BMARS

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Running the Script

```
rm(list = ls())
source("bmars_script.R")
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
set.seed(12)
f <-function(x){
  10*sin(pi*x[,1]*x[,2])+20*(x[,3]-.5)^2+10*x[,4]+5*x[,5]
}

sigma <- 1 # noise sd
n <- 500 # number of observations
x <- matrix(runif(n*10),n,10) #10 variables, only first 5 matter
y <- rnorm(n,f(x),sigma)
```

```
iter <- 10000
mod <- bmars(x, its = iter)
```

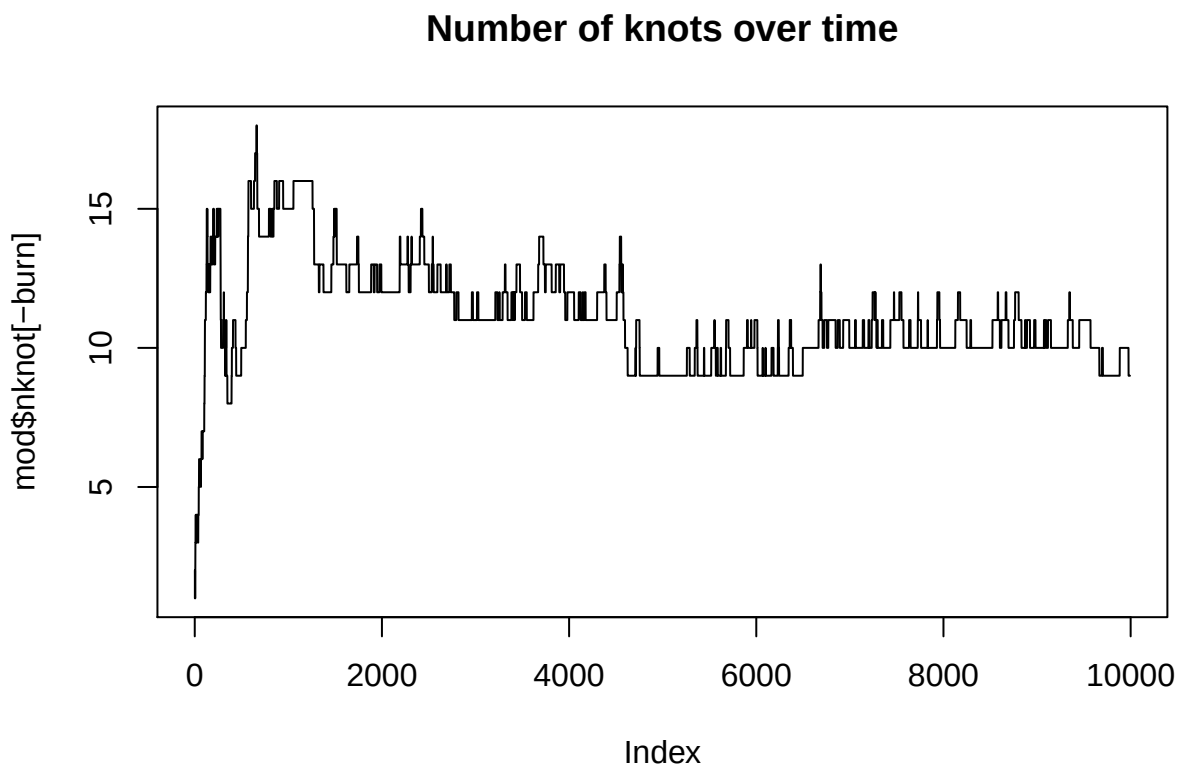
```
burn <- 1:7#50
X <- mod$X
beta <- mod$beta

mod$count
```

```
##  birth  death change
##    176    167    360
```

