Analysis of complex networks with algebra

· Workshop 39 ·

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Sunbelt 2022 Conference ☆ 4 July 2022

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Agenda

Analysis of complex networks with algebra

1. Introduction (plotting multigraphs)
2. Elementary structures
   - ➠ Example 1: Dihedral group
3. Group structure in social networks
   - ➠ Example 2: Kariera kinship
4. Multiplex and signed networks
   - ➠ Example 3: Monastery novices
   - ➠ Example 4: Incubator network A
5. Affiliation and multilevel networks
   - ➠ Example 5: Group of Twenty (valued)

1. Introduction

Plotting multigraphs

Package 'multiplex'

August 28, 2013

Type Package

Title Analysis of Multiple Social Networks with Algebra

Version 1.0

Depends R (>= 3.0.1)

Date 2013-08-28

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Description multiplex - Analysis of Multiple Social Networks with Algebra is a package for the study of social systems made of different types of relationships. It is possible to create and manipulate multivariate network data with different formats, and there are effective ways available to treat multiple networks with routines that combine algebraic systems like the partially ordered semigroup or the semiring structure together with the relational bundles occurring in different types of multivariate network data sets.

License GPL-3

Suggests Rgraphviz

Encoding latin1

Collate
'as.semigroup.R' 'as.strings.R' 'bundle.census.R' 'bundles.R''cngr.R' 'convert.R' 'cph.R' '

