Chapter 4

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Libraries and data used

Libraries

```
library(UserNetR)
library(statnet)
```

```
## Loading required package: tergm
```

```
## Loading required package: ergm
```

```
## Loading required package: network
```

```
## network: Classes for Relational Data
## Version 1.16.0 created on 2019-11-30.
## copyright (c) 2005, Carter T. Butts, University of California-Irvine
##                     Mark S. Handcock, University of California -- Los Angeles
##                     David R. Hunter, Penn State University
##                     Martina Morris, University of Washington
##                     Skye Bender-deMoll, University of Washington
##  For citation information, type citation("network").
##  Type help("network-package") to get started.
```

```
##
## ergm: version 3.10.4, created on 2019-06-10
## Copyright (c) 2019, Mark S. Handcock, University of California -- Los Angeles
##                     David R. Hunter, Penn State University
##                     Carter T. Butts, University of California -- Irvine
##                     Steven M. Goodreau, University of Washington
##                     Pavel N. Krivitsky, University of Wollongong
##                     Martina Morris, University of Washington
##                     with contributions from
```

```
##                     Li Wang
##                     Kirk Li, University of Washington
##                     Skye Bender-deMoll, University of Washington
##                     Chad Klumb
## Based on "statnet" project software (statnet.org).
## For license and citation information see statnet.org/attribution
## or type citation("ergm").

## NOTE: Versions before 3.6.1 had a bug in the implementation of the bd()
## constriant which distorted the sampled distribution somewhat. In
## addition, Sampson's Monks datasets had mislabeled vertices. See the
## NEWS and the documentation for more details.

## NOTE: Some common term arguments pertaining to vertex attribute and
## level selection have changed in 3.10.0. See terms help for more
## details. Use 'options(ergm.term=list(version="3.9.4"))' to use old
## behavior.

## Loading required package: networkDynamic

##
## networkDynamic: version 0.10.1, created on 2020-01-16
## Copyright (c) 2020, Carter T. Butts, University of California -- Irvine
##                     Ayn Leslie-Cook, University of Washington
##                     Pavel N. Krivitsky, University of Wollongong
##                     Skye Bender-deMoll, University of Washington
##                     with contributions from
##                     Zack Almquist, University of California -- Irvine
##                     David R. Hunter, Penn State University
##                     Li Wang
##                     Kirk Li, University of Washington
##                     Steven M. Goodreau, University of Washington
##                     Jeffrey Horner
##                     Martina Morris, University of Washington
## Based on "statnet" project software (statnet.org).
## For license and citation information see statnet.org/attribution
## or type citation("networkDynamic").

##
## tergm: version 3.6.1, created on 2019-06-12
## Copyright (c) 2019, Pavel N. Krivitsky, University of Wollongong
##                     Mark S. Handcock, University of California -- Los Angeles
##                     with contributions from
##                     David R. Hunter, Penn State University
##                     Steven M. Goodreau, University of Washington
##                     Martina Morris, University of Washington
##                     Nicole Bohme Carnegie, New York University
##                     Carter T. Butts, University of California -- Irvine
##                     Ayn Leslie-Cook, University of Washington
##                     Skye Bender-deMoll
##                     Li Wang
##                     Kirk Li, University of Washington
## Based on "statnet" project software (statnet.org).
## For license and citation information see statnet.org/attribution
## or type citation("tergm").

## Loading required package: ergm.count
```

```
##
## ergm.count: version 3.4.0, created on 2019-05-15
## Copyright (c) 2019, Pavel N. Krivitsky, University of Wollongong
##                     with contributions from
##                     Mark S. Handcock, University of California -- Los Angeles
##                     David R. Hunter, Penn State University
## Based on "statnet" project software (statnet.org).
## For license and citation information see statnet.org/attribution
## or type citation("ergm.count").

## NOTE: The form of the term 'CMP' has been changed in version 3.2 of
## 'ergm.count'. See the news or help('CMP') for more information.

## Loading required package: sna

## Loading required package: statnet.common

##
## Attaching package: 'statnet.common'

## The following object is masked from 'package:base':
##
##     order

## sna: Tools for Social Network Analysis
## Version 2.5 created on 2019-12-09.
## copyright (c) 2005, Carter T. Butts, University of California-Irvine
##  For citation information, type citation("sna").
##  Type help(package="sna") to get started.

## Loading required package: tsna

##
## statnet: version 2019.6, created on 2019-06-13
## Copyright (c) 2019, Mark S. Handcock, University of California -- Los Angeles
##                     David R. Hunter, Penn State University
##                     Carter T. Butts, University of California -- Irvine
##                     Steven M. Goodreau, University of Washington
##                     Pavel N. Krivitsky, University of Wollongong
##                     Skye Bender-deMoll
##                     Martina Morris, University of Washington
## Based on "statnet" project software (statnet.org).
## For license and citation information see statnet.org/attribution
## or type citation("statnet").

## unable to reach CRAN
```

