R Notebook

```
source("Sampling_algorithm.r")
source("Johnson_SU_density.r")
source("Online update moments.r")
source("Johnson transformation with online update moment method.r")
source("Johnson transformation with MLE method.r")
source("Johnson transformation with perfect map.r")
```

```
library(coda)
library(moments)
library(nleqslv)
# set the parameter
lambda_john <- 1
delta_john <- 0.5
xi_john <-  1
gamma_john <- 1
nits = 50000
pre_nits = 2000
h = 0.9
x_curr = 0

# define the density function with one parameter
d_logpi <- function(x) d_logJohnson (x,lambda_john,delta_john,xi_john,gamma_john)
log_pi <- function(x) log_dJohnson (x,lambda_john,delta_john,xi_john,gamma_john)

# Sampling by different algorithm
t1 <- Sys.time()
sample_MALA <- Adaptive_MALA(d_logpi,log_pi,nits, h,x_curr)
```

```
## 10000  iterations completed.
## 20000  iterations completed.
## 30000  iterations completed.
## 40000  iterations completed.
## 50000  iterations completed.
```

```
t2 <- Sys.time()
sample_RWM <- Adaptive_RWM(log_pi,nits,h,x_curr)
```

```
## iteration 10000iteration 20000iteration 30000iteration 40000iteration 50000
```

```
t3 <- Sys.time()
trans_john <- Transformation_johnsonsu_mom(log_pi,d_logpi,nits,x_curr)
```

```
## 10000  iterations completed.
## 20000  iterations completed.
## 30000  iterations completed.
## 40000  iterations completed.
## 50000  iterations completed.
```

```r
t4 <- Sys.time()
perfect_john <- Perfect_map_johnsonsu(log_pi,xi_john,lambda_john,delta_john,gamma_john)
```

```
## iteration 10000iteration 20000iteration 30000iteration 40000iteration 50000
```

```r
t5 <- Sys.time()
pre_samples <- Adaptive_RWM(log_pi,pre_nits,h,x_curr)$x_store
trans_john_mle <- Sampling_trsanformation_johnsonsu_MLE (pre_samples,log_pi,nits,method = "MLE",x_curr =
```

```
## iteration 10000iteration 20000iteration 30000iteration 40000iteration 50000
```

```r
t6 <- Sys.time()

# print the ESS per sec
cat("the ESS per sec of MALA is: ",effectiveSize(sample_MALA$x_store) / as.numeric(t2- t1,units = "secs
```

```
## the ESS per sec of MALA is:  16.24925
```

```r
cat("the ESS per sec of RWM is: ",effectiveSize(sample_RWM$x_store) / as.numeric(t3 - t2,units = "secs")
```

```
## the ESS per sec of RWM is:  157.0281
```

```r
cat("the ESS per sec of transformation method with Johnson SU (online update moment method) is: ",effec
```

```
## the ESS per sec of transformation method with Johnson SU (online update moment method) is:  75.22064
```

```r
cat('The ESS per sec of transformation method with Johnson SU (MLE method) is: ', effectiveSize(trans_j
```

```
## The ESS per sec of transformation method with Johnson SU (MLE method) is:  1263.852
```

```r
cat("the ESS per sec of Perfect transformation is: ",effectiveSize(perfect_john$samples_x)/ as.numeric(
```

```
## the ESS per sec of Perfect transformation is:  1533.58
```