Really quickly, I'd like to describe a better modification to the Markov chain.

Suppose the raw chain (that is, the one determined by $\mathrm{BrAn}(A, B)$) is not ergodic. We will construct a modified chain that is ergodic.

Let $C_1, \ldots, C_m$ be the communicating classes of the raw chain. Let x_i^* be an arbitrary state in C_i, $i \in [m]$. The alphabet at each x_i^* will be $B \cup \{\bar{1}\}$, and the probability distribution will be $(1-\varepsilon)\,\mathrm{unif}(B)$ over B and $\varepsilon\,\mathrm{unif}(\bar{1})$ over $\{\bar{1}\}$.

Next, the alphabet at $\{\bar{0}\}$ will be $[1]_0^n = B \cup B^c$ and the distribution is $(1-\varepsilon)\,\mathrm{unif}(B)$ over B and $\varepsilon\,\mathrm{unif}(B)$ over B^c.

The modified chain is finite. It is aperiodic because $\bar{0}$ can map to itself. For irreducibility, fix starting state x_S and target state x_T. The trajectory from x_S will enter C_i (for some i) w/p 1, and then will hit x_i^* w/p 1. If the next 2 letters are $\bar{1}$ and x_T, then the resulting state is x_T. So every state communicates with every other state, ergo irreducibility, ergo ergodicity

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12/18/22 From

[3] Cantor, "Projecting the standard error of the Kaplan-Meier estimator" (2001), take formula

$$\widehat{\mathrm{var}}_2 = \hat{S}^2(t) \sum_{t_i \le t} \frac{d_i}{N(t_i)[N(t_i) - d_i]} = V_t$$

To project V_t, replace observed times t_i by a partition of the interval $[0, t]$ by $0 = x_0 < x_1 < \cdots < x_n = t$, with $x_i - x_{i-1} = \Delta x$. Now, d_i can be thought of as the number of deaths in the interval $[x_{i-1}, i)$, and $N(x_i)$ the ~~number~~ value at risk at time x_i.
Replace each ~~approximation~~ value by expected value

$$d_i \to \lambda(x_i) N(x_i) \Delta x$$

$$N(x_i) \to \begin{cases} rTS(x_i)U(x_i) & \text{if } x_i < \tau \\ rS(x_i)U(x_i)(T+\tau-x_i) & x_i \geq \tau \end{cases}$$

We don't need integrals since the survival functions support is $\mathbb{N}$.

To understand $U(x_i)$, we need to provide a clean description of the simulation stopping criteria. For i in $[n]$, let T_{iM} be the first time at which some number M of messages have gone extinct. Now, let

$T = \max\{T_{iM} : i \in [n]\}$

So, if you're a message, your odds of being censored increase as your message ID increases

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12/22/2022

I don't want any methodological goof ups, so I'm gonna read a few chapters of this book "Survival Analysis: A Self-Learning Text" to make sure everything is solid.

Ch 1. Introduction to Survival Analysis

- Type of problems addressed
- The outcome variable
- "Censored data"
- What survival and hazard functions are.

I. What is survival analysis?

Interested in time until an event occurs.

We assume only one event is of designated interest. If more than one event is considered, this is a recurrent event or competing risk problem.

Time = survival time; event = failure