Exploring network data with latentnet and lvm4net

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Network data

```
load("lazega.RData")
str(X)
```

```
# 'data.frame':    36 obs. of  9 variables:
#  $ name     : chr   "V1" "V2" "V3" "V4" ...
#  $ Seniority: int  1 2 3 4 5 6 7 8 9 10 ...
#  $ Status   : int  1 1 1 1 1 1 1 1 1 1 ...
#  $ Gender   : int  1 1 1 1 1 1 1 1 1 1 ...
#  $ Office   : int  1 1 2 1 2 2 2 1 1 1 ...
#  $ Years    : int  31 32 13 31 31 29 29 28 25 25 ...
#  $ Age      : int  64 62 67 59 59 55 63 53 53 53 ...
#  $ Practice : int  1 2 1 2 1 1 2 1 2 2 ...
#  $ School   : int  1 1 1 3 2 1 3 3 1 3 ...
```

```
head(Y)
```

```
#     V1 V2 V3 V4 V5 V6 V7 V8 V9 V10 V11 V12 V13 V14 V15 V16 V17 V18
# V1   0  0  0  0  0  0  0  0  0   0   0   0   0   0   0   0   1   0
# V2   0  0  0  0  0  0  1  0  0   0   0   0   0   0   0   1   1   0
# V3   0  0  0  0  0  0  0  0  0   0   0   0   0   0   0   0   0   1
# V4   0  0  0  0  0  0  0  0  0   0   0   1   0   0   0   0   1   0
# V5   0  0  0  0  0  0  0  0  0   0   0   0   0   0   0   