covdepGE demo

10/31/2021

```
library(covdepGE)
library(ggplot2)
library(latex2exp)
`?`(covdepGE())
```

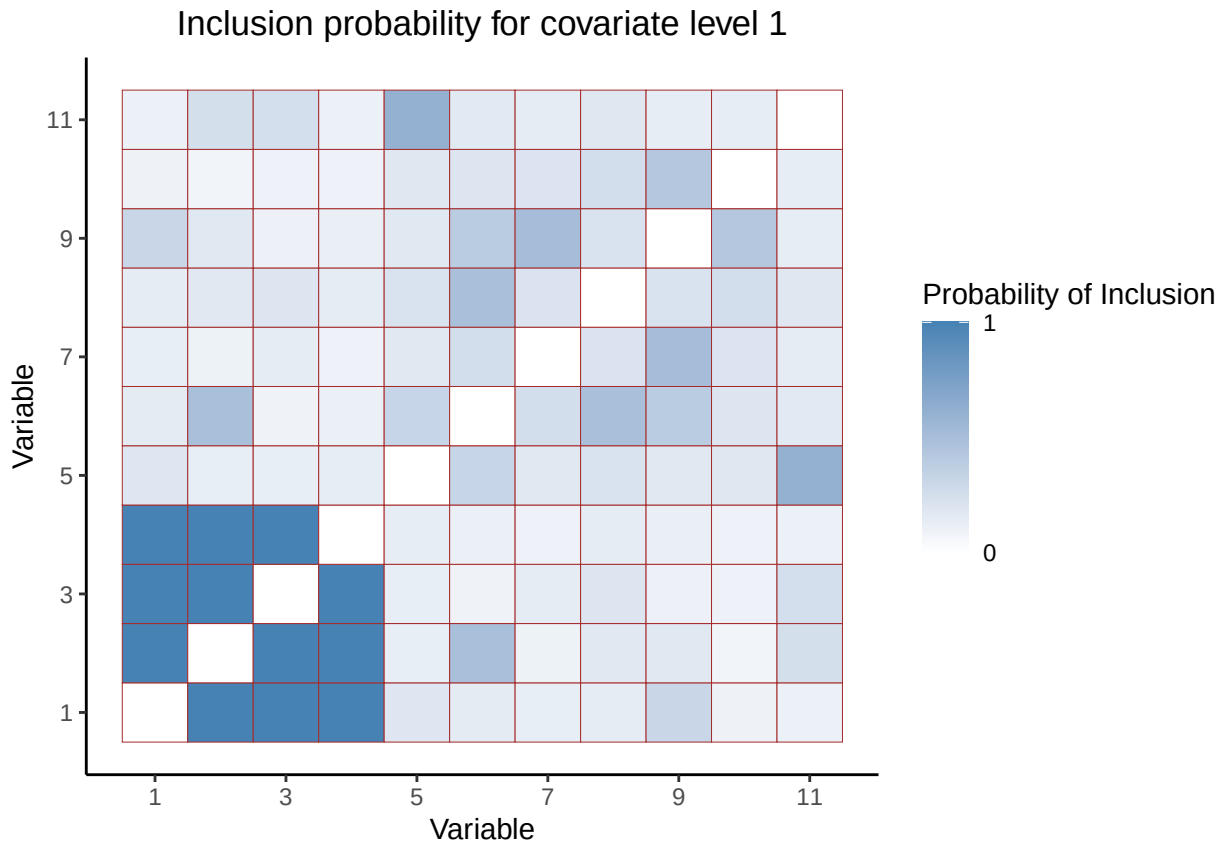
```
## starting httpd help server ... done
```

```
source("generate_data.R")  # script for generating the data for the discrete and
# continuous covariate model
cont <- generate_continuous()
disc <- generate_discrete()

# apply to the discrete data
out.disc <- covdepGE(disc$data, disc$covts)

# get the probabilities of inclusion
incl.probs.disc <- out.disc$inclusion_probs

# get the graphs
graphs.disc <- out.disc$graphs

# visualize the probabilities of inclusion for the first
# individual (covariate level 1)
round(incl.probs1 <- incl.probs.disc[[1]], 2)
```

```
##       [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10] [,11]
##  [1,] 0.00 1.00 1.00 1.00 0.19 0.15 0.13 0.14 0.32  0.10  0.11
##  [2,] 1.00 0.00 1.00 1.00 0.13 0.49 0.10 0.17 0.18  0.08  0.25
##  [3,] 1.00 1.00 0.00 1.00 0.13 0.09 0.15 0.20 0.10  0.10  