CWVS: Critical Window Variable Selection

CWVS_Example

[1] Simulate data for analysis:

- Setting the reproducibility seed and initializing packages for data simulation:

```
set.seed(4679)

library(CWVS)
library(boot)  #Inverse logit transformation
```

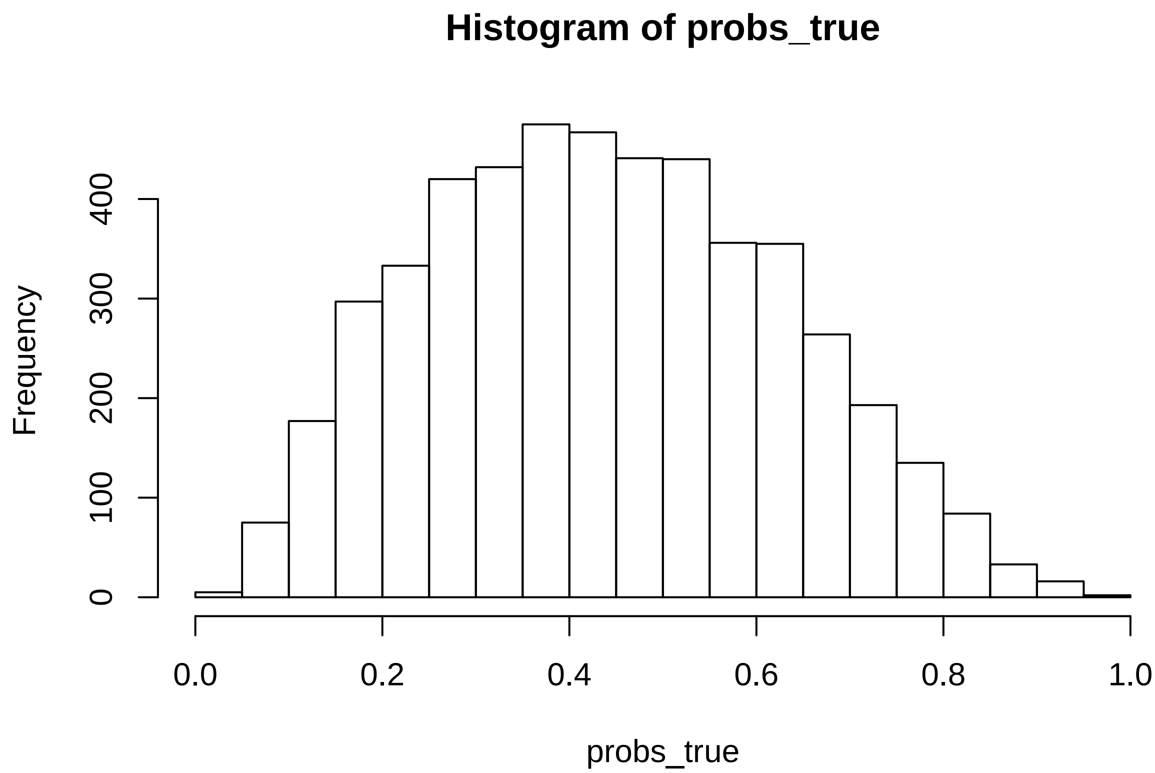
- Setting the global data values:

```
n<-5000  #Sample size
m<-27  #Number of exposure time periods
x<-matrix(1,
          nrow=n,
          ncol=1)  #Covariate design matrix
z<-matrix(rnorm(n=(n*m)),
          nrow=n,
          ncol=m)  #Exposure design matrix

for(j in 1:m){
   z[,j]<-(z[,j] - median(z[,j]))/IQR(z[,j])  #Data standardization (interquartile range)
   }
```

- Setting the values for the statistical model parameters:

```
beta_true<- -0.30
theta_true<-rep(0.60, times=m)
gamma_true<-c(rep(0, times=12),
              rep(1, times=4),
              rep(0, times=11))
alpha_true<-gamma_true*theta_true
logit_p_true<-x%*%beta_true +
              z%*%alpha_true
probs_true<-inv.logit(logit_p_true)
hist(probs_true)
```



- Simulating the analysis dataset:

```
y<-rbinom(n=n,
          size=1,
          prob=probs_true)
```

[2] Fit GPCW to estimate critical windows of susceptibility:

```
results<-CWVS(mcmc_samples = 10000,
              y = y, x = x, z = z,
              metrop_var_phi1_trans = 1.00,
              metrop_var_phi2_trans = 1.00,
              metrop_var_A11_trans = 0.05,
              metrop_var_A22_trans = 0.50,
              metrop_var_A21 = 1.00)
```