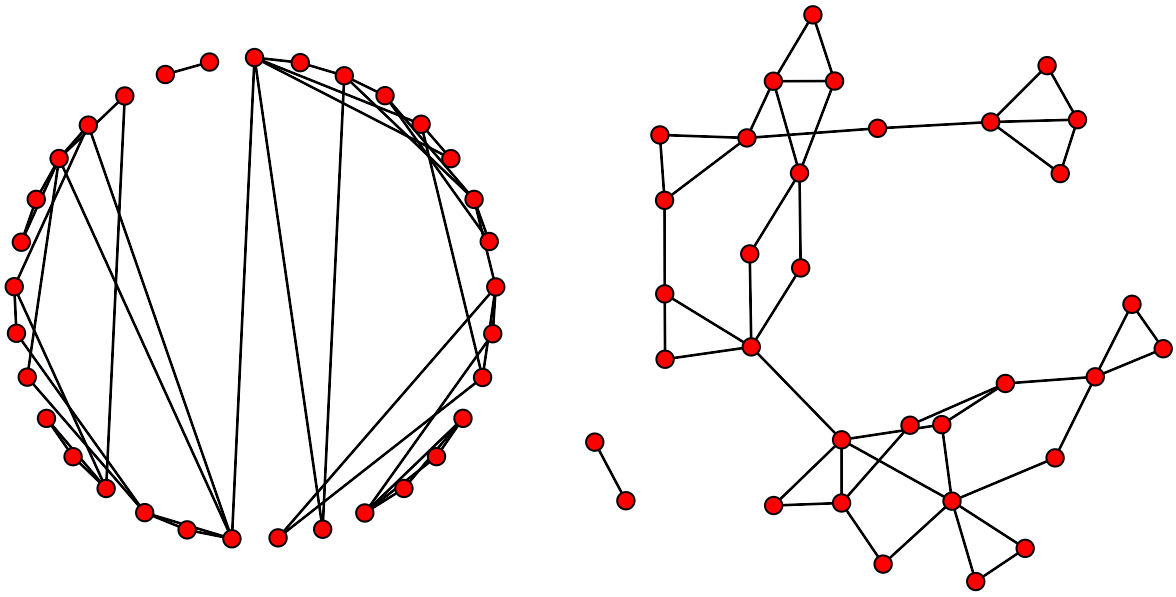
```
#library(igraph) will be loaded in flow to prevent interferance with statnet
library(intergraph)
```

Data

```
data("Moreno")
data("Bali")
```

chanlage of net vis

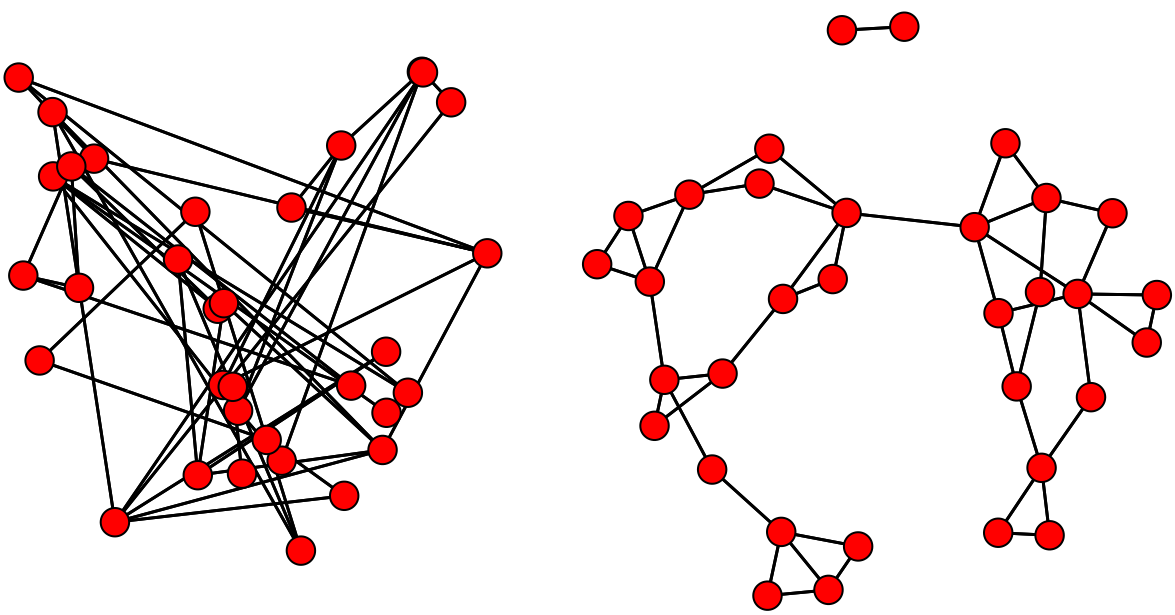
```
op <- par(mar = rep(0, 4),
          mfrow = c(1, 2))
plot(Moreno,
     mode = "circle",
     vertex.cex = 1.5)
plot(Moreno,
     mode = "fruchtermanreingold",
     vertex.cex = 1.5)
```



```
par(op)
```