0.24
##  [4,] 1.00 1.00 1.00 0.00 0.14 0.12 0.10 0.14 0.12  0.10  0.11
##  [5,] 0.19 0.13 0.13 0.14 0.00 0.32 0.18 0.22 0.18  0.18  0.61
##  [6,] 0.15 0.49 0.09 0.12 0.32 0.00 0.25 0.49 0.40  0.20  0.17
##  [7,] 0.13 0.10 0.15 0.10 0.18 0.25 0.00 0.21 0.51  0.20  0.15
##  [8,] 0.14 0.17 0.20 0.14 0.22 0.49 0.21 0.00 0.21  0.25  0.18
##  [9,] 0.32 0.18 0.10 0.12 0.18 0.40 0.51 0.21 0.00  0.43  0.14
## [10,] 0.10 0.08 0.10 0.10 0.18 0.20 0.20 0.25 0.43  0.00  0.14
## [11,] 0.11 0.25 0.24 0.11 0.61 0.17 0.15 0.18 0.14  0.14  0.00
```

```
(ggplot(reshape2::melt(incl.probs1), aes(x = Var1, y = Var2, fill = value)) +
    geom_tile(color = "brown") + scale_fill_gradient(low = "white",
    high = "steelblue", breaks = c(1, 0)) + labs(fill = "Probability of Inclusion") +
    theme_classic() + xlab("Variable") + ylab("Variable") + scale_x_continuous(breaks = seq(1,
    ncol(disc$data), 2)) + scale_y_continuous(breaks = seq(1, ncol(disc$data),
```

```
