

Product of Bivariate Copulas (PBC)

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This document

shows briefly how to use the `PBC` package. See the package documentation and references for more informations. Please let the authors know about bugs or suggestions!

Let's get started

Load the package.

```
> library(PBC)
```

Set the underlying graphical structure you wish, for instance

```
> g <- graph.formula(X1-X2, X2-X3, X3-X4, X4-X5, simplify = FALSE)
```

Pick a copula family (here Gumbel)

```
> myPBC <- pbcGumbel(g)
```

Or:

```
> myPBC <- pbc(g, model="gumbel")
```

You can visualize the graph in Figure 1. Generate n observations from that model with the parameter vector θ .

```
> theta <- 1:4
```

```
> n <- 100
```

```
> data <- rPBC(n, theta, myPBC)
```

```
> head(data)
```

```
      [,1]      [,2]      [,3]      [,4]      [,5]
[1,] 0.4207798 0.4129958 0.3961161 0.34178897 0.3904424
[2,] 0.5765883 0.4706939 0.4174468 0.39497048 0.7239168
[3,] 0.4576926 0.5401168 0.8620587 0.04900605 0.5249799
[4,] 0.4096496 0.9234606 0.9544151 0.07820935 0.1144382
[5,] 0.8578222 0.3694362 0.3692440 0.67192170 0.7021367
[6,] 0.7780032 0.7220907 0.4635803 0.35661046 0.4217583
```

Estimate the parameters:

```
> init <- 1/runif(4)
```

```
> theta.hat <- pbcOptim(init, data, myPBC, method = 'BFGS')
```

```
[1] 0.7854512 1.4776297 3.7307616 3.9968941
```

The value for `init` was set randomly. It is best to provide a first guess, for instance by finding the pairwise maximum likelihood estimate (you don't need this package for that).

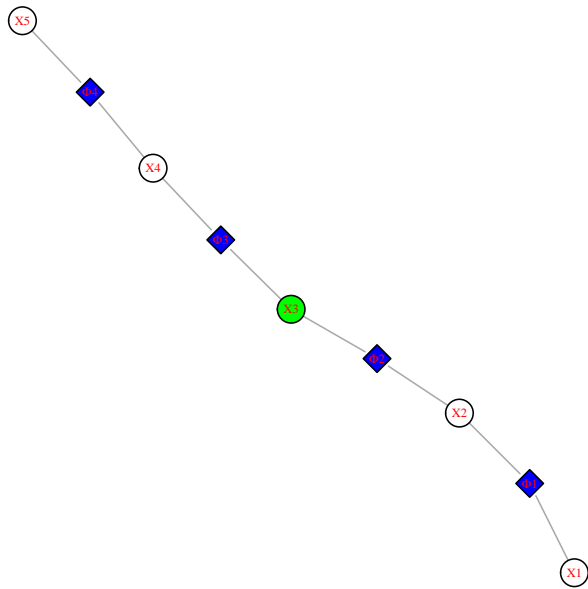


Figure 1: Graph underlying the PBC model.