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
```

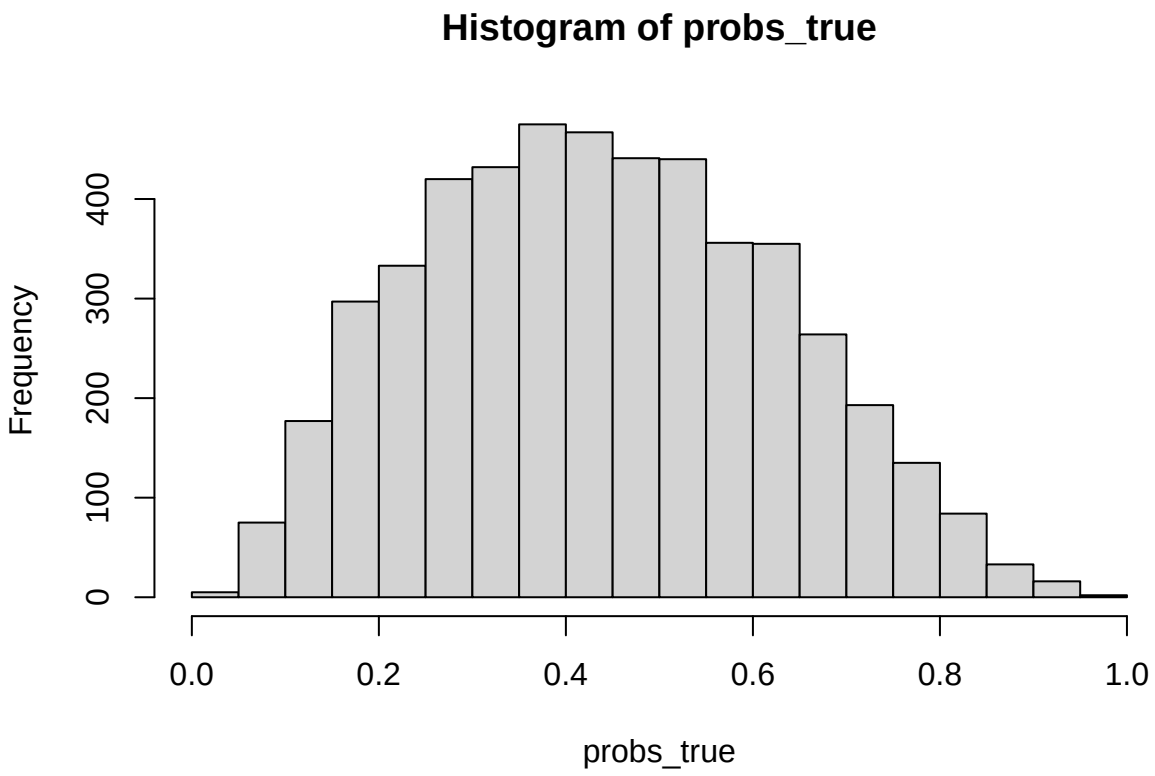
```
## Warning: package 'boot' was built under R version 4.2.3
```

- 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)
```




```
trials<-rep(1, times = n)
```

- Simulating the analysis dataset:

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

[2] Fit CWVS to identify/estimate critical windows of susceptibility:

