

BPTR: Bernstein Polynomial Temporal Realignment

BPTR_Example

[1] Loading simulated data:

```
#####  
#Packages  
#####  
library(BPTR)  
library(matrixStats)  
library(HDInterval)  
  
#####  
#Load Data  
#####  
url_path<-"https://raw.githubusercontent.com/warrenjl/BPTR/main/BPTR_Example/Simulated_Dataset.RData"  
load(url(url_path))
```

[2] Model fitting:

```
#####  
#Model Fitting  
#####  
set.seed(1234)  
  
d<-2  
results<-BPTR(mcmc_samples = 11000,  
              y_trans = sim_data$y_trans,  
              r = sim_data$r,  
              m = sim_data$m,  
              t = sim_data$t_mat,  
              x = sim_data$x,  
              z = sim_data$z,  
              a0 = sim_data$a0,  
              a1 = sim_data$a1,  
              d = d,  
              metrop_V = seq(0.005, 0.03, length.out = (d-1)),  
              metrop_var_delta = rep(0.30^2, times = sum(sim_data$r)))
```

```
## Progress: 10%  
## V Acceptance (min): 64%  
## V Acceptance (max): 64%  
## delta Acceptance (min): 45%  
## delta Acceptance (max): 66%  
## *****  
## Progress: 20%  
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## delta Acceptance (min): 37%  
## delta Acceptance (max): 60%  
## *****  
## Progress: 30%  
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## delta Acceptance (min): 34%
```

```

## delta Acceptance (max): 58%
## *****
## Progress: 40%
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## delta Acceptance (min): 31%
## delta Acceptance (max): 57%
## *****
## Progress: 50%
## V Acceptance (min): 26%
## V Acceptance (max): 26%
## delta Acceptance (min): 30%
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## *****
## Progress: 60%
## V Acceptance (min): 23%
## V Acceptance (max): 23%
## delta Acceptance (min): 28%
## delta Acceptance (max): 54%
## *****
## Progress: 70%
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## delta Acceptance (min): 27%
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## *****
## Progress: 80%
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## delta Acceptance (min): 27%
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## *****
## Progress: 90%
## V Acceptance (min): 20%
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## delta Acceptance (min): 26%
## delta Acceptance (max): 51%
## *****
## Progress: 100%
## V Acceptance (min): 19%
## V Acceptance (max): 19%
## delta Acceptance (min): 26%
## delta Acceptance (max): 50%
## *****

```

[3] Posterior inference for severity function:

```

keep_set<-seq(1001, #burnin
             11000, #posterior samples
             10)   #thinning rate

#####
#Severity Function Inference
#####
ds_time<-seq(sim_data$min_dis_time_select,

```

```

        sim_data$max_dis_time_select,
        0.01)
z_ds<-matrix(NA,
            nrow = length(ds_time),
            ncol = (d+1))
for(j in 1:length(ds_time)){
  z_ds[j,]<-choose(d, c(0:d))*
    (ds_time[j]^c(0:d))*
    (1.00 - ds_time[j])^(d - c(0:d))
}

dis_sev<-matrix(NA,
               nrow = length(ds_time),
               ncol = length(keep_set))
for(j in 1:length(keep_set)){
  dis_sev[,j]<-exp(results$gamma[1, keep_set[j]])*c(z_ds%%c(0.00, results$theta[,keep_set[j]]))
}

dis_sev_post_mean<-rowMeans(dis_sev)
dis_sev_quant<-rowQuantiles(dis_sev,
                             probs = c(0.025, 0.975))

plot(sim_data$dis_sev,
     type = "l",
     lwd = 2,
     col = "red")
lines(dis_sev_post_mean,
      lwd = 2)
lines(dis_sev_quant[,1],
      lwd = 2,
      lty = 2)
lines(dis_sev_quant[,2],
      lwd = 2,
      lty = 2)

```

