R lunchs
5 JUIN 2018 - Université de Genève

Réseaux dans R

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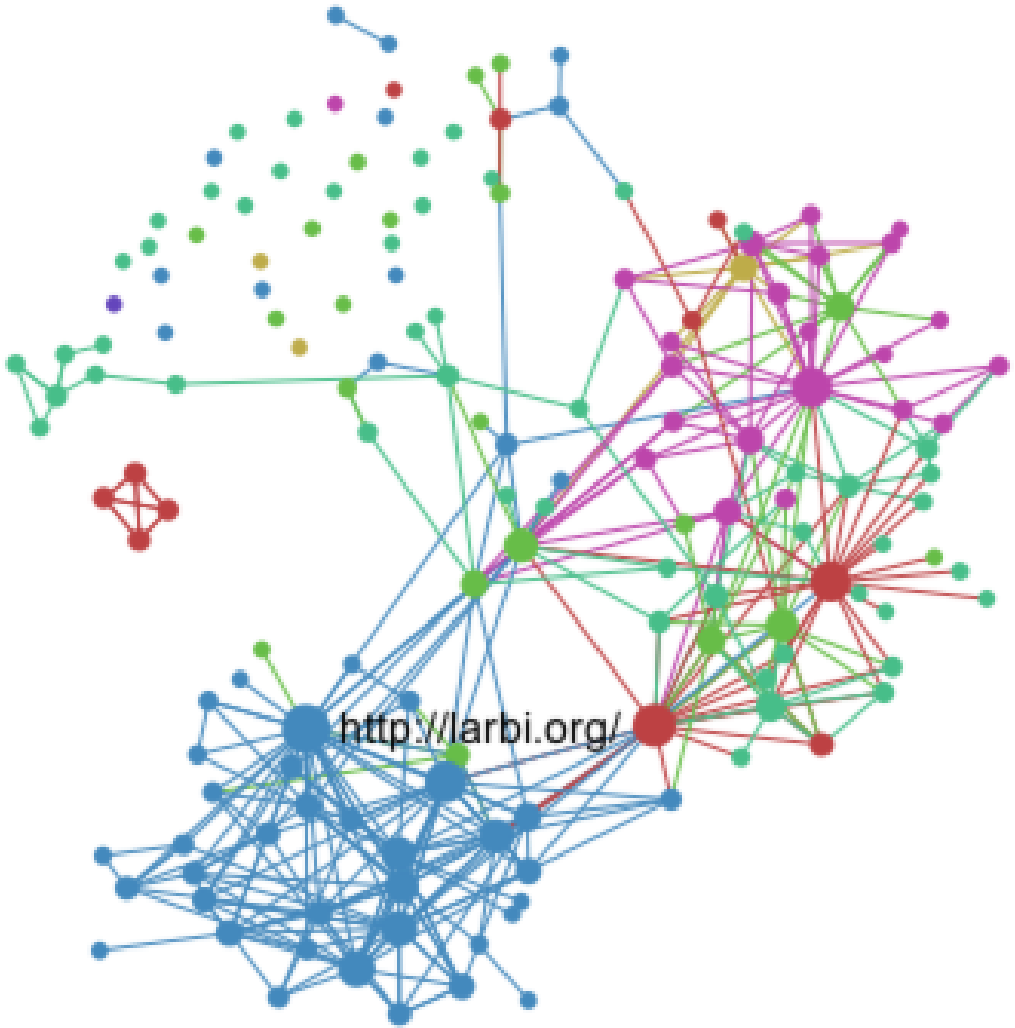
Plan

- Introduction
- Composantes d'un réseau
- Principaux packages R
- Illustrations
- Conclusion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Eléments d'un réseau