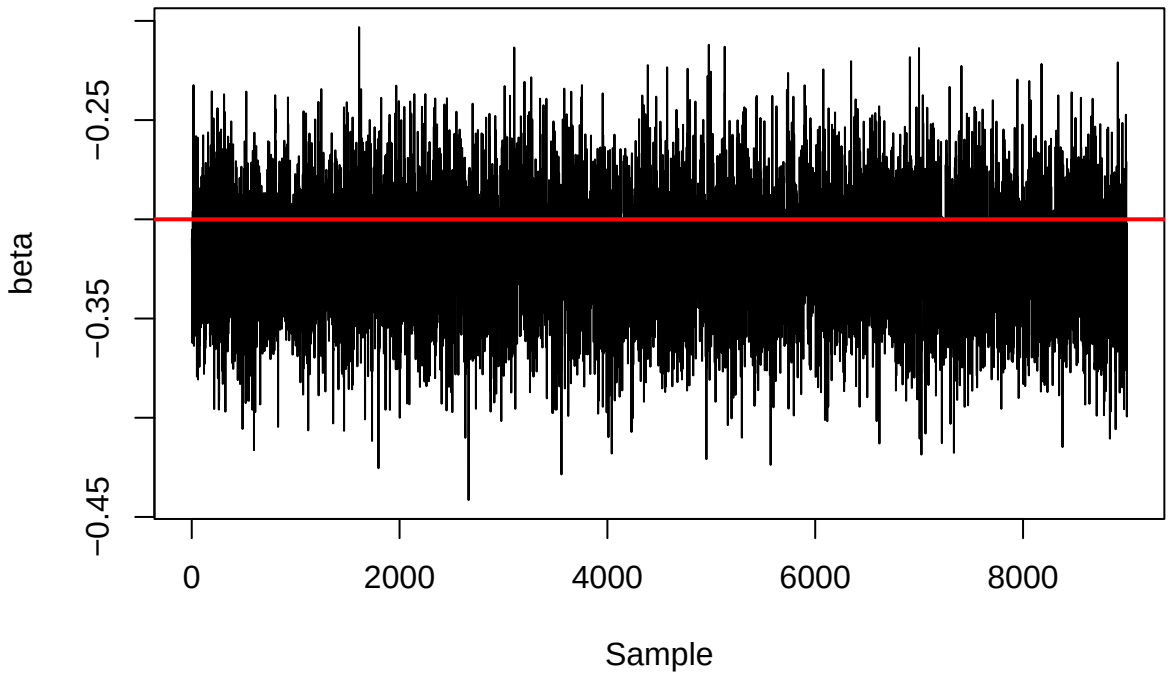
```
results<-CWVS(mcmc_samples = 10000,
              y = y, x = x, z = z,
              likelihood_indicator = 0,
              trials = trials,
              metrop_var_phi1_trans = 1.00,
              metrop_var_phi2_trans = 1.00,
              metrop_var_A11_trans = 0.03,
              metrop_var_A22_trans = 0.30)
```

```
## Progress: 10%
## phi1 Acceptance: 32%
## phi2 Acceptance: 36%
## A11 Acceptance: 23%
## A22 Acceptance: 31%
## ********************
## Progress: 20%
## phi1 Acceptance: 32%
## phi2 Acceptance: 37%
```

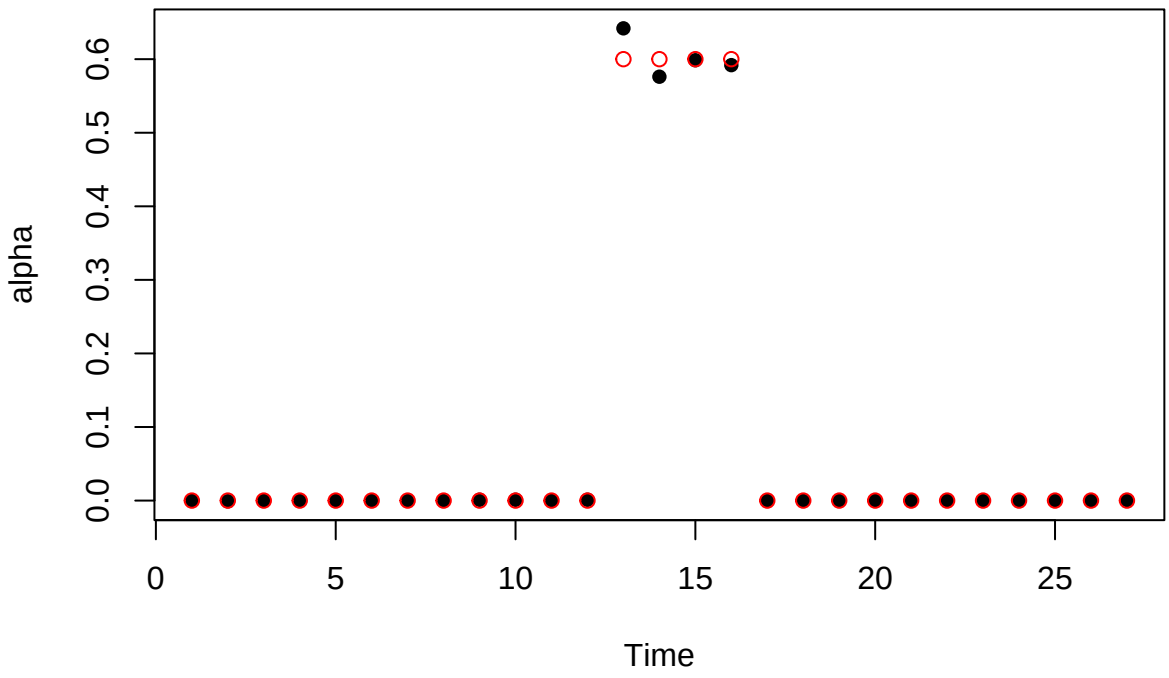
```
## A11 Acceptance: 23%
## A22 Acceptance: 28%
## ********************
## Progress: 30%
## phi1 Acceptance: 32%
## phi2 Acceptance: 37%
## A11 Acceptance: 23%
## A22 Acceptance: 28%
## ********************
## Progress: 40%
## phi1 Acceptance: 33%
## phi2 Acceptance: 37%
## A11 Acceptance: 23%
## A22 Acceptance: 26%
## ********************
## Progress: 50%
## phi1 Acceptance: 33%
## phi2 Acceptance: 37%
## A11 Acceptance: 23%
## A22 Acceptance: 25%
## ********************
## Progress: 60%
## phi1 Acceptance: 33%
## phi2 Acceptance: 37%
## A11 Acceptance: 24%
## A22 Acceptance: 25%
## ********************
## Progress: 70%
## phi1 Acceptance: 33%
## phi2 Acceptance: 37%
## A11 Acceptance: 23%
## A22 Acceptance: 24%
## ********************
## Progress: 80%
## phi1 Acceptance: 33%
## phi2 Acceptance: 37%
## A11 Acceptance: 24%
## A22 Acceptance: 25%
## ********************
## Progress: 90%
## phi1 Acceptance: 33%
## phi2 Acceptance: 37%
## A11 Acceptance: 24%
## A22 Acceptance: 25%
## ********************
## Progress: 100%
## phi1 Acceptance: 33%
## phi2 Acceptance: 37%
## A11 Acceptance: 24%
## A22 Acceptance: 25%
## ********************
```

```
plot(results$beta[1, 1001:10000],
     type="l",
```

