

Qbild

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How to get Qbild?

- Download the qbilcpp folder from the **GitHub repo**,
- Run the following commands :-
 - R CMD build qbild
 - R CMD install qbilcpp_1.0.tar.gz

After finishing the steps:

Load and Manipulate Data

```
library(qbild)
library(knitr)

set.seed(10)

#####
## Loading and manipulation of the data set
#####

data <- readRDS("~/airpollution.rda")

## extract names for fixed variables, to be used in plots/summary
names_fixed <- names(data[,3:5])

### response variable, check that we have 4 outcomes per id
y = matrix(data[,2],nrow=4) ## y is of the form m*n, here m = 4

### for numeric entries
x1 = matrix(data[,3],nrow=4)
x3 = matrix(data[,5],nrow=4)

### for factor entries, convert to numeric
data[,4] = as.numeric(levels(data[,4]))[data[,4]]
x2 = matrix(data[,4],nrow=4)

fixed = cbind(x1,x2,x3) #of the form m*kn; where k is the number of covariates

##### if no random(fixed) covariates present, add an intercept matrix as follows
random = matrix(1,nrow=4,ncol=ncol(y)) #of the form m*ln; where k is the number of covariates
```

```

##Set Parameters
nsim = 5000
p = 0.25 ##default for the sampler as well
fixed_intercept = TRUE #add the column of 1s to model matrix
random_intercept = FALSE #already added as a matrix

### Note : b0, B0, c1, d1 are set by default and need not be specified
#### Burn is set to 0 by default
### Summarize prints the summary and is TRUE by default
#### Method defaults to blocked, and uses regex to avoid issues with capitalizations

```

Blocked

Running the sampler

```

time_a = Sys.time()
out <- model.qbld(nsim=nsim, p=p, y=y, fixed=fixed, random=random,
                 fixed_intercept=fixed_intercept,
                 random_intercept=random_intercept, method = "block",
                 summarize = TRUE, names_fixed=names_fixed)

## Please wait while we're processing your request.
## I recommend listening to Vienna by Billy Joel while you wait.
## https://music.apple.com/in/album/vienna/158617952?i=158618071
## OR Everywhere by Fleetwood Mac.
## https://music.apple.com/in/album/everywhere/202271826?i=202272247
## No. of sim: 100
## No. of sim: 200
## No. of sim: 300
## No. of sim: 400
## No. of sim: 500
## No. of sim: 600
## No. of sim: 700
## No. of sim: 800
## No. of sim: 900
## No. of sim: 1000
## No. of sim: 1100
## No. of sim: 1200
## No. of sim: 1300
## No. of sim: 1400
## No. of sim: 1500
## No. of sim: 1600
## No. of sim: 1700
## No. of sim: 1800
## No. of sim: 1900
## No. of sim: 2000
## No. of sim: 2100
## No. of sim: 2200
## No. of sim: 2300
## No. of sim: 2400
## No. of sim: 2500
## No. of sim: 2600