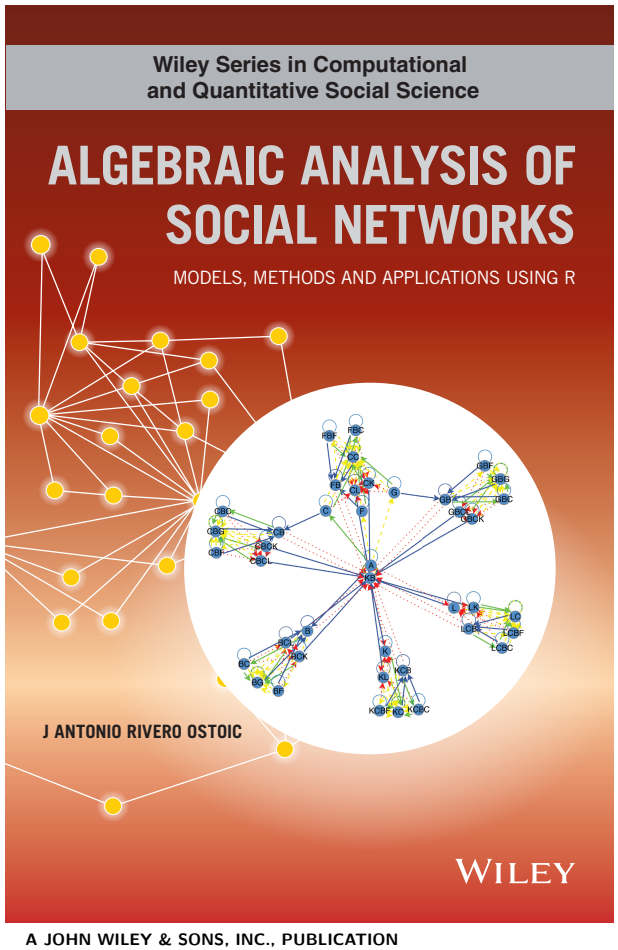
NeedsCompilation no

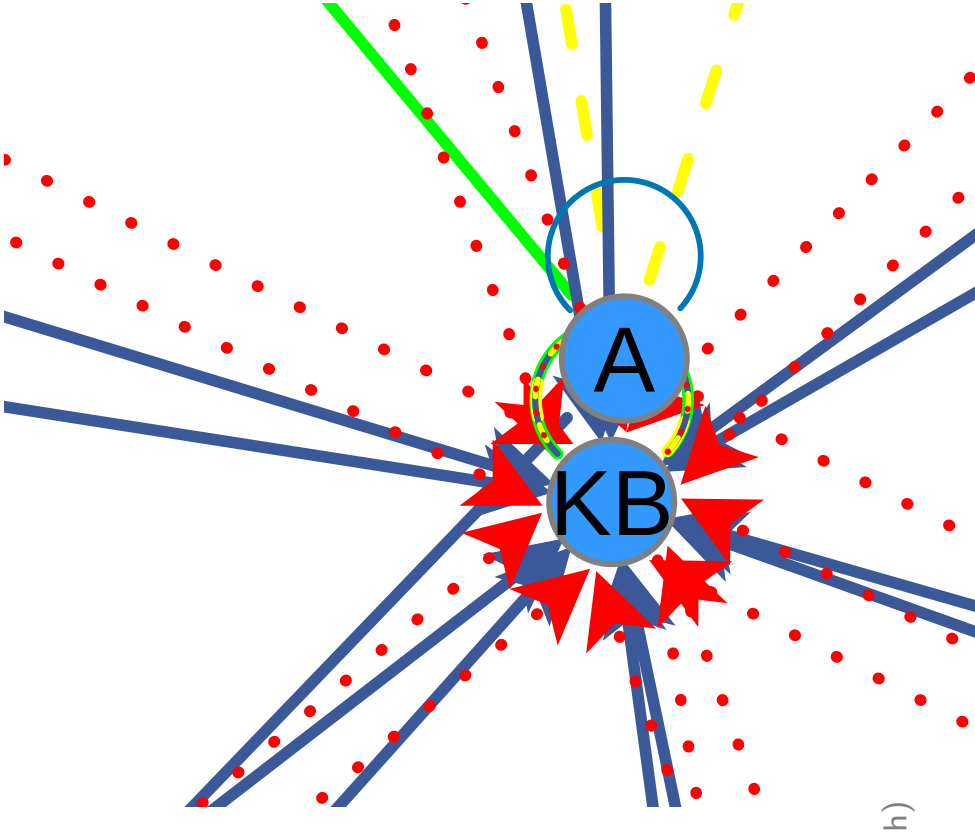
Repository CRAN

Date/Publication 2013-08-28 13:53:11

R topics documented:

‘multigraph’ *to plot multiplex networks in* **R**





(Cayley graph)

Download and install packages in **R** console (or IDE Rstudio):

```
# from CRAN
install.packages("multiplex", "multigraph")
# or versions from GitHub
devtools::install_github("mplex/multiplex")
devtools::install_github("mplex/multigraph")
```

```
# load packages
library("multigraph")
# Loading required package: multiplex
```

Different ways to represent network data

$(1, 2)$

```
multiplex::transf("1, 2")
```

```
  1 2
1 0 1
2 0 0
```

```
multigraph("1, 2", cex = 18, lwd = 20, rot = -90, pos = 0, vedist = -2)
```

```
scp <- list(cex = 18, lwd = 20, rot = -90, pos = 0, vedist = -2)
multigraph("1, 2", scope = scp)
```

Representing network data

Undirected

$\{1, 2\}$

```
matrix(c(0,1,1,0), nrow = 2, ncol = 2)
```

```
     [,1] [,2]
[1,]    0    1
[2,]    1    0
```

```
multigraph("1, 2", directed = FALSE, scope = scp)
```

Multiplex

$(1, 2); (2, 1)$

```
, , 1

  1 2
1 0 1
2 0 0

, , 2

  1 2
1 0 0
2 1 0
```

```
multigraph(list("1, 2", "2, 1"), scope = scp, ecol = 1, bwd = .7)
```

