

# KDExp: Kernel Density Estimation Prior Distribution for Exposure Uncertainty Propagation

## KDExp\_Example

[1] Load the simulated data: See Table 1 of the Manuscript

- Associated: Yes
- Correlated: Yes
- Skewed: No
- $\delta_i$  Variance: Low

```
set.seed(8453)
```

```
library(KDExp)
```

```
library(kernelboot)
```

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

```
load("C:\\Users\\jlw98\\Desktop\\Yale Research\\Created R Packages\\KDExp\\KDExp_Example\\simulated_data")
```

```
y<-sim_data[[1]]
```

```
x<-matrix(1,
          nrow = length(y),
          ncol = 1)
```

```
z_ppd<-sim_data[[2]]
```

```
dim(z_ppd)
```

```
## [1] 250 1000
```

[2] Fit the Models:

```
#####  
#UKDE Bandwidth Estimation  
#####
```

```
h<-rep(0.00,
      times = length(y))  
for(k in 1:length(y)){  
  h[k]<-bw.SJ(z_ppd[k,])  
}
```

```
#####  
#MKDE Bandwidth Estimation  
#####
```

```
H<-bw.scott(t(z_ppd))
```

```
#####  
#Model Fitting  
#####
```

```
burnin<-1000
```

```
mcmc_samples<-6000
```

```
thin<-10
```

```
keep_set<-seq((burnin + 1),  
             mcmc_samples,  
             thin)
```

```
results_ukde<-UKDE(mcmc_samples = mcmc_samples,
                    y = y,
                    x = x,
                    z_ppd = z_ppd,
                    h = h,
                    likelihood_indicator = 1)
```

```
## Progress: 10%
## *****
## Progress: 20%
## *****
## Progress: 30%
## *****
## Progress: 40%
## *****
## Progress: 50%
## *****
## Progress: 60%
## *****
## Progress: 70%
## *****
## Progress: 80%
## *****
## Progress: 90%
## *****
## Progress: 100%
## *****
```

```
results_mkde<-MKDE(mcmc_samples = mcmc_samples,
                    y = y,
                    x = x,
                    z_ppd = z_ppd,
                    H = H,
                    likelihood_indicator = 1)
```

```
## Progress: 10%
## *****
## Progress: 20%
## *****
## Progress: 30%
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## Progress: 40%
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## Progress: 50%
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## Progress: 60%
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## Progress: 70%
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## Progress: 80%
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## Progress: 90%
## *****
## Progress: 100%
```

```
## *****
```

[3] Analyzing Output:

```
plot(results_ukde$theta[keep_set,1], type="l")  
lines(results_mkde$theta[keep_set,1], col = "red")  
abline(h = 1.00, #Truth  
       col = "blue",  
       lwd = 2)
```