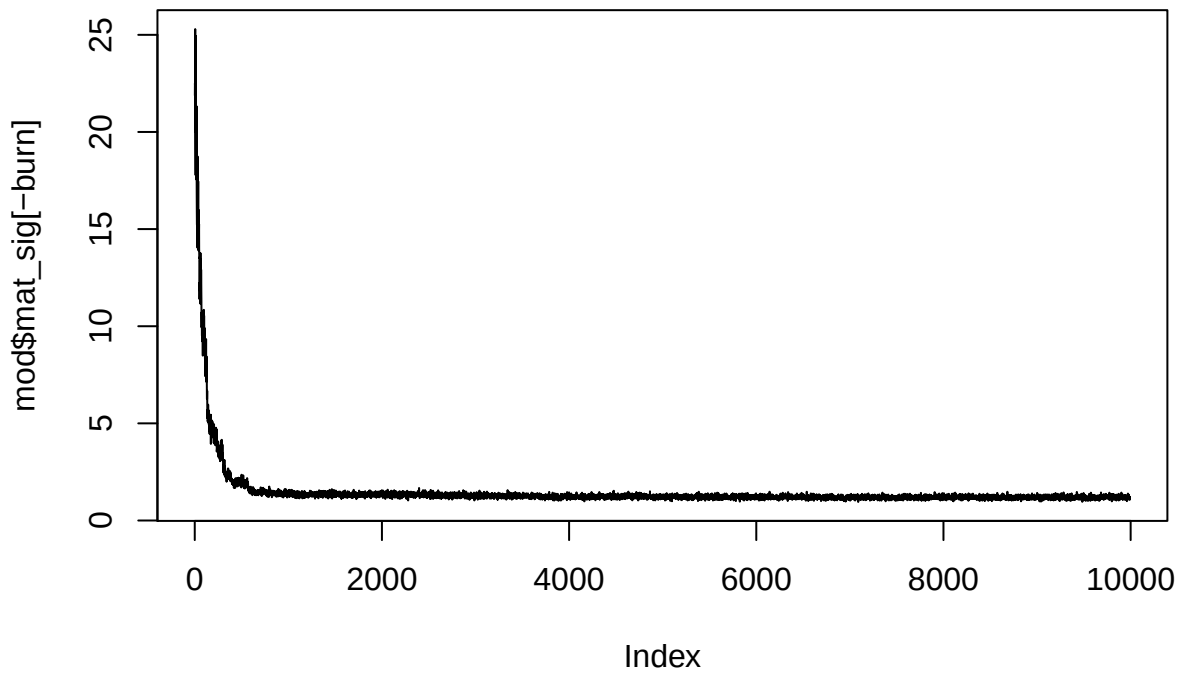
```
mod$nknot[length(mod$nknot)]
```

```
## [1] 9
```

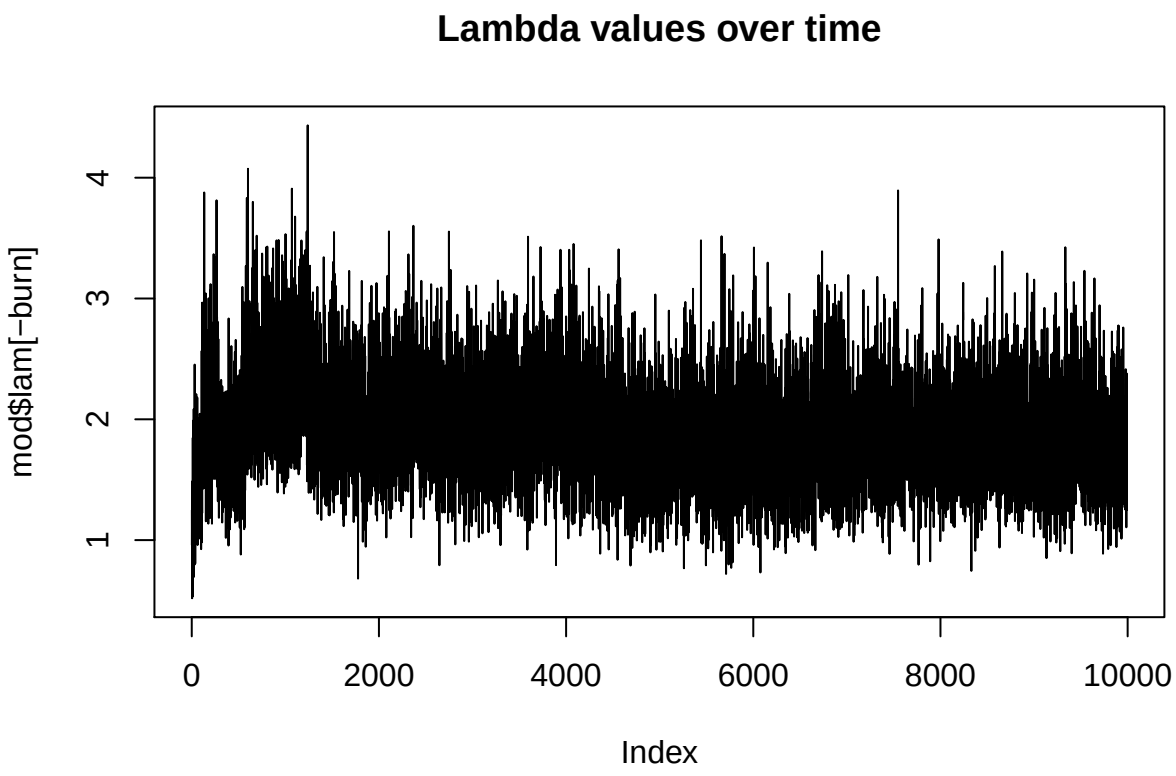
```
plot(mod$nknot[-burn], type = "l",
     main = "Number of knots over time")
```



