'Toy' Phase-type Example

Dual repairable redundant
electronic subsystem.

State	Meaning
1	both PS working
2	1 failed, 2 working
3	1 working, 2 failed
4	subsystem failed
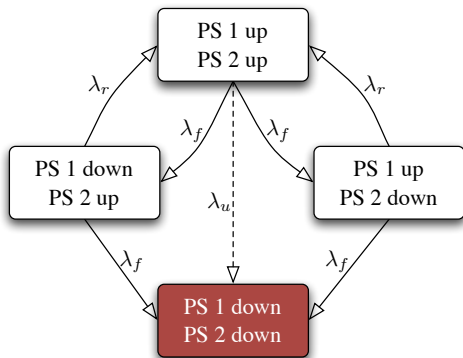
$$\implies \mathbf{T} = \begin{pmatrix} -2\lambda_\mathrm{f} & \lambda_\mathrm{f} & \lambda_\mathrm{f} & 0 \\ \lambda_\mathrm{r} & -\lambda_\mathrm{r} - \lambda_\mathrm{f} & 0 & \lambda_\mathrm{f} \\ \lambda_\mathrm{r} & 0 & -\lambda_\mathrm{r} - \lambda_\mathrm{f} & \lambda_\mathrm{f} \\ 0 & 0 & 0 & 0 \end{pmatrix}$$

$X \sim \mathrm{PHT}(\boldsymbol{\pi}, \mathbf{T})$ is random variable representing time to entering the
absorbing state.

Bladt et al. (2003): Metropolis-Hastings within Gibbs MCMC algorithm.

- Generator of CTMC assumed dense and unstructured.
- Rejection sampling provides proposals to a MH step.
- Focus: distribution fitting.

Aslett & Wilson extensions:

- Explicit structure on underlying stochastic process.
- Prove conjugacy for larger family of priors.
- Accommodate censored observations.
- Extend computational tractability to wider class of problems.
- Significant increase in speed.
- Focus: inference for scientifically interpretable parameters in the stochastic process.

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