0   0   1
# V6   0  0  0  0  0  0  0  0  0   0   0   0   0   0   0   0   0   0
#     V19 V20 V21 V22 V23 V24 V25 V26 V27 V28 V29 V30 V31 V32 V33 V34
# V1    0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
```
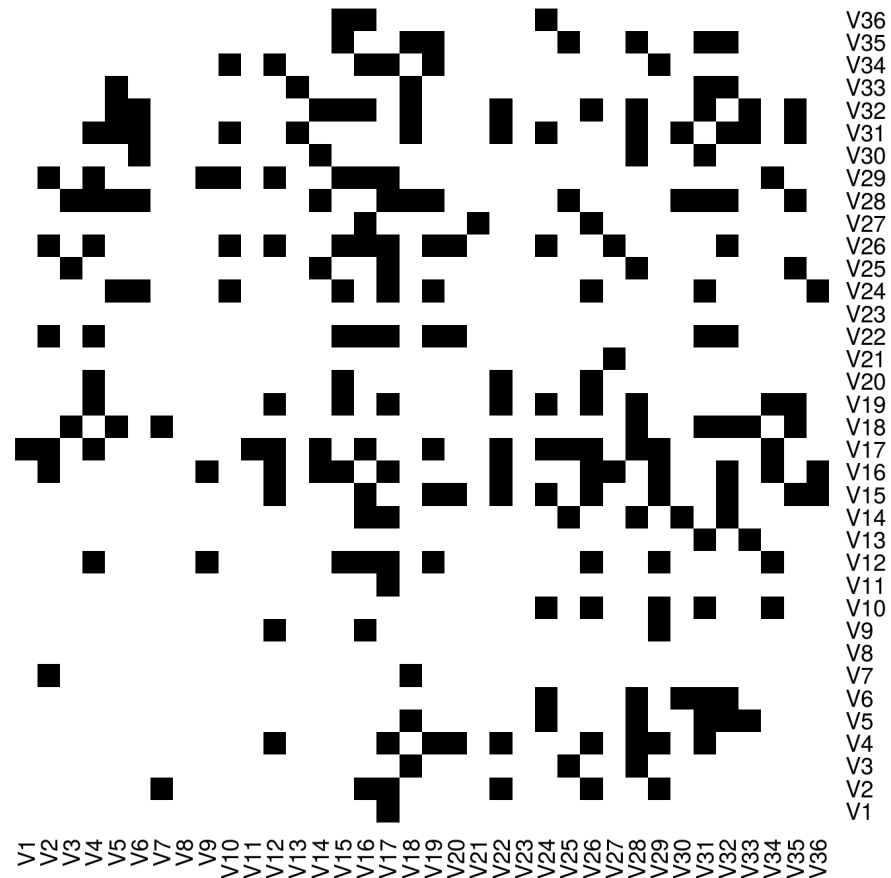
Heatmap
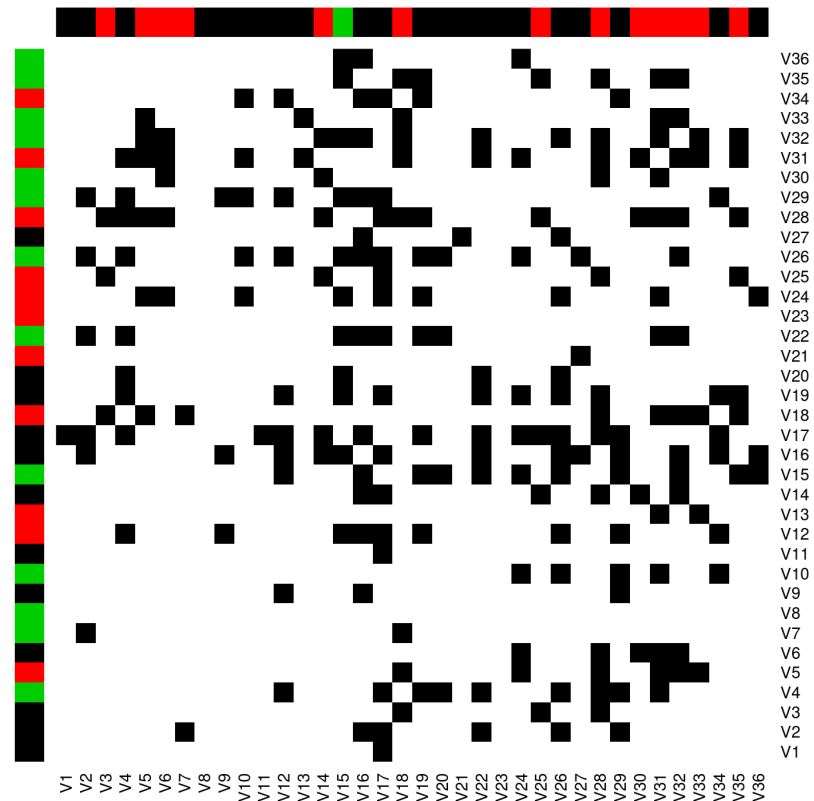
```r
heatmap(Y, scale = "none", col = c(0,1))
```
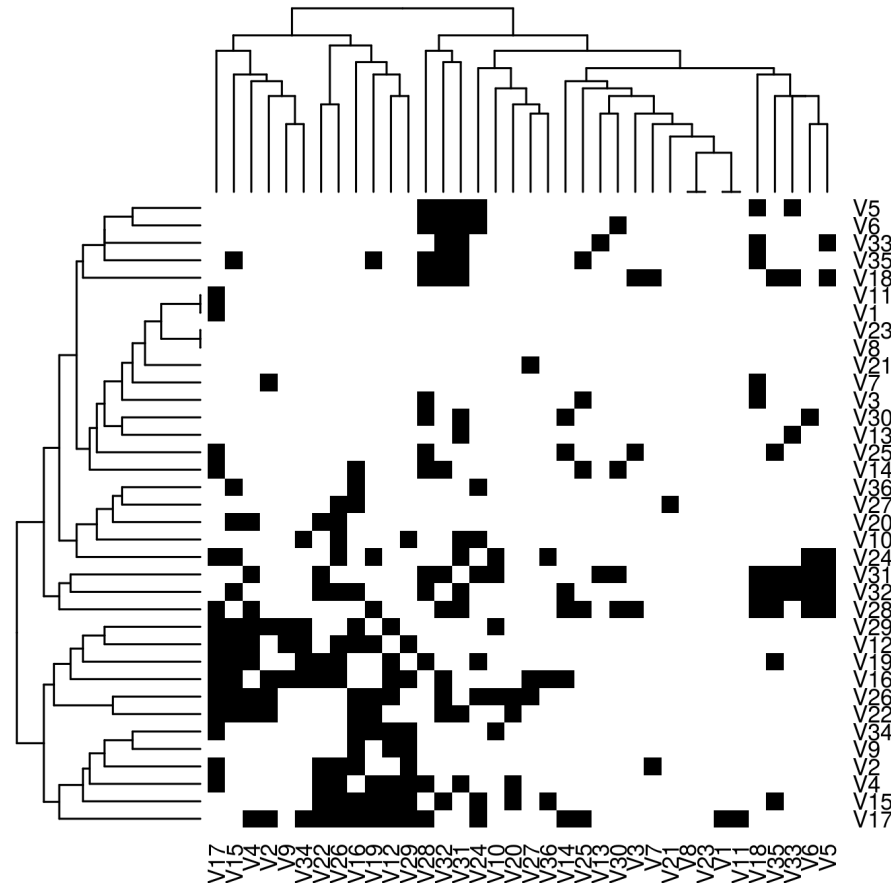
Heatmap

```r
heatmap(Y, Colv = NA, Rowv = NA, scale = "none", col = c(0,1))
```
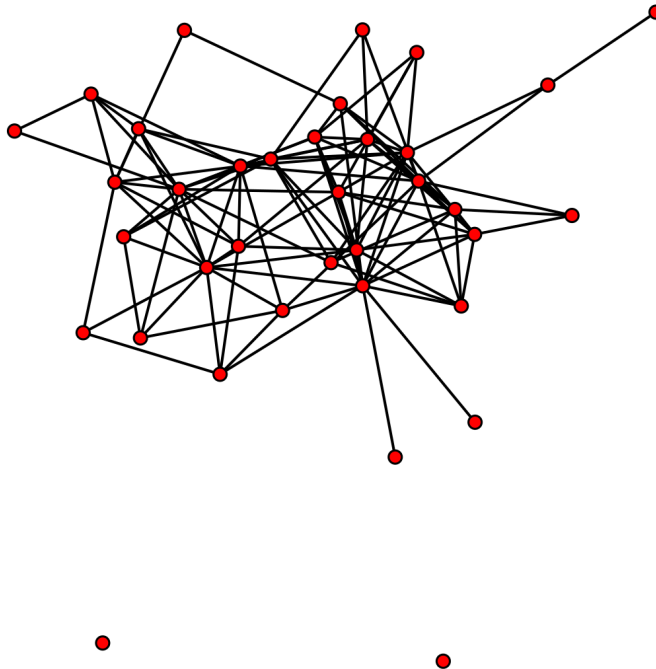
