Markov Chains

M/M/1/b



$$\sum_{N=0}^{b} T_{k} = 1$$

- Analize state 0

- Rate of leaving : To A

- Rate of entering: TI, U

To 1 = T.4

 $T_1 = T_0 \frac{\lambda}{\mu}$

Balance equations for states 1 to b-1

Leaving state 1: (A + U) TI,

Entering state 1: ATTO + 11 Tz

$$(\lambda + \mu) T_1 = \lambda T_0 + \mu T_2$$

$$\lambda T_1 + \mu T_1 = \lambda T_0 + \mu T_2$$

$$\lambda(\frac{\lambda}{\mu}) \pi_0 + \mu(\frac{\lambda}{\mu}) \pi_0 = \lambda \pi_0 + \mu \pi_1$$

$$\lambda \left(\frac{\lambda}{\mu}\right) T_0 + \lambda T_0 = \lambda T_0 + \mu T_2$$

$$\left(\frac{\Delta}{\mu}\right)^2 \mathbb{T}_0 = \mathbb{T}_2$$

$$\mathbb{T}_2 = \mathbb{U}^2 \mathbb{T}_0$$

$$\sum_{k=0}^{b} \sqrt{k} = 1$$

$$\sqrt{1 - \sqrt{b^{+1}}} = 1$$

-Balance for state b

ATT = MTG

 $T_b = A T_{b-1}$

- Use total probability to solve for My

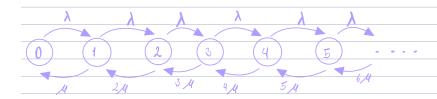
$$\frac{1}{1 - 0} = \frac{1 - 0}{1 - 0} = \frac{1 - 0}{1 - 0} + 1$$

In general:

$$T_{k} = v^{k} T_{0}$$

$$T_{k} = v^{k} \left(\frac{1 - v}{1 - v^{b + 1}}\right)$$

 $M/M/ \sim$



State 0:

$$L = \varepsilon$$

$$\lambda \Pi_0 = \mu \Pi, \qquad \Pi_i = \frac{\lambda}{\mu} \Pi_0$$

State 1:

Endering state 1: 170+2472

Leaving state 1: AT, + AT,

$\lambda \Pi_0 + 2\mu \Pi_2 = \lambda \Pi_1 + \mu \Pi_1$
$T_t = \frac{\lambda}{\lambda^2} T_0$
λη ₀ +24η ₂ = λλη η ₀ + χλη η ₀
Λ 11 ₀ + 24 z - 1/μ 11 ⁰
17/6+247/2= 1 1/10 + 1/10
·
$2\mu \Upsilon_2 = \lambda \frac{\lambda}{\mu} \Upsilon_0$
$\lambda T_z = \left(\frac{\lambda}{\mu}\right)^z T_0$
\sim $(\lambda)^{2} \sim$
$I_2 = \frac{\left(\frac{\lambda}{M}\right)^2 I_0}{2}$
State 2:
Filozopa dada 2. AM + 311 TT
Entering state 2: A71, + 3.0 Ts Leaving state 2: A71, + 3.0 Tz
- 10 mg side 10 - 11 mg mg
$\lambda T_1 + 3A T_2 = \lambda T_2 + 2A T_2$
$T_1 = \frac{\lambda}{\lambda^2} T_0$ $T_2 = \underbrace{\frac{\lambda}{\lambda^2}}_{2} T_0$
$\sim (\Delta)^{2}$
$\lambda \left(\frac{\lambda}{\lambda} \right) \gamma_0 + 3\mu \gamma_3 = \lambda \left(\frac{\lambda}{\lambda} \right) \gamma_0 + 2\mu \left(\frac{\lambda}{\lambda} \right) \gamma_0$
$\lambda \left(\frac{\lambda}{\lambda} \right) \gamma_0 + 3\mu \gamma_3 = \lambda \left(\frac{(\frac{\lambda}{\lambda})^4 \gamma_0}{2} \right) + \lambda \left(\frac{\lambda}{\lambda} \right)^4 \gamma_0$
$\frac{\lambda^2}{\lambda} \pi_0 + 3\mu \pi_3 = \lambda \left(\frac{(\lambda)^3 \pi_0}{\lambda}\right) + \frac{\lambda^2}{\mu} \pi_0$
3μ Tι _ν = λ ((Δ) ^ν η _ο)
$ \frac{1}{3} = \frac{\left(\frac{1}{\sqrt{2}}\right)^{\frac{1}{2}}}{2} \cdot \frac{1}{2} \cdot $
3 ₁₁
\
$\frac{\sum_{k} \left(\frac{\lambda_{k}}{\lambda_{k}} \right)^{2} \prod_{k} \frac{1}{k} \prod_{k} $
$\Pi_{3} = \frac{\left(\frac{\Lambda}{a}\right)^{3}}{3} \Pi_{0}$
6
lack
3×2×1

In general: $T_k = \frac{v^k T_0}{k!}$	
In general: T = v To	
K	
",	
- L~	
$\frac{\sum_{k=0}^{\infty} \frac{u^k \pi_o}{k!} = 1}{k!}$	
k:0 k!	
$\frac{10}{100} \sum_{k=0}^{\infty} \frac{y^k}{k!} = 1$	
N=O N;	
e ⁰	
60	
~r K_L	
$\mathcal{I}_{\mathbf{k}} = 0^{\mathbf{k}} \cdot 1^{\mathbf{k}}$	
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