Aesthetics of Network Layouts

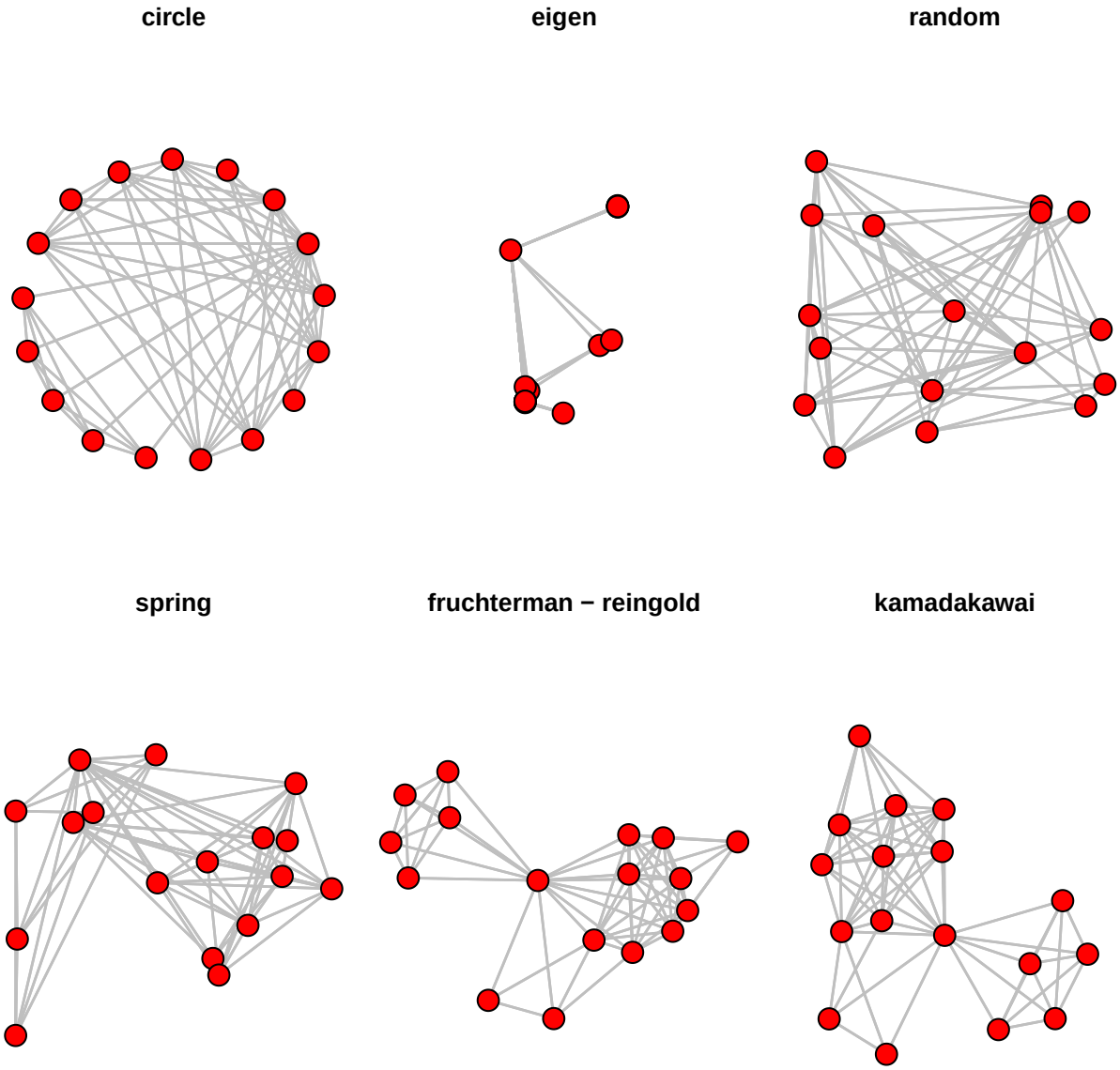
```
op <- par(mar = c(0,0,4,0),
          mfrow = c(1,2))
gplot(Moreno,
      gmode = "graph",
      mode = "random",
      vertex.cex = 1.5,
      main = "Random layout")
gplot(Moreno,
      gmode = "graph",
      mode = "fruchtermanreingold",
      vertex.cex = 1.5,
      main = "Fruchterman - Reingold")
```



```
par(op)
```