Heatmap with attributes

```
heatmap(Y, Colv = NA, Rowv = NA, scale = "none", col = c(0,1),
    ColSideColors = as.character(X$Office),
    RowSideColors = as.character(X$School))
```
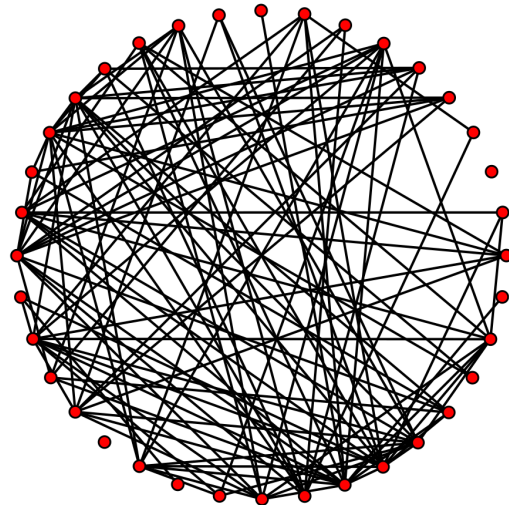
Handling Networks

```
library(statnet)
y <- network(Y, directed =  !isSymmetric(Y))
plot(y)
```
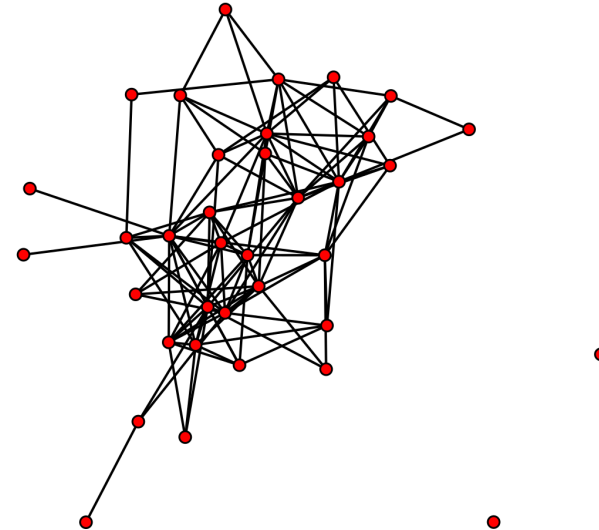
Plotting Networks

```
par(mfrow = c(1, 2))
plot(y, mode = "circle", main = "Circle")
plot(y, mode = "fruchtermanreingold", main = "Fruchterman Reingold")
```

Circle