```

```

## No. of sim: 2700
## No. of sim: 2800
## No. of sim: 2900
## No. of sim: 3000
## No. of sim: 3100
## No. of sim: 3200
## No. of sim: 3300
## No. of sim: 3400
## No. of sim: 3500
## No. of sim: 3600
## No. of sim: 3700
## No. of sim: 3800
## No. of sim: 3900
## No. of sim: 4000
## No. of sim: 4100
## No. of sim: 4200
## No. of sim: 4300
## No. of sim: 4400
## No. of sim: 4500
## No. of sim: 4600
## No. of sim: 4700
## No. of sim: 4800
## No. of sim: 4900
##
## Quantile used = 0.25
##
## No. of Iterations = 5000 samples
## Type of Sampler = block
## Burn-in Used? = FALSE
##
## 1. Statistics for each variable,
##      Mean   SD     ESS GR Diagnostic   MCSE
## Intercept -0.07 0.94 2200.83         1.001 0.020
## age       -0.03 0.13  170.05         1.002 0.010
## smoking   -0.27 0.62 1589.78         1.000 0.015
## counts    -0.21 0.09   8.95         1.015 0.029
## Varphi2    1.01 0.43  775.13         1.000 0.015
##
##
## 2. Quantiles for each variable,
##      2.5%   25%   50%   75%  97.5%
## Intercept -1.917 -0.715 -0.079 0.549 1.798
## age       -0.286 -0.112 -0.028 0.060 0.227
## smoking   -1.479 -0.685 -0.266 0.145 0.923
## counts    -0.379 -0.270 -0.227 -0.140 -0.054
## Varphi2    0.454  0.715  0.918 1.206 2.125
##
## MultiESS value = 848.3944 775.1308
##
## 3. Model Selection Criterion
## Log likelihood = -76.98894
## AIC = 163.9779
## BIC = 180.3175

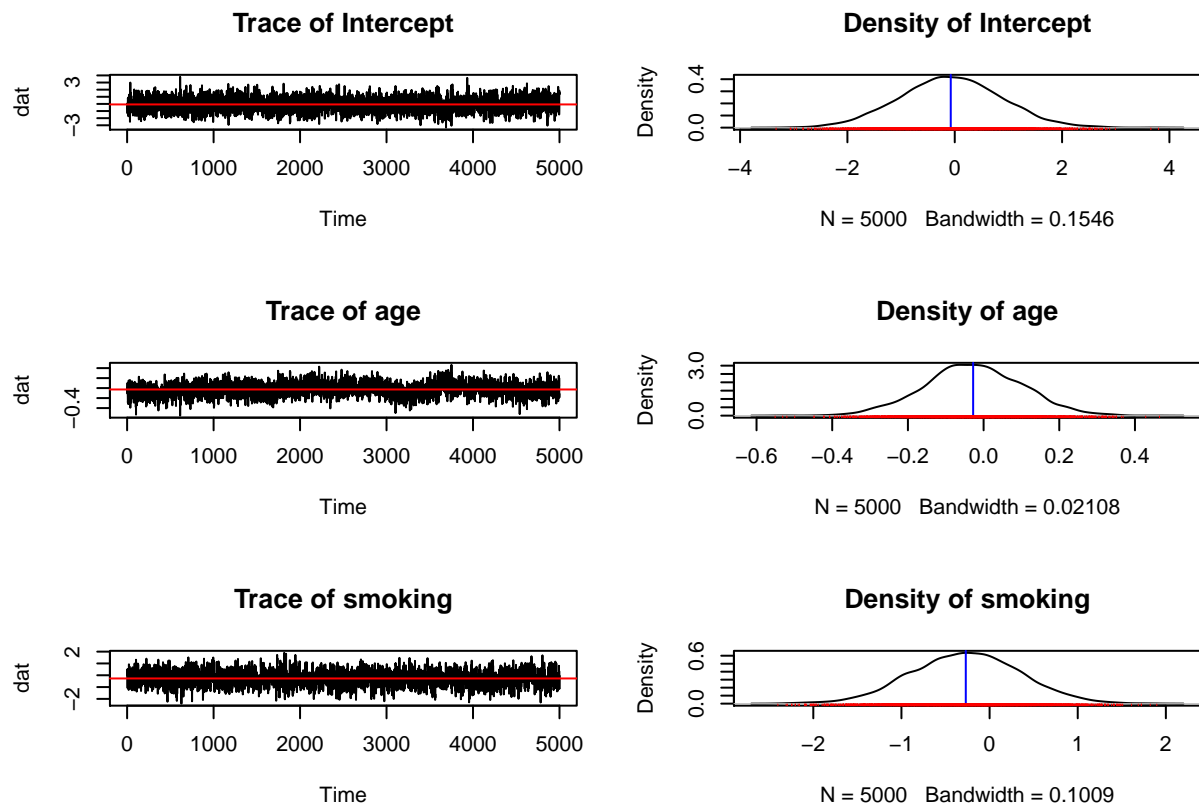
```