basic plotting algorithms and methods

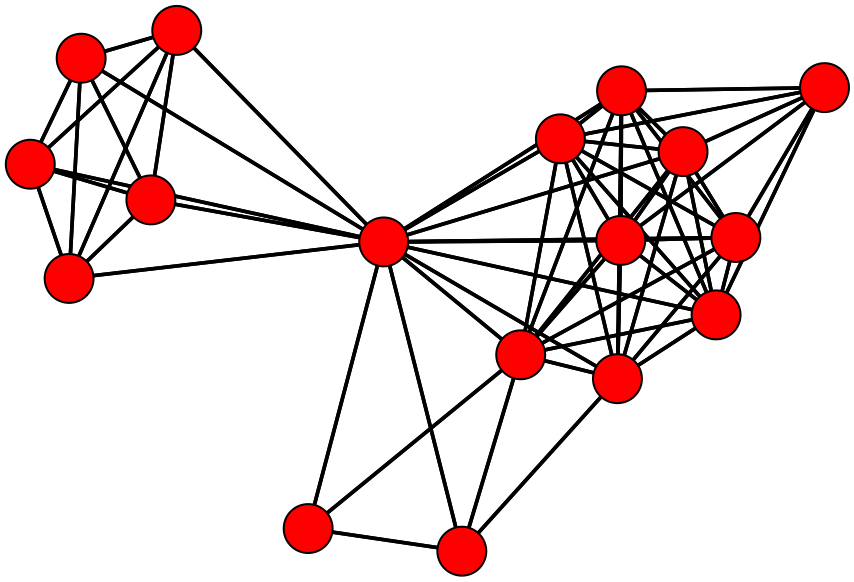
```
op <- par(mar = c(0,0,4,0),
          mfrow = c(2,3))
gplot(Bali,
      gmode = "graph",
      edge.col = "grey75",
      vertex.cex = 1.5,
      mode = "circle",
      main = "circle")

gplot(Bali,
      gmode = "graph",
      edge.col = "grey75",
      vertex.cex = 1.5,
      mode = "eigen",
      main = "eigen")

gplot(Bali,
      gmode = "graph",
      edge.col = "grey75",
      vertex.cex = 1.5,
      mode = "random",
      main = "random")

gplot(Bali,
      gmode = "graph",
      edge.col = "grey75",
      vertex.cex = 1.5,
      mode = "spring",
      main = "spring")

gplot(Bali,
      gmode = "graph",
      edge.col = "grey75",
      vertex.cex = 1.5,
      mode = "fruchtermanreingold",
      main = "fruchterman - reingold")

gplot(Bali,
      gmode = "graph",
      edge.col = "grey75",
      vertex.cex = 1.5,
      mode = "kamadakawai",
      main = "kamadakawai")
```




```
par(op)
```

finer control over netwaork layout

```
mycoords1 <- gplot(Bali,
                   gmode = "graph",
                   vertex.cex = 1.5)
```



```
mycoords2 <- mycoords1
mycoords2[,2] <- mycoords1[,2] * 1.5
mycoords1
```

