Results

Bruna Wundervald

October 2021

Contents

Sampling distributions 2
τ 2
μ 2
μ_j 2
First simulated data 2
Smaller k_1 4

Results when 'fitting' a tree from zero

Sampling distributions

τ

$\tau|\mu_1, \ldots, \mu_m, y, \alpha, \beta, k_1, k_2 \sim$
$\text{Gamma}((n+m+1)/2+\alpha, \left(\frac{\sum_{j=1}^{m}\sum_{i=1}^{n_j}(y_{ij}-\mu_j)^2}{2} + \beta + \frac{\sum_{j=1}^{m}(\mu_j-\mu)^2}{2k_1} + \frac{\mu^2}{2k_2})\right)$

μ

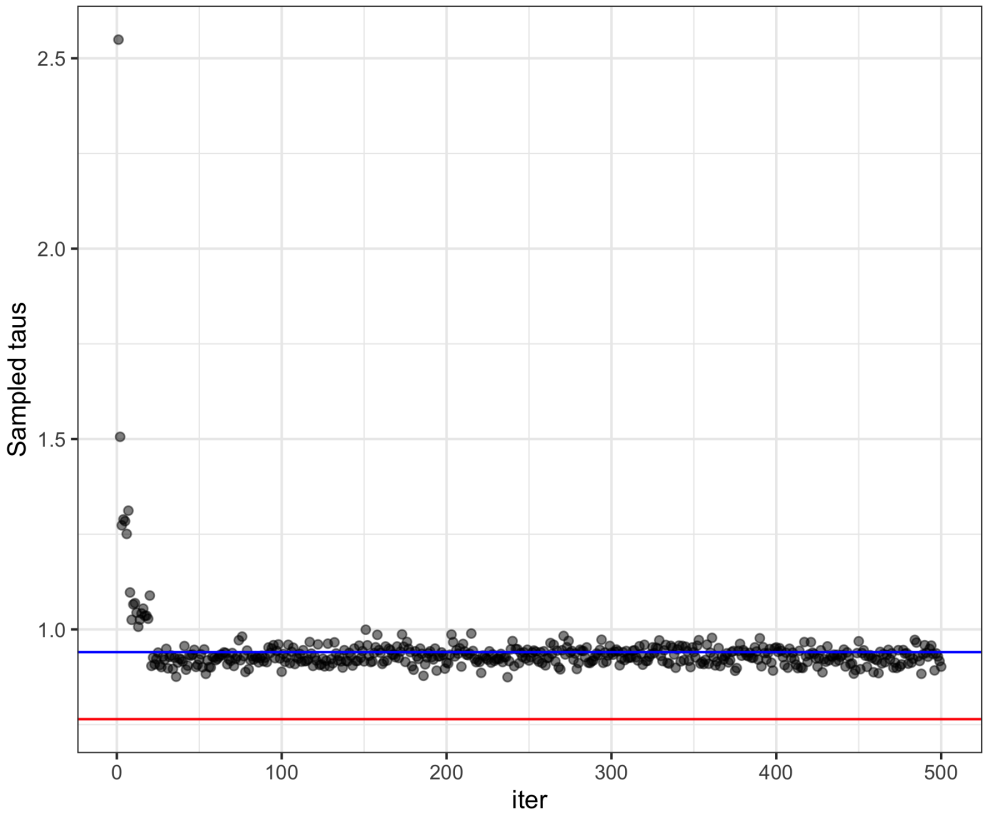
$$\mu_j|\mu, y, \tau, k_1 \sim N(\frac{\mu/k_1 + \bar{y}_j n_j}{n_j + 1/k_1}, ((n_j + \frac{1}{k_1})\tau)^{-1})$$