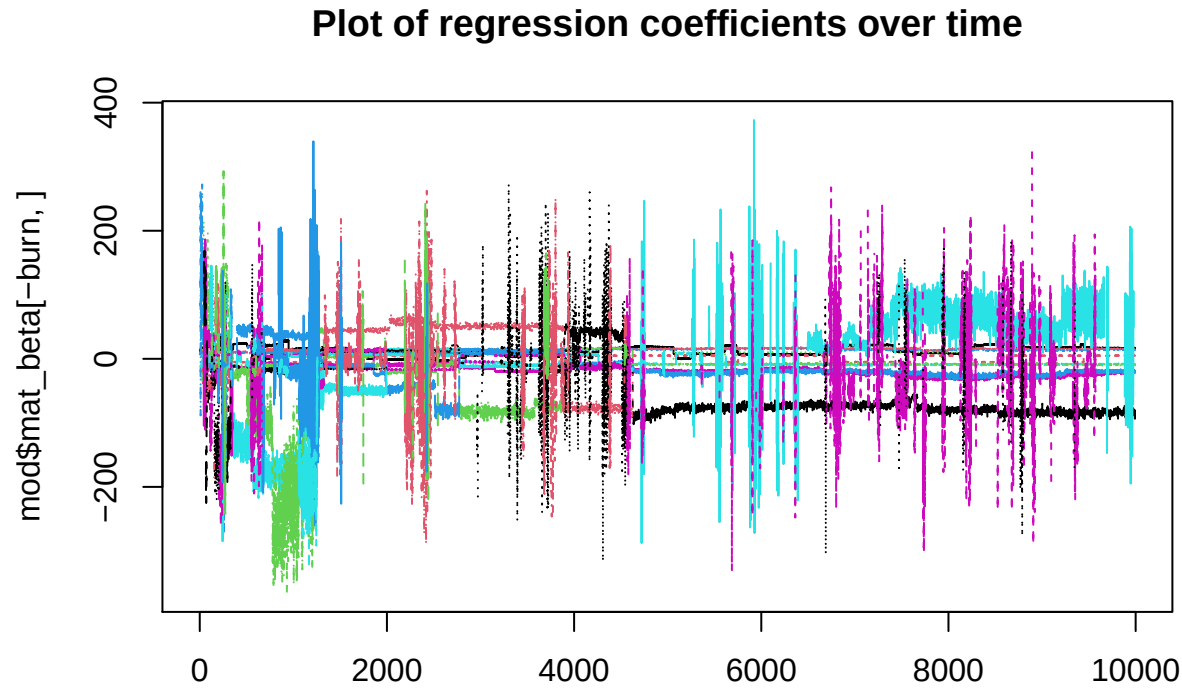

```
plot(mod$mat_sig[-burn], type = "l",
     main = "Sigma^2 values over time")
```



