3}\frac{\mu}{\lambda}\pi_2$

X_n

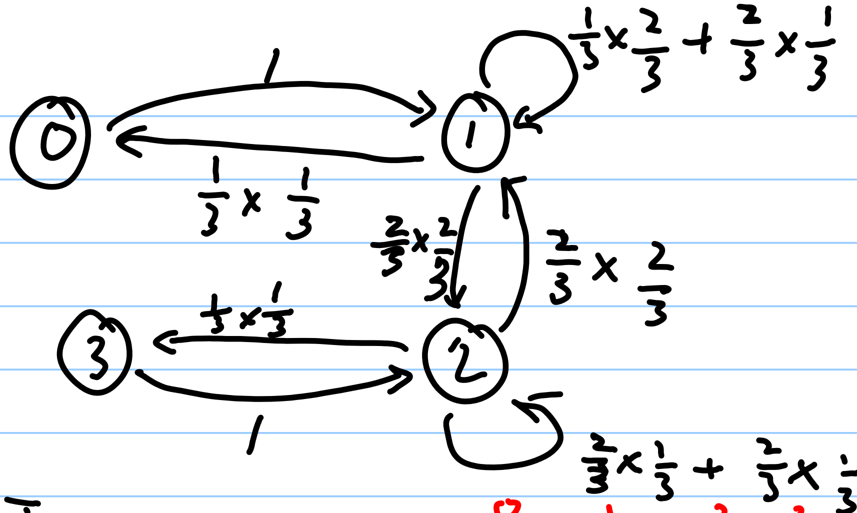


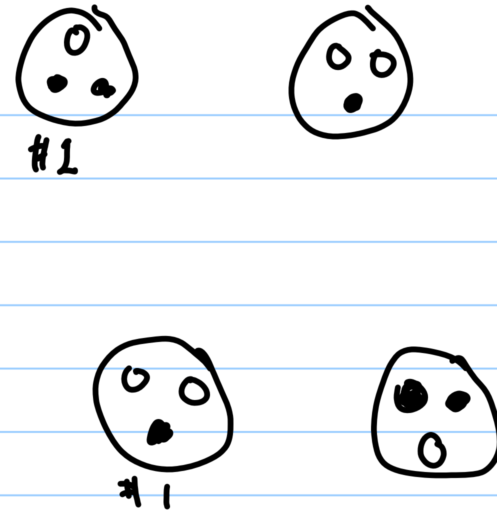
$$P_i = p \cdot P_{i+1} + q \cdot P_{i-1} \qquad P_0 = 0 \quad P_N = 1$$

$$\begin{cases} i=1 \hookrightarrow & P_1 = pP_2 \\ i=1 & P_2 = pP_3 + qP_1 \\ & \\ i=N-1 & P_{N-1} = pP_N + qP_{N-2} = p + qP_{N-2} \end{cases}$$

solve the N-1 linear equation to know P_i

$X_n = \{0, 1, 2, 3\}$ # of white ball in first urn





$$\begin{cases} \pi P = \pi \\ \pi \mathbf{1} = 1 \end{cases}$$

$$P = \begin{array}{c} \\ 0 \\ 1 \\ 2 \\ 3 \end{array} \begin{array}{c} \begin{array}{cccc} 0 & 1 & 2 & 3 \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 0 \\ 1/9 & 4/9 & 4/9 & 0 \\ 0 & 4/9 & 4/9 & 1/9 \\ 0 & 0 & 1 & 0 \end{bmatrix} \end{array}$$