Model

- The *ideology space* is $\mathcal{I} = \{-1, ..., 0, ..., +1\}$ with L elements
- $\theta_{it} \in \mathcal{I}$ is the ideology of user i at time t
- A page is a tuple, $(v_j, \mu_j, \sigma_j^2, \alpha_j, \beta_j)$ where
  - The variables (μ_j, σ_j^2) govern the production of its content when visited. This distribution is a quantized normal, $N_j = \Phi((x - \mu_j)/\sigma_j)$, over $\mathcal{I}$.
  - The variables (α_j, β_j) govern the influence it has over users after observing content. This distribution is a quantized Kamuraswamy, $K_j(x) = 1 - (1 - x_j^{\alpha})^{\beta_j}$, over $\mathcal{I}$
- The user's expected utility from visiting page j is

  $$U_j(\theta_{it}) = \int_{\mathbb{R}} v_j - \left| \frac{\theta_{it} - n}{w} \right|^{\tau} dN_j(n)$$

  where (u_0, w, τ) are non-negative parameters. A user visits page j with probability

  $$p[j|\theta_{it}] = \frac{e^{U_j(\theta_{it})}}{1 + \sum_{j'} e^{U_{j'}(\theta_{it})}} \mathbb{I}\{U_j(\theta_{it}) \geq 0\},$$

  and ends the browsing session with probability

  $$p[EOS|\theta_{it}] = \frac{1}{1 + \sum_{j'} e^{U_{j'}(\theta_{it})}}$$

- After a user with ideology θ_{it} visits page j and observes content n_{jt}, their ideology transitions to a point in the interval $[\theta_{it} \wedge n_{jt}, \theta_{it} \vee n_{jt}] \cap \mathcal{I}$. This transition occurs as Kamuraswamy, with

  $$x_{ij} =$$

So a model is a tuple (τ, w) of consumer parameters, and tuples $\{(v_j, \mu_j, \sigma_j^2, \alpha_j, \beta_j)\}_{j=1,...,J}$, all to be estimated from transition data at the user level.

Computation

A path is a sequence π_i