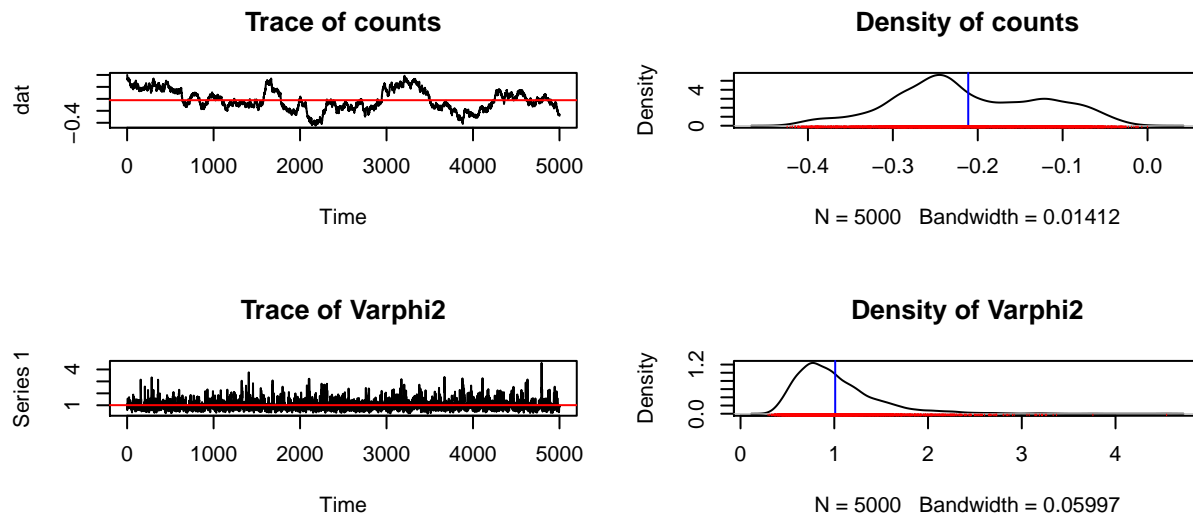
```
time_b = Sys.time()
paste0("Time elapsed = ",round(time_b-time_a,2)," sec")
```

```
## [1] "Time elapsed = 2.8 sec"
```

Plotting the output

```
plot(out) #rugplot allows for coda type points concentration
```





