Aggregated Regression: Horseshoeing Interval Censored Data

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I have an interesting side project to estimate trend changes in political polling data. The polls are interval censored, we only get aggregate counts over a 3-6 day window, but trends can change quicker, like after a debate. I'm using frequentist penalization with EM, but Bayesian would be nicer as this is getting a bit too complicated for frequentist and Bayesian would make a better applied paper. – Mike

1 Single Interval

The behavior of the *horseshoe prior*

$$\begin{aligned}\beta_i &\sim N(0, \tau\lambda_j)\\ \lambda_i &\sim C_+(0,1)\\ \tau &\sim C_+(0,\tau_0)\end{aligned}$$

on groups $j = 1, \cdots q$ with $N_j = 1000$ trials and $n_j \sim Bin\left(N_j, p = logit^{-1}(\theta_j + \sum_{i=1}^{k} X_{ij}\beta_i)\right)$ with $\beta_i = i/k$ for $i = 1, \cdots k$, $\theta_j = -25$, and $X_{ij} \sim Bern(0.5)$ is as follows.