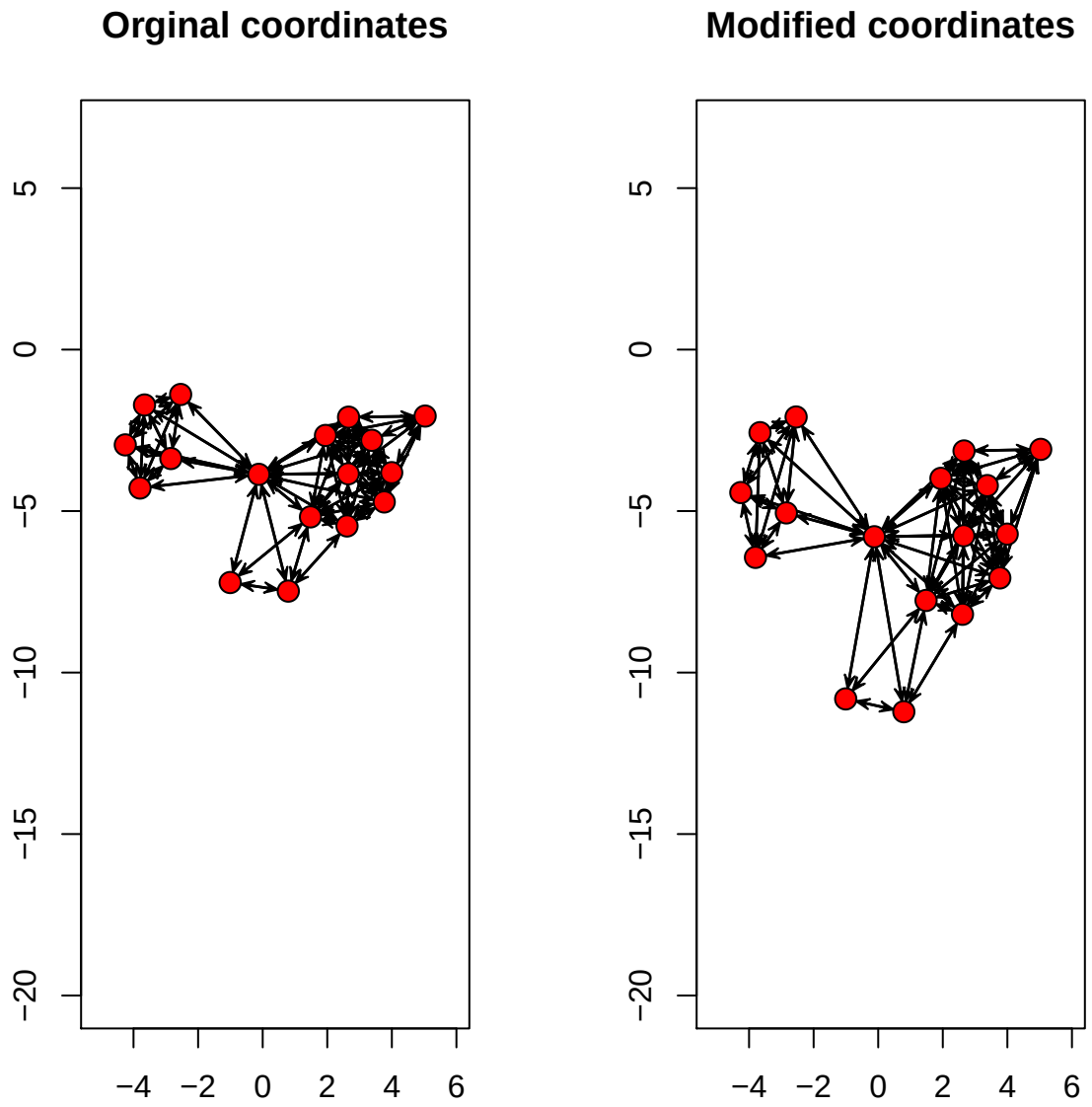
```
##               x         y
##  [1,]  2.6111615 -5.460480
##  [2,]  0.7916218 -7.477364
##  [3,]  3.7642200 -4.714515
##  [4,] -0.1218662 -3.861468
##  [5,]  1.9439791 -2.656143
##  [6,]  1.4801326 -5.181313
##  [7,] -1.0050290 -7.212736
##  [8,]  2.6590173 -2.094501
##  [9,]  3.3781323 -2.805828
```

```
## [10,] -2.5414007 -1.388423
## [11,] -2.8439429 -3.370079
## [12,] -4.2540148 -2.953005
## [13,] -3.7999787 -4.288498
## [14,] -3.6593447 -1.713453
## [15,]  2.6499322 -3.844160
## [16,]  5.0322048 -2.057353
## [17,]  3.9956331 -3.809658
```

```
mycoords2
```

```
##                x          y
##  [1,]  2.6111615  -8.190720
##  [2,]  0.7916218 -11.216046
##  [3,]  3.7642200  -7.071772
##  [4,] -0.1218662  -5.792202
##  [5,]  1.9439791  -3.984214
##  [6,]  1.4801326  -7.771970
##  [7,] -1.0050290 -10.819105
##  [8,]  2.6590173  -3.141751
##  [9,]  3.3781323  -4.208741
## [10,] -2.5414007  -2.082634
## [11,] -2.8439429  -5.055118
## [12,] -4.2540148  -4.429507
## [13,] -3.7999787  -6.432747
## [14,] -3.6593447  -2.570179
## [15,]  2.6499322  -5.766240
## [16,]  5.0322048  -3.086030
## [17,]  3.9956331  -5.714487
```

```
op <- par(mar = c(4, 3, 4, 3),
          mfrow = c(1, 2))
gplot(Bali,
      coord = mycoords1,
      vertex.cex = 1.5,
      suppress.axes = FALSE,
      ylim = c(min(mycoords2[,2]) - 1,
               max(mycoords2[,2]) + 1),
      main = "Orginal coordinates")
gplot(Bali,
      coord = mycoords2,
      vertex.cex = 1.5,
      suppress.axes = FALSE,
      ylim = c(min(mycoords2[,2]) - 1,
               max(mycoords2[,2]) + 1),
      main = "Modified coordinates")
```




```
par(op)
```