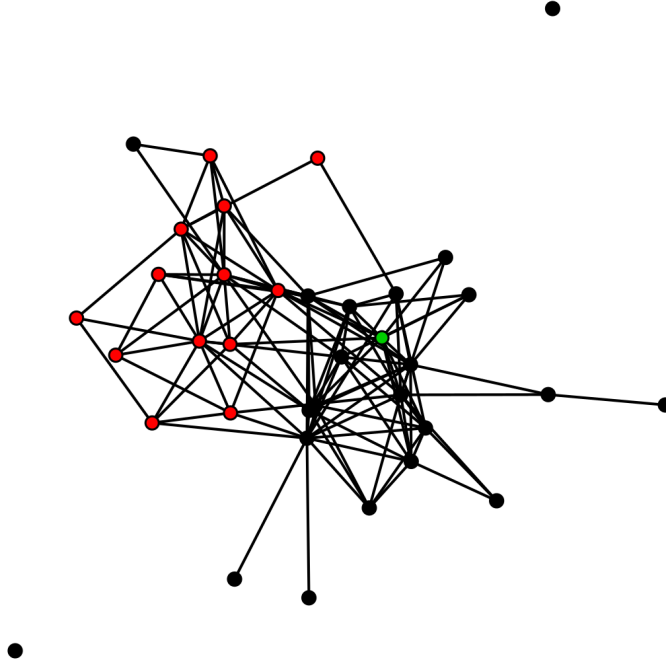
Fruchterman Reingold

Setting attributes of a network

```
set.vertex.attribute(y, "Office", X$Office)
set.vertex.attribute(y, "School", X$School)
set.vertex.attribute(y, "Years", X$Years)
set.vertex.attribute(y, "Gender", X$Gender)
set.vertex.attribute(y, "Age", X$Age)
set.vertex.attribute(y, "Practice", X$Practice)
```
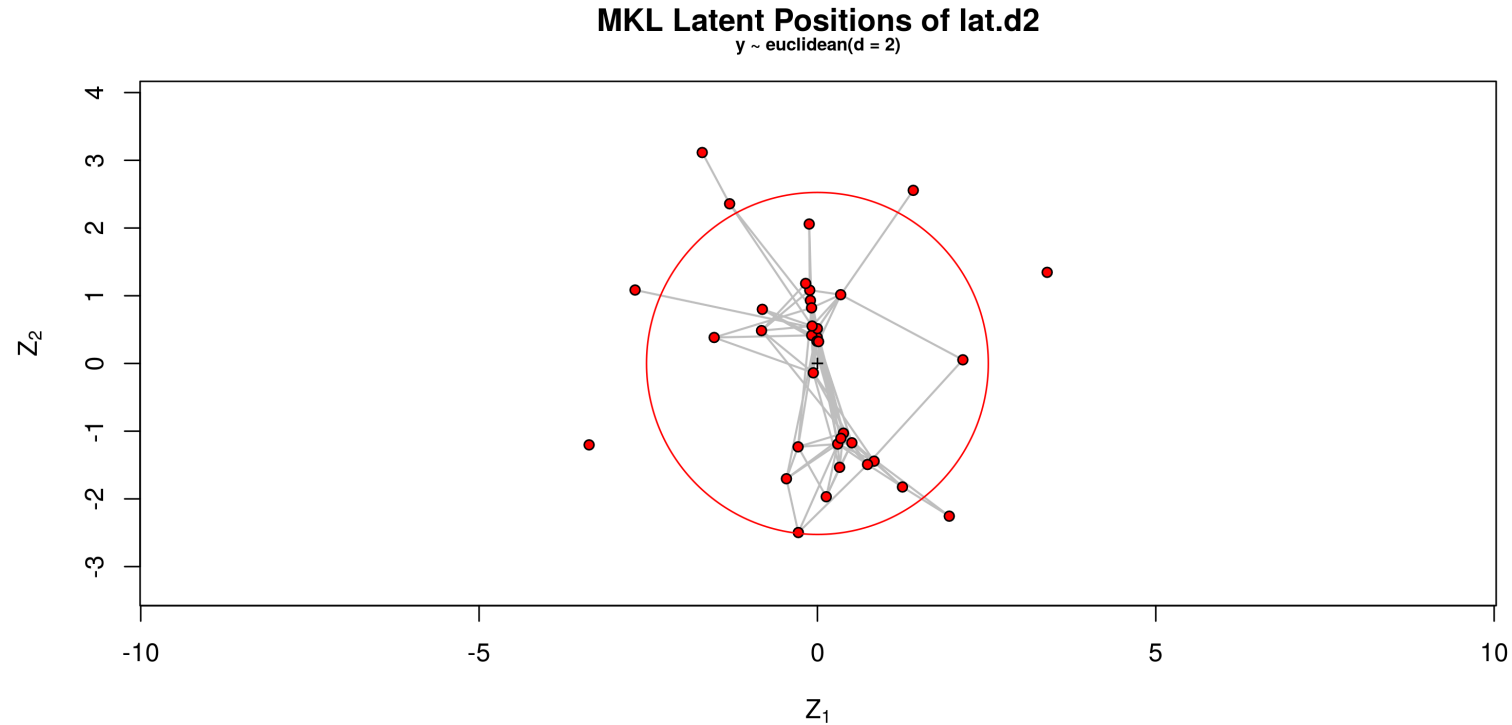
Plot with attributes

```
plot(y, vertex.col = "Office")
```
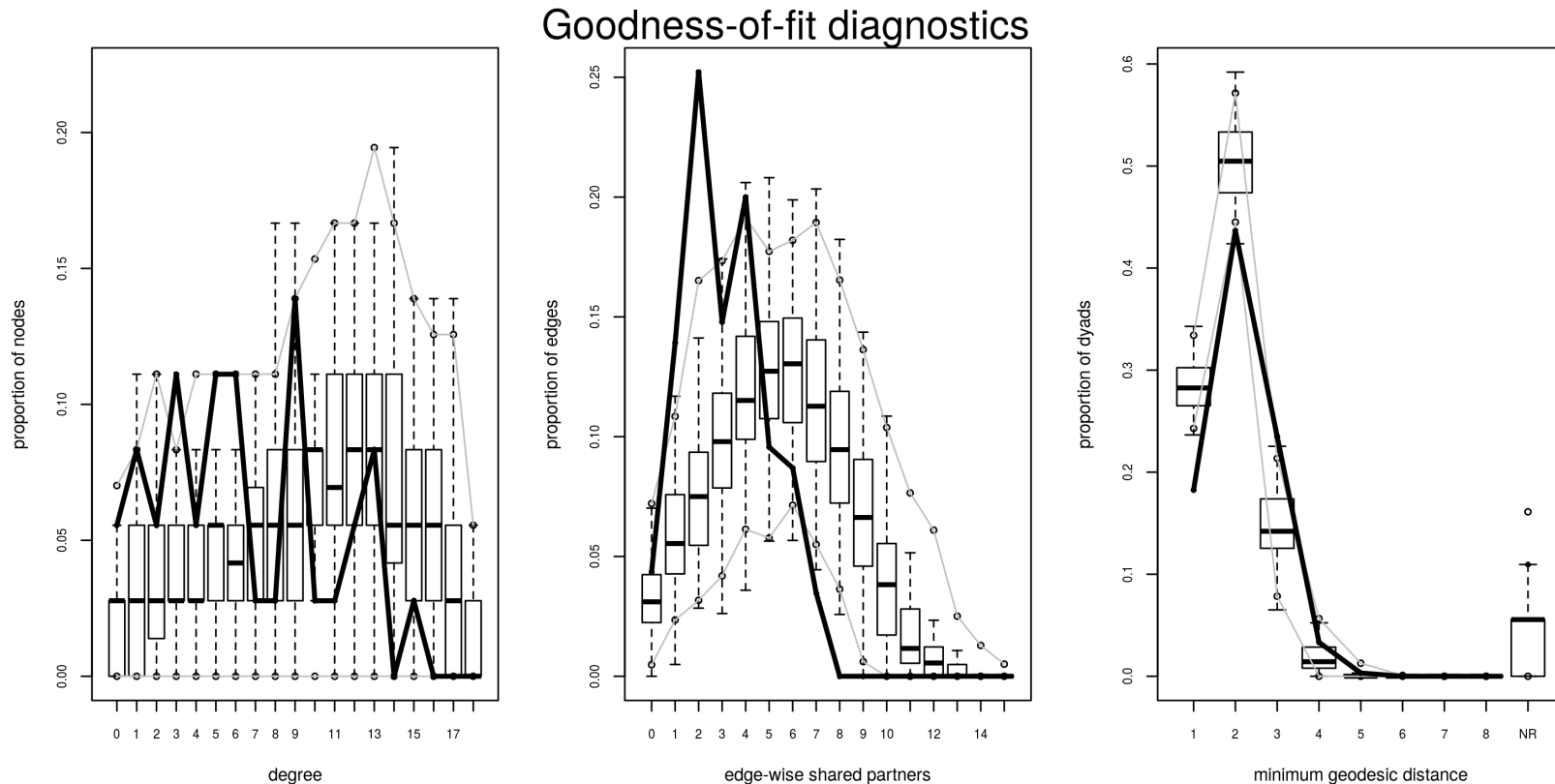
latentnet

```r
library(latentnet)