Unblocked

Running the sampler

```
time_a = Sys.time()
out2 <- model.qbld(nsim=nsim, p=p, y=y, fixed=fixed, random=random,
  fixed_intercept=fixed_intercept,
  random_intercept=random_intercept, method = "Unblock",
  summarize = TRUE, names_fixed = NULL) #names not added and will be auto generated
```

```
## Please wait while we're processing your request.
## I recommend listening to Vienna by Billy Joel while you wait.
## https://music.apple.com/in/album/vienna/158617952?i=158618071
## OR Everywhere by Fleetwood Mac.
## https://music.apple.com/in/album/everywhere/202271826?i=202272247
## No. of sim: 200
## No. of sim: 400
## No. of sim: 600
## No. of sim: 800
## No. of sim: 1000
## No. of sim: 1200
## No. of sim: 1400
## No. of sim: 1600
## No. of sim: 1800
## No. of sim: 2000
```

```

## No. of sim: 2200
## No. of sim: 2400
## No. of sim: 2600
## No. of sim: 2800
## No. of sim: 3000
## No. of sim: 3200
## No. of sim: 3400
## No. of sim: 3600
## No. of sim: 3800
## No. of sim: 4000
## No. of sim: 4200
## No. of sim: 4400
## No. of sim: 4600
## No. of sim: 4800
##
## Quantile used = 0.25
##
## No. of Iterations = 5000 samples
## Type of Sampler = Unblock
## Burn-in Used? = FALSE
##
## 1. Statistics for each variable,
##      Mean   SD     ESS GR Diagnostic   MCSE
## Intercept -0.10 0.94 2121.70         1.000 0.020
## beta1     -0.01 0.13  295.38         1.005 0.007
## beta2     -0.30 0.62  363.39         1.002 0.032
## beta3     -0.24 0.07   5.66         1.043 0.031
## Varphi2    1.02 0.44  675.02         1.001 0.017
##
##
## 2. Quantiles for each variable,
##      2.5%   25%   50%   75%  97.5%
## Intercept -1.911 -0.735 -0.109 0.532 1.752
## beta1     -0.270 -0.093 -0.006 0.081 0.237
## beta2     -1.481 -0.720 -0.300 0.115 0.932
## beta3     -0.369 -0.296 -0.248 -0.193 -0.077
## Varphi2    0.458  0.715  0.917 1.221 2.132
##
## MultiESS value = 351.2343 675.0183
##
## 3. Model Selection Criterion
## Log likelihood = -77.13456
## AIC = 164.2691
## BIC = 180.6087

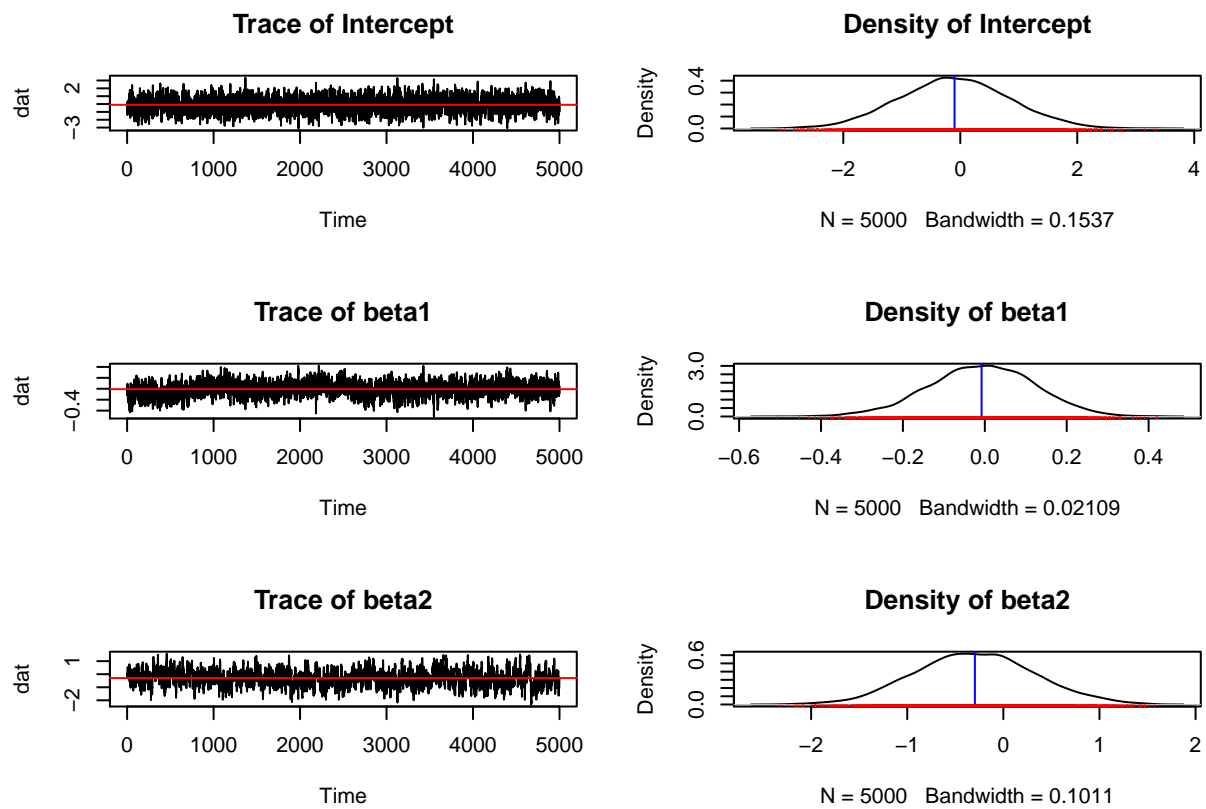
time_b = Sys.time()
paste0("Time elapsed = ",round(time_b-time_a,2)," sec")

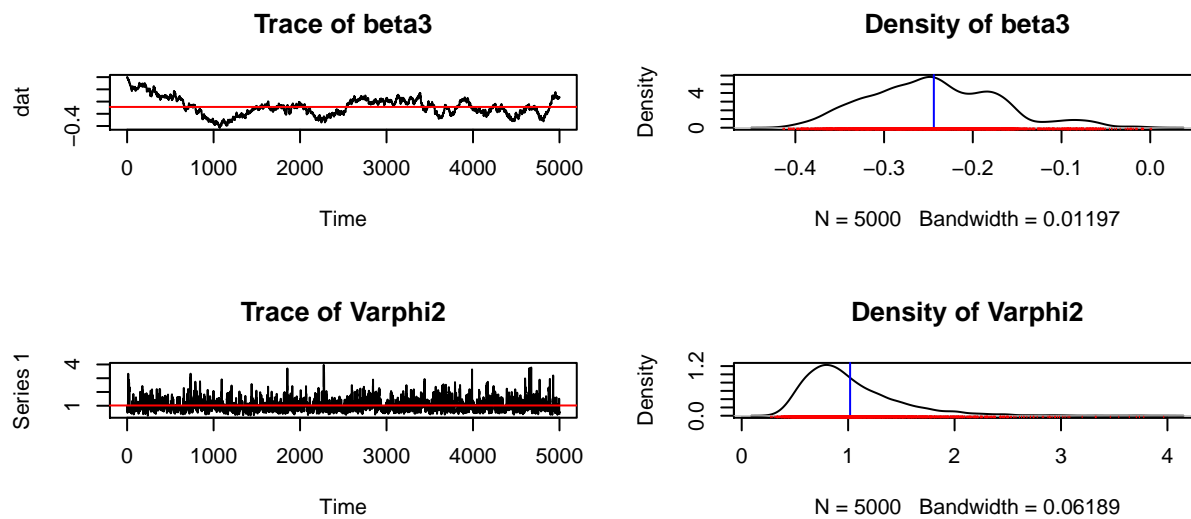
## [1] "Time elapsed = 1.66 sec"