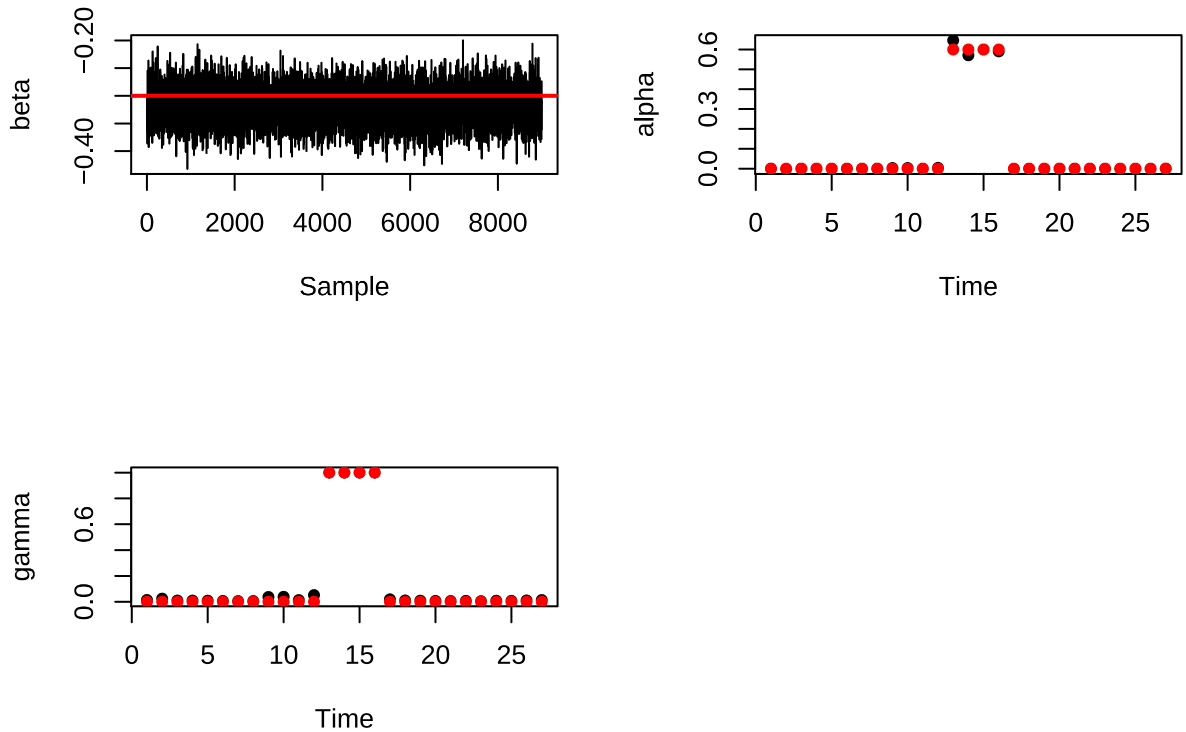
```
## Progress: 10%
## phi1 Acceptance: 37%
## phi2 Acceptance: 37%
## A11 Acceptance: 17%
## A22 Acceptance: 24%
## A21 Acceptance: 22%
## *******************
## Progress: 20%
## phi1 Acceptance: 36%
## phi2 Acceptance: 37%
## A11 Acceptance: 18%
## A22 Acceptance: 25%
```

```
## A21 Acceptance: 20%
## ********************
## Progress: 30%
## phi1 Acceptance: 35%
## phi2 Acceptance: 37%
## A11 Acceptance: 18%
## A22 Acceptance: 23%
## A21 Acceptance: 20%
## ********************
## Progress: 40%
## phi1 Acceptance: 34%
## phi2 Acceptance: 37%
## A11 Acceptance: 18%
## A22 Acceptance: 25%
## A21 Acceptance: 20%
## ********************
## Progress: 50%
## phi1 Acceptance: 35%
## phi2 Acceptance: 37%
## A11 Acceptance: 18%
## A22 Acceptance: 24%
## A21 Acceptance: 21%
## ********************
## Progress: 60%
## phi1 Acceptance: 35%
## phi2 Acceptance: 36%
## A11 Acceptance: 19%
## A22 Acceptance: 24%
## A21 Acceptance: 22%
## ********************
## Progress: 70%
## phi1 Acceptance: 34%
## phi2 Acceptance: 36%
## A11 Acceptance: 19%
## A22 Acceptance: 25%
## A21 Acceptance: 22%
## ********************
## Progress: 80%
## phi1 Acceptance: 34%
## phi2 Acceptance: 36%
## A11 Acceptance: 19%
## A22 Acceptance: 24%
## A21 Acceptance: 21%
## ********************
## Progress: 90%
## phi1 Acceptance: 34%
## phi2 Acceptance: 37%
## A11 Acceptance: 19%
## A22 Acceptance: 23%
## A21 Acceptance: 21%
## ********************
## Progress: 100%
## phi1 Acceptance: 34%
## phi2 Acceptance: 36%
```

```
## A11 Acceptance: 19%
## A22 Acceptance: 21%
## A21 Acceptance: 21%
## *******************
```

[3] Analyzing Output:

```r
par(mfrow=c(2,2))
plot(results$beta[1, 1001:10000],
     type="l",
     ylab="beta",
     xlab="Sample")
abline(h=beta_true,
       col="red",
       lwd=2)  #True value
plot(rowMeans(results$alpha[,1001:10000]),
     pch=16,
     ylab="alpha",
     xlab="Time")
points(alpha_true,
       pch=16,
       col="red")  #True values
plot(rowMeans(results$gamma[,1001:10000]),
     pch=16,
     ylab="gamma",
     xlab="Time")
points(gamma_true,
       pch=16,
       col="red")  #True values
```


beta
−0.20
−0.40
0
2000
4000
6000
8000
Sample
alpha
0.0
0.3
0.6
0
5
10
15
20
25
Time
gamma
0.0
0.6
0
5
10
15
20
25
Time