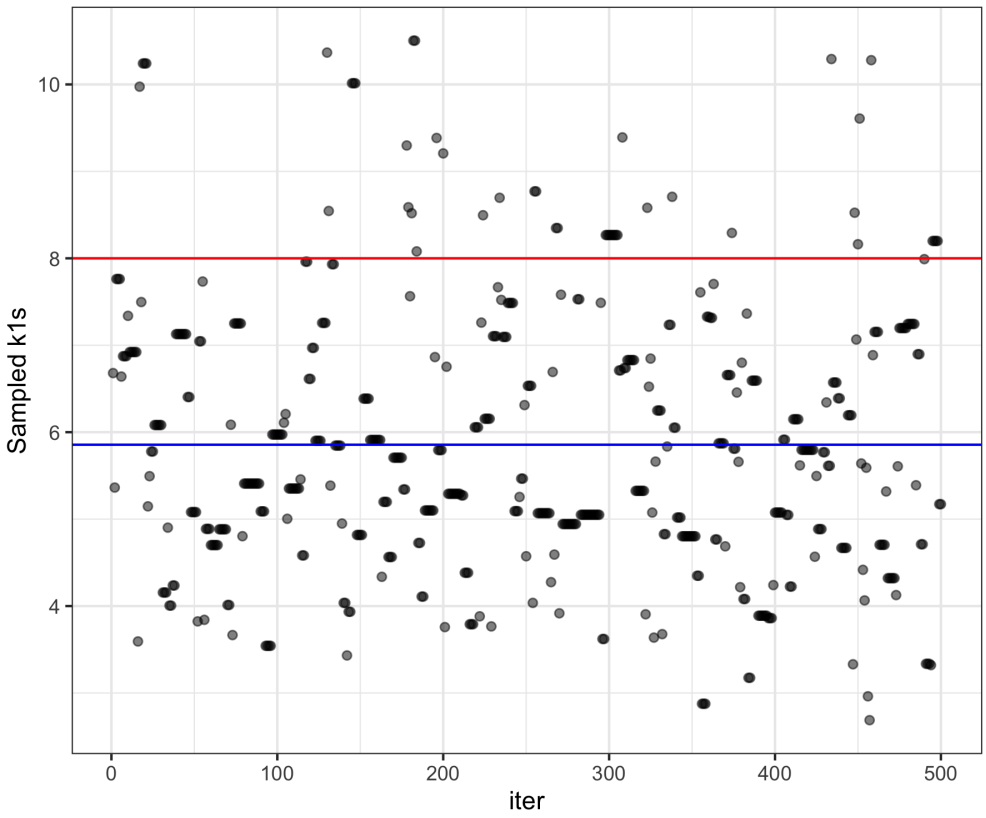
μ_j

$$\mu|y, \tau, k_1, k_2 \sim MVN(\frac{\mathbf{1}^T\Psi^{-1}\mathbf{y}}{\mathbf{1}^T\Psi^{-1}\mathbf{1} + k_2^{-1}}, ((\mathbf{1}^T\Psi^{-1}\mathbf{1} + k_2^{-1})\tau)^{-1})$$

First simulated data

- Fixed small tree (one split, 2 nodes) in $X_1 < 0.5$
- n = 1000; k1 = 8; k2 = 5; $\mu_\mu = 0$; $\alpha = 0.5$; $\beta = 1$; m = 10
- k_1 comes from a uniform min_u = 0, max_u = 20 with a weibull prior
- Red lines represent true values;
- Blue lines represent the average