network graph layout *igraph*

```
detach(package:statnet, unload = TRUE)
detach(package:sna, unload = TRUE)
detach(package:tsna, unload = TRUE)
detach(package:ergm.count, unload = TRUE)
detach(package:tergm, unload = TRUE)
detach(package:networkDynamic, unload = TRUE)
detach(package:ergm, unload = TRUE)
detach(package:network, unload = TRUE)
```

```
## Warning: 'network' namespace cannot be unloaded:
```

```
##   namespace 'network' is imported by 'intergraph' so cannot be unloaded
```

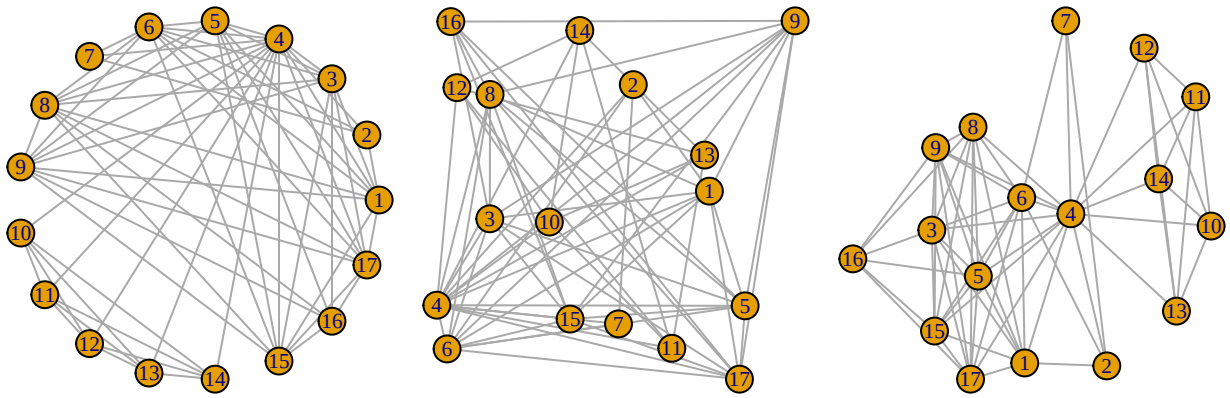
```
detach(package:statnet.common, unload = TRUE)
library(igraph)
```

```
##
## Attaching package: 'igraph'
```

```
## The following objects are masked from 'package:stats':
##
##     decompose, spectrum
```

```
## The following object is masked from 'package:base':
##
##     union
```

```
iBali <- asIgraph(Bali)
op <- par(mar = c(0,0,3,0),
          mfrow = c(1,3))

plot(iBali,
     layout = layout_in_circle,
     main = "Circle")

plot(iBali,
     layout = layout_randomly,
     main = "Random")

plot(iBali,
     layout = layout_with_kk,
     main = "Kamada - Kawai")
```




```
par(op)
```