    2)) + ggtitle("Inclusion probability for covariate level 1") +
    theme(plot.title = element_text(hjust = 0.5)))
```

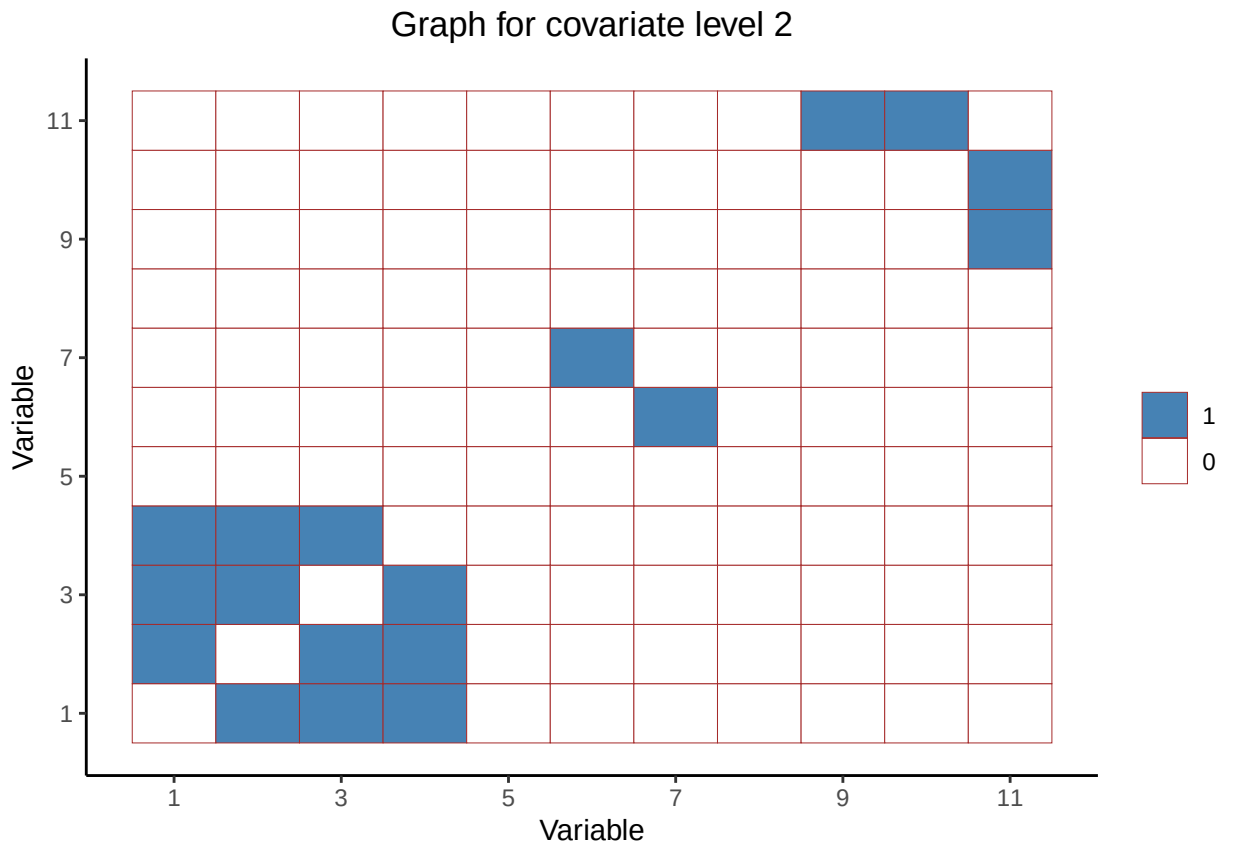



```
# visualize the graph for the last individual (covariate level
# 2)
(graph100 <- graphs.disc[[length(graphs.disc)]])
```

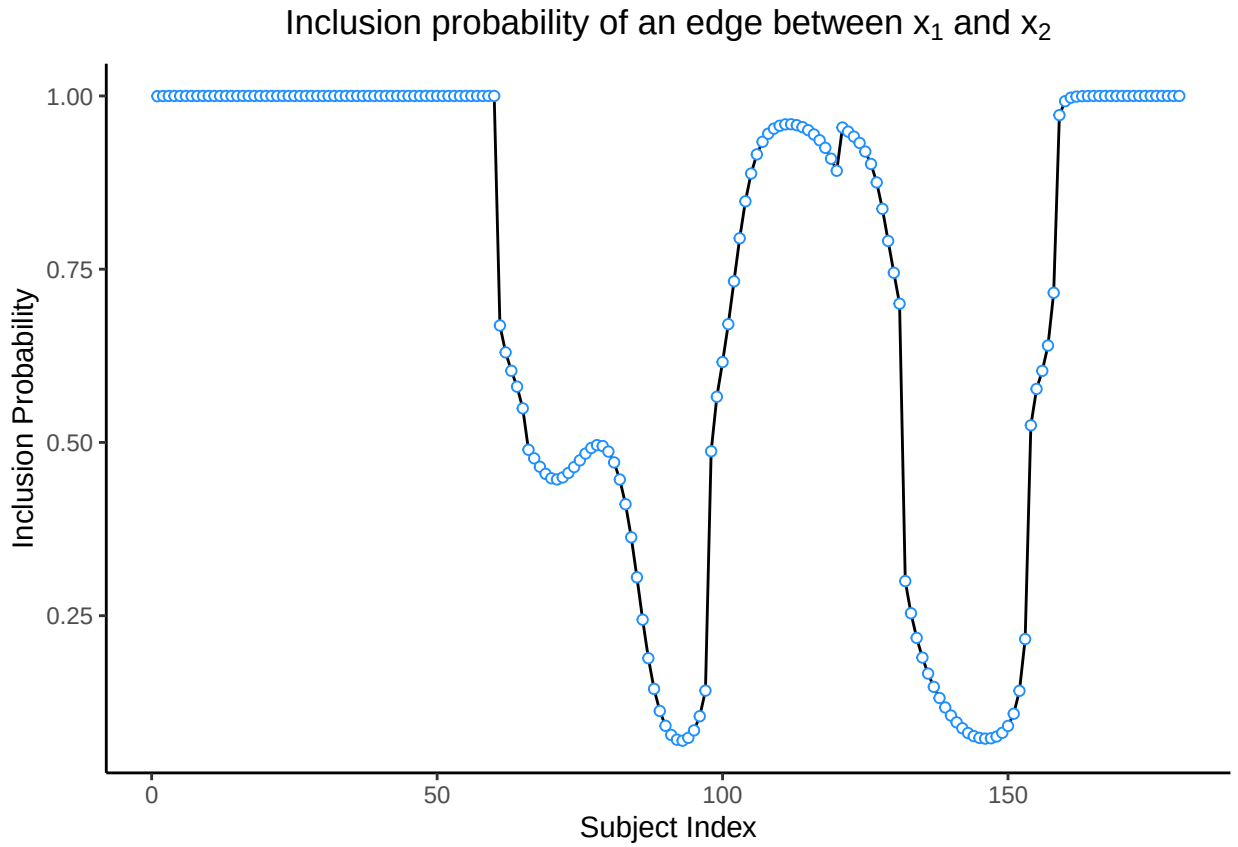
```
##       [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10] [,11]
##  [1,]    0    1    1    1    0    0    0    0    0     0     0
##  [2,]    1    0    1    1    0    0    0    0    0     0     0
##  [3,]    1    1    0    1    0    0    0    0    0     0     0
##  [4,]    1    1    1    0    0    0    0    0    0     0     0
##  [5,]    0    0    0    0    0    0    0    0    0     0     0
##  [6,]    0    0    0    0    0    0    1    0    0     0     0
##  [7,]    0    0    0    0    0    1    0    0    0     0     0
##  [8,]    0    0    0    0    0    0    0    0    0     0     0
##  [9,]    0    0    0    0    0    0    0    0    0     0     1
## [10,]    0    0    0    0    0    0    0    0    0     0     1
## [11,]    0    0    0    0    0    0    0    0    1     1     0
```