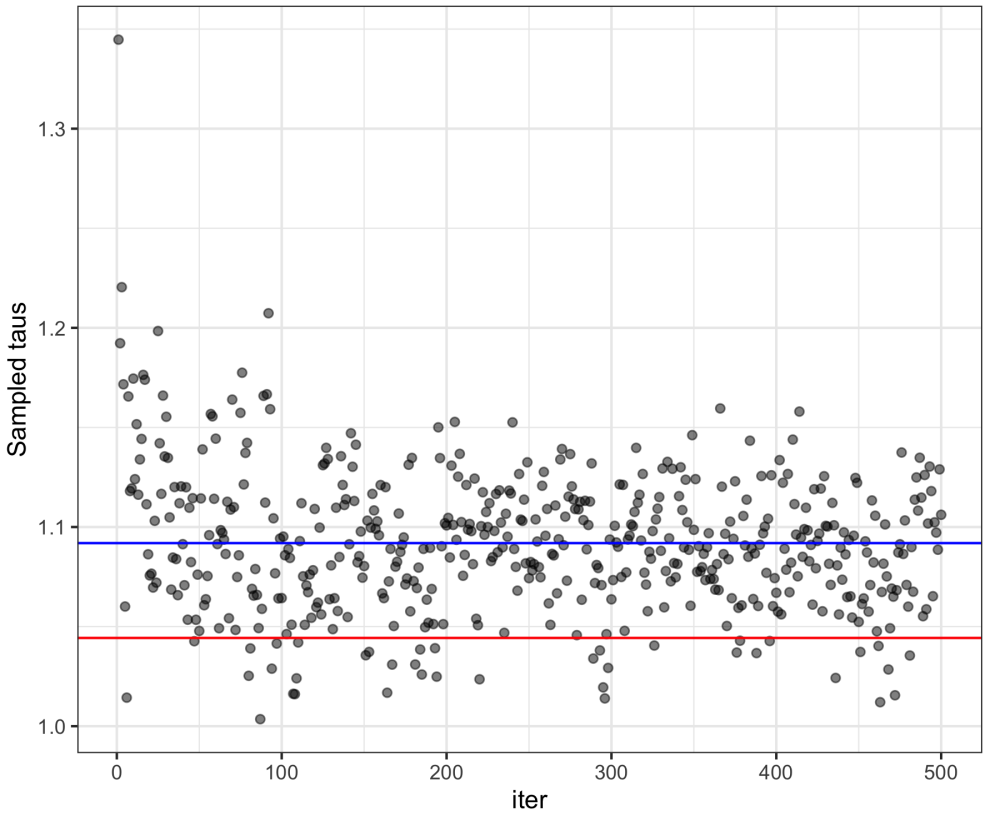
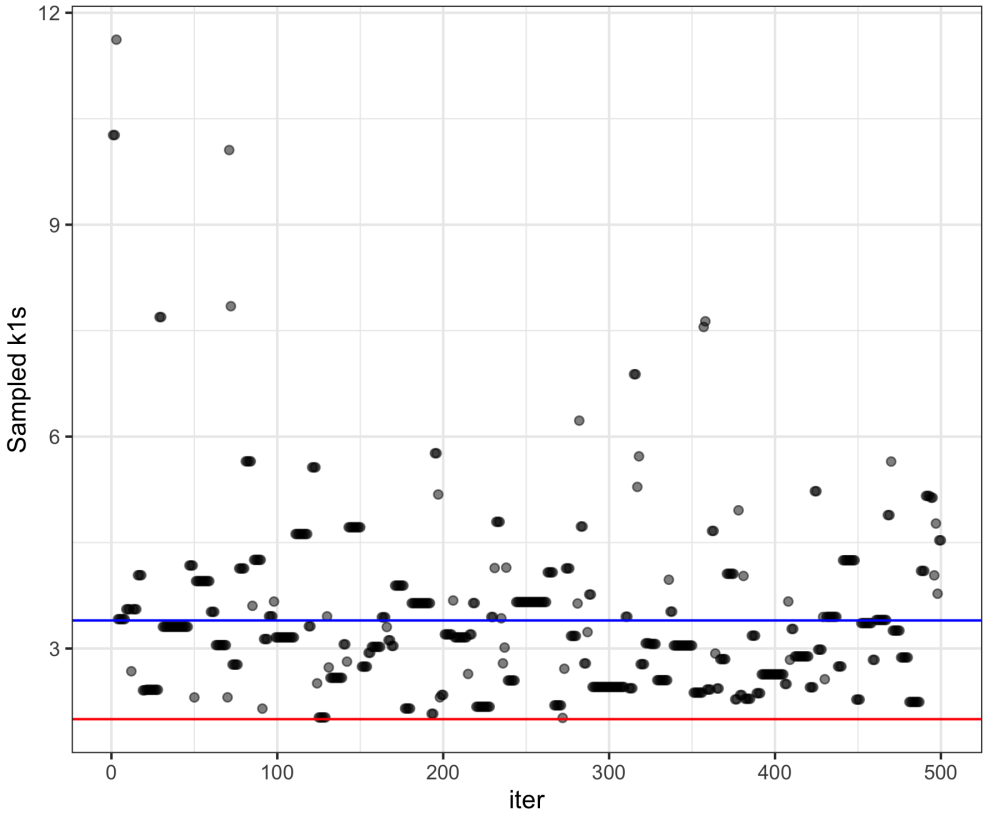

Sampled taus
2.5
2.0
1.5
1.0
0
100
200
300
400
500
iter


Sampled k1s
10
8
6
4
0
100
200
300
400
500
iter

model	RSS with group	RSS without group
mhb	853.838	3144.323
RF	677.384	3758.530
tree	2804.922	2804.922

Smaller k_1

- $k_1 = 2$



model	RSS with group	RSS without group
mhb	1205.234	3339.540
RF	1248.228	4023.099
tree	2113.876	3036.414