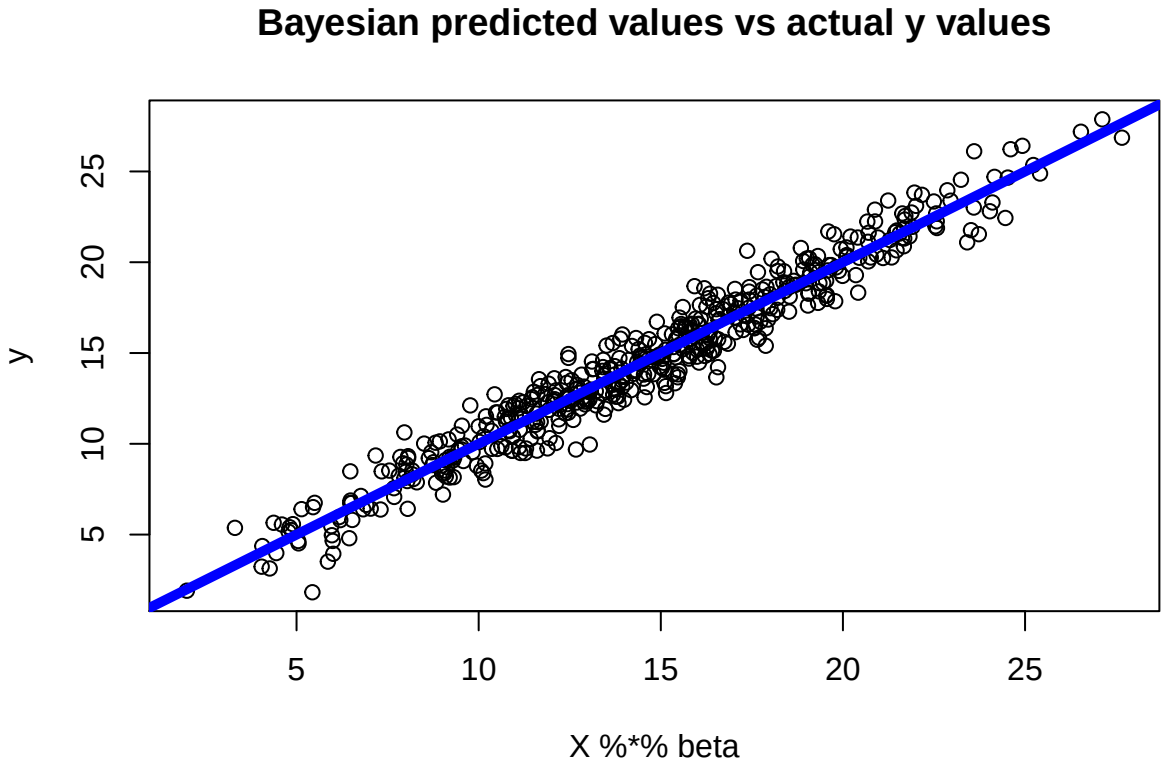

```
plot(mod$lam[-burn], type = "l",
     main = "Lambda values over time")
```




```
matplot(mod$mat_beta[-burn,], type = "l",
        main = "Plot of regression coefficients over time")
```




```
plot(X %*% beta, y,
main = "Bayesian predicted values vs actual y values")
abline(0, 1, lwd = 5, col = "blue1") #should follow a very straight line
```




```
mod1 <- lm(y ~ X %*% beta); rsq <- summary(mod1)$r.squared
cat("The predicted y values are correlated with the actual values with
an R^2 of", rsq, "\n")
```

```
## The predicted y values are correlated with the actual values with
## an R^2 of 0.9510709
```

Prediction of New Values with BMARS

```
xtest <- matrix(runif(1000*10), 1000, 10)
pred <- predict.bmars(mod, X = xtest)

plot(colMeans(pred), f(xtest),
     main = "True y values vs predicted y-values")
abline(a= 0, b = 1, lwd = 2, col = "blue1")
```