```
(ggplot(reshape2::melt(graph100), aes(x = Var1, y = Var2, fill = value)) +
    geom_tile(color = "brown") + scale_fill_gradient(low = "white",
    high = "steelblue", breaks = c(1, 0)) + guides(fill = guide_legend(title = "")) +
    theme_classic() + xlab("Variable") + ylab("Variable") + scale_x_continuous(breaks = seq(1,
```

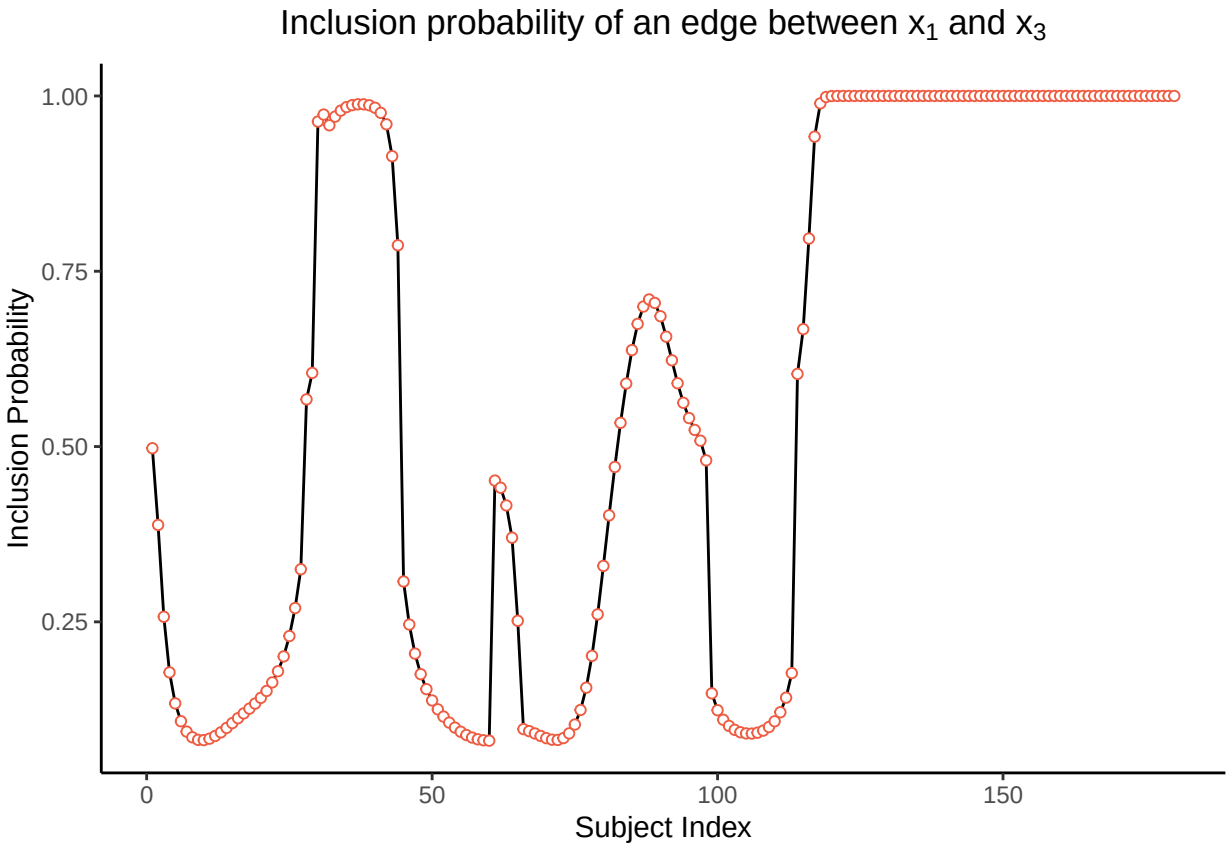
```
    ncol(disc$data), 2)) + scale_y_continuous(breaks = seq(1, ncol(disc$data),
    2)) + ggtitle("Graph for covariate level 2") + theme(plot.title = element_text(hjust = 0.5)))
```




```
# apply to the continuous data
out.cont <- covdepGE(cont$data, cont$covts)

# get the continuous probabilities of inclusion
incl.probs.cont <- out.cont$inclusion_probs

# get probabilities of inclusion for x_1 to x_2 and x_1 to x_3
probs12 <- unlist(lapply(incl.probs.cont, function(x) x[1, 2]))
probs13 <- unlist(lapply(out.cont$inclusion_probs, function(x) x[1,
    3]))

# visualize them
(ggplot(data.frame(subj = 1:length(probs12), prob = probs12), aes(subj,
    prob)) + geom_line() + geom_point(color = "dodgerblue", fill = "white",
    shape = 21) + theme_classic() + xlab("Subject Index") + ylab("Inclusion Probability") +
    ggtitle(TeX("Inclusion probability of an edge between $x_1$ and $x_2$")) +
    theme(plot.title = element_text(hjust = 0.5)))
```




```
(ggplot(data.frame(subj = 1:length(probs13), prob = probs13), aes(subj,
    prob)) + geom_line() + geom_point(color = "tomato2", fill = "white",
    shape = 21) + theme_classic() + xlab("Subject Index") + ylab("Inclusion Probability") +
    ggtitle(TeX("Inclusion probability of an edge between $x_1$ and $x_3$")) +
    theme(plot.title = element_text(hjust = 0.5)))
```


Inclusion probability of an edge between x_1 and x_3
Inclusion Probability
1.00
0.75
0.50
0.25
0
50
100
150
Subject Index