```

Plotting the output

```
plot(out2) #rugplot allows for coda type points concentration
```





```
### load an exisiting run and try summary/plot on it
run25 <- readRDS("~/Desktop/gsoc_qbld/Testing/run25.rds")
run25[[1]] = t(run25[[1]])

### make a qbld object out of existing object
out3 <- make.qbld(run25,p=0.25,nsim=5000,burn=0,
  varnames.fixed = c("beta1","beta2","beta3","varphi2")
  ,which="blocked")

summary(out3) ##AIC,BIC,loglike missing as cannot be calculated
```

```
##
## Quantile used = 0.25
##
## No. of Iterations = 5000 samples
## Type of Sampler = blocked
## Burn-in Used? = FALSE
##
## 1. Statistics for each variable,
##      Mean   SD   ESS GR Diagnostic  MCSE
## beta1  -5.32 0.25 291.05      1.002 0.015
## beta2   6.15 0.31 231.76      1.002 0.020
## beta3   4.35 0.26 307.26      1.001 0.015
## varphi2  0.95 0.16 149.84      1.004 0.013
##
```



```
##
## 2. Quantiles for each variable,
##      2.5%   25%   50%   75%  97.5%
## beta1  -5.763 -5.467 -5.329 -5.188 -4.901
## beta2   5.613  5.970  6.153  6.333  6.672
## beta3   3.889  4.198  4.352  4.508  4.816
## varphi2 0.667  0.827  0.937  1.056  1.266
##
## MultiESS value = 500.9752 149.8425
```

```
plot(out3)
```