Multiplex

$(1,2);(2,1)$

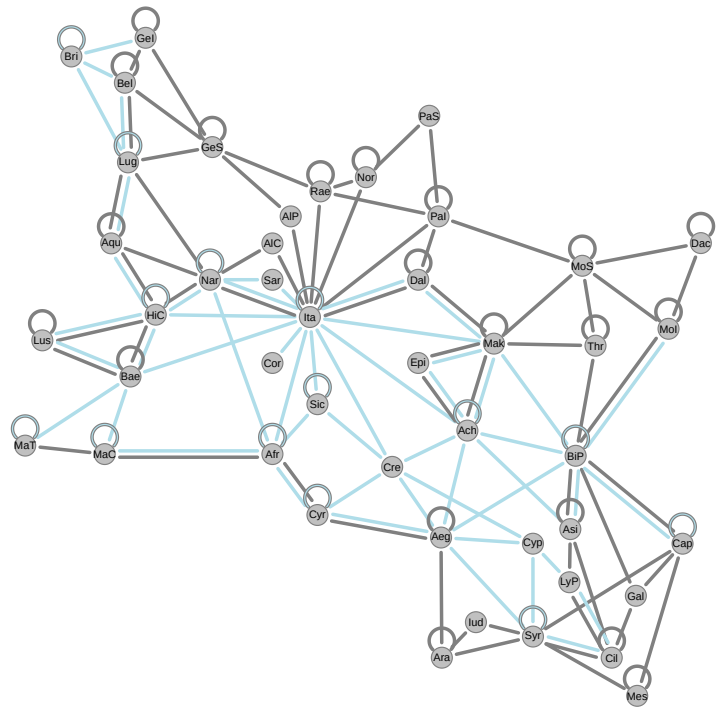
```
, , 1

  1 2
1 0 1
2 0 0

, , 2

  1 2
1 0 0
2 1 0
```

```
net <- list("1, 2", "2, 1")
multigraph(net, scope = scp, ecol = 1, bwd = .7, swp = TRUE)
```

Roman Empire transport network: Multiplex and undirected

ca. AD 125

routes based on Rodrigue (2013)

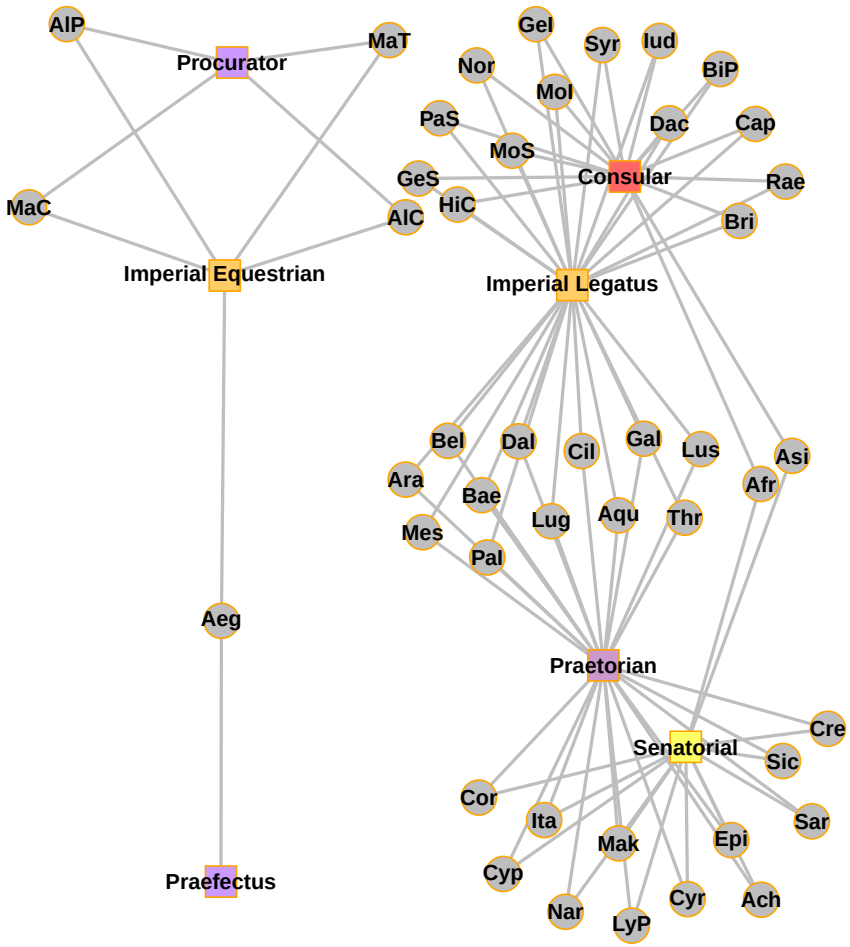



```
sdam::plot.map(type = "rp")
```

(Forthcomming)

Roman provinces political affiliations: Two-mode

ca. AD 117



(Forthcomming)