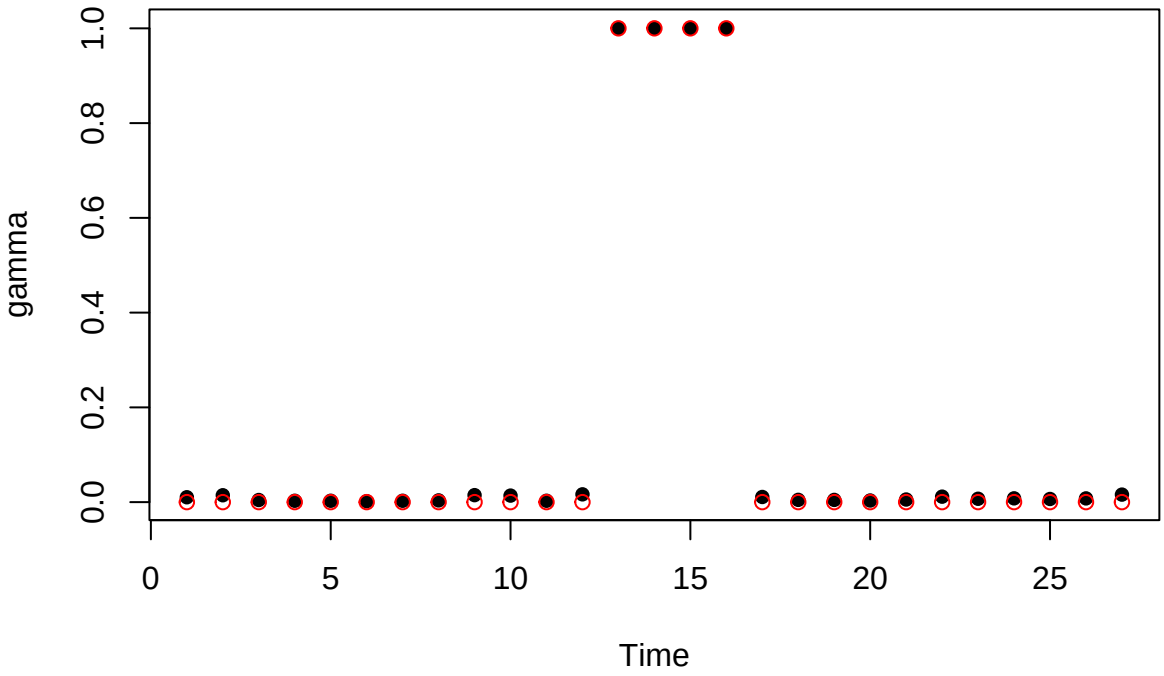
```
     ylab="beta",
     xlab="Sample")
abline(h=beta_true,
       col="red",
       lwd=2)  #True value
```




```
plot(rowMeans(results$alpha[,1001:10000]),
              pch=16,
              ylab="alpha",
              xlab="Time")
points(alpha_true,
       col="red")
```




```
plot(rowMeans(results$gamma[,1001:10000]),
     pch=16,
     ylab="gamma",
     xlab="Time")
points(gamma_true,
       col="red")
```


gamma
0.0
0.2
0.4
0.6
0.8
1.0
0
5
10
15
20
25
Time