lat.d2 <- ergmm(y ~ euclidean(d = 2))
plot(lat.d2)
```
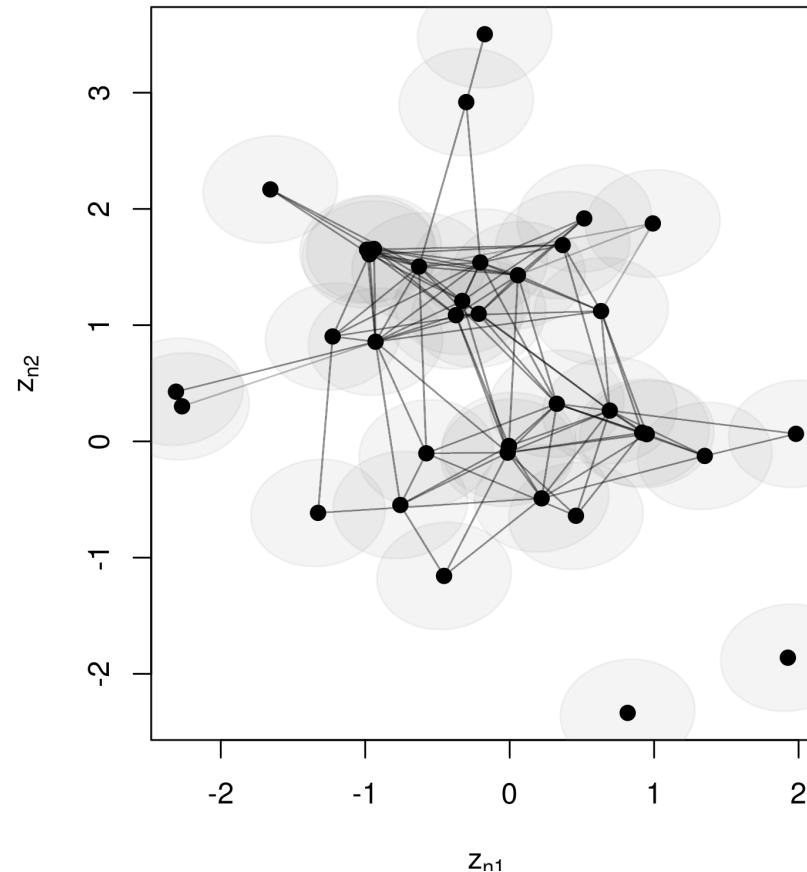

MKL Latent Positions of lat.d2
y ~ euclidean(d = 2)

latentnet - goodness of fit

```
gf.lat.d2 <- gof(lat.d2, GOF = ~ degree + esp + distance)
par(mfrow = c(1, 3))
plot(gf.lat.d2)
```


Goodness-of-fit diagnostics

lvm4net

```
library(lvm4net)
lvm.d2 <- lsm(Y, D = 2, nstart = 5)
plot(lvm.d2, Y, drawCB = TRUE, LEVEL = 0.95)
```

`lvm4net` - goodness of fit

```
goflsm <- goflsm(lvm.d2, Y = Y)
```


Goodness-of-fit diagnostics