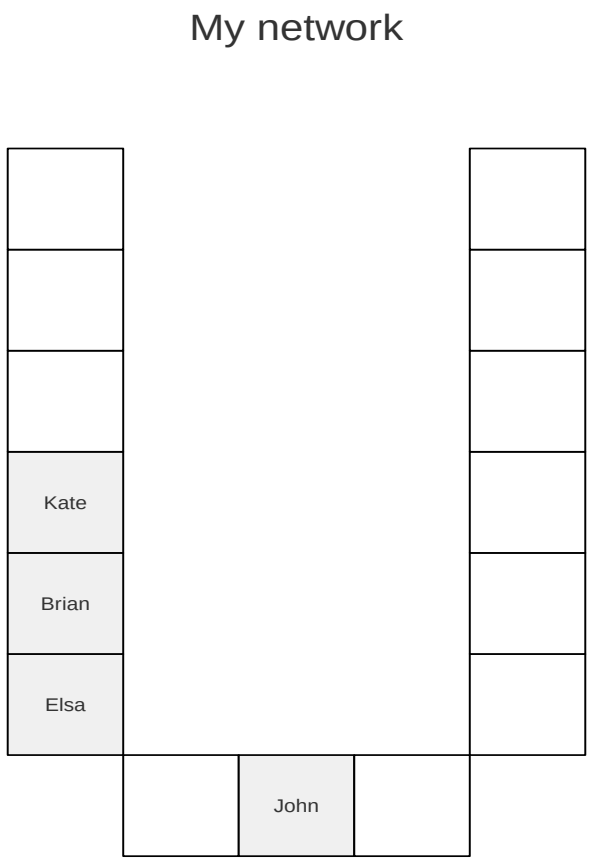
- Noeuds
- Liens
- Covariables

```
library(debate)


## Warning:  package 'sp' was built under R version 3.3.2
## Warning:  package 'spnet' was built under R version 3.3.2
## Warning:  package 'shape' was built under R version 3.3.2

mymap <- room.create.u(x=c(6,3,6), out='matrix')
mymap


##      [,1] [,2] [,3] [,4] [,5]
## [1,]    0   -1   -1   -1    0
## [2,]    0   -1   -1   -1    0
## [3,]    0   -1   -1   -1    0
## [4,]    0   -1   -1   -1    0
## [5,]    0   -1   -1   -1    0
## [6,]    0   -1   -1   -1    0
## [7,]   -1    0    0    0   -1
```

```
node <- c("John", "Elsa", "Brian", "Kate")
position <- c(2,4,6,8)

net1 <- spnet.create(
  data.frame(
    'NODE' =  node,
    'POSITION' = position
  )
)

graph.map(net1) <- room.create.u(x=c(6,3,6))
graph.title.main(net1) <- "My network"
```

```
net1


## This is a valid 'SpatialNetwork' object.
##
## - Data: (first rows)
##
##    NODE POSITION
## 1  John        2
## 2  Elsa        4
## 3 Brian        6
## 4  Kate        8
##
## - Map:
##     Length: 15
##
## - Plotting options:
```

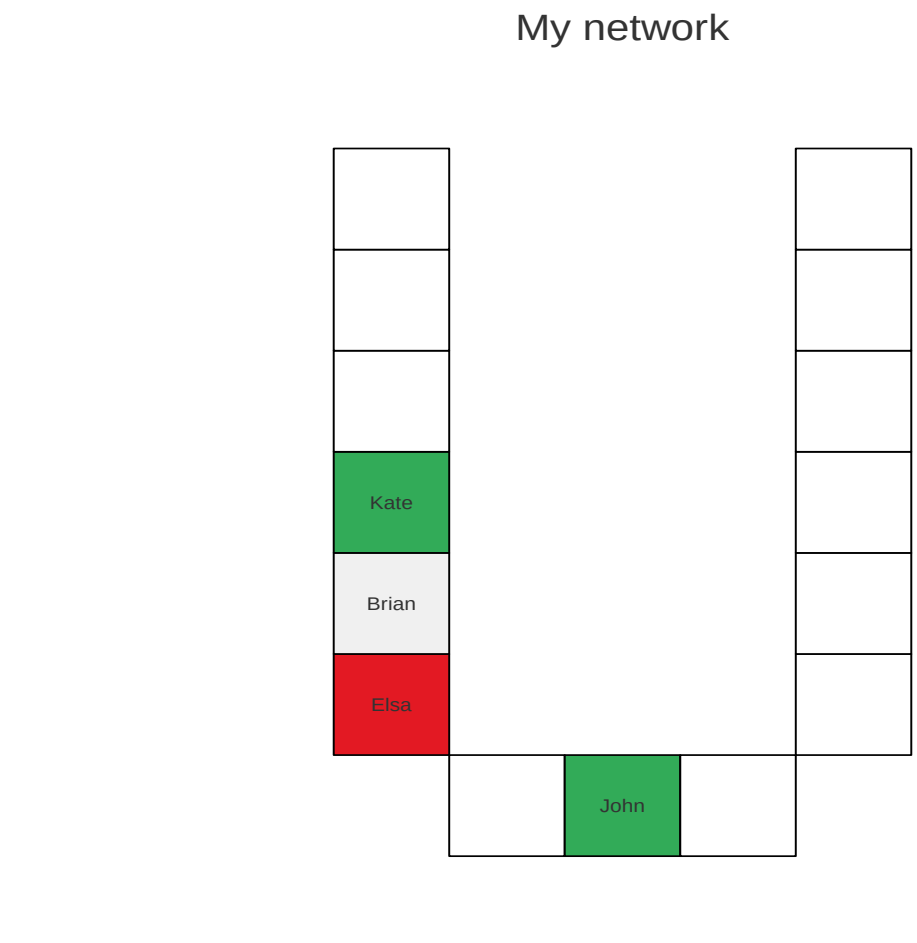
```
plot(net1)
```



```
net1$parti <- c('vert', 'socialiste', 'autre', 'vert')


graph.color.variable(net1) <- "parti"
graph.color.legend(net1) <- c('vert'="#32AB58", 'socialiste'="#E31923")
```

```
net1


## This is a valid 'SpatialNetwork' object.
##
## - Data: (first rows)
##
##    NODE POSITION      parti
## 1  John        2       vert
## 2  Elsa        4 socialiste
## 3 Brian        6      autre
## 4  Kate        8       vert
##
## - Map:
##     Length: 15
##
## - Plotting options:
##     Variable used to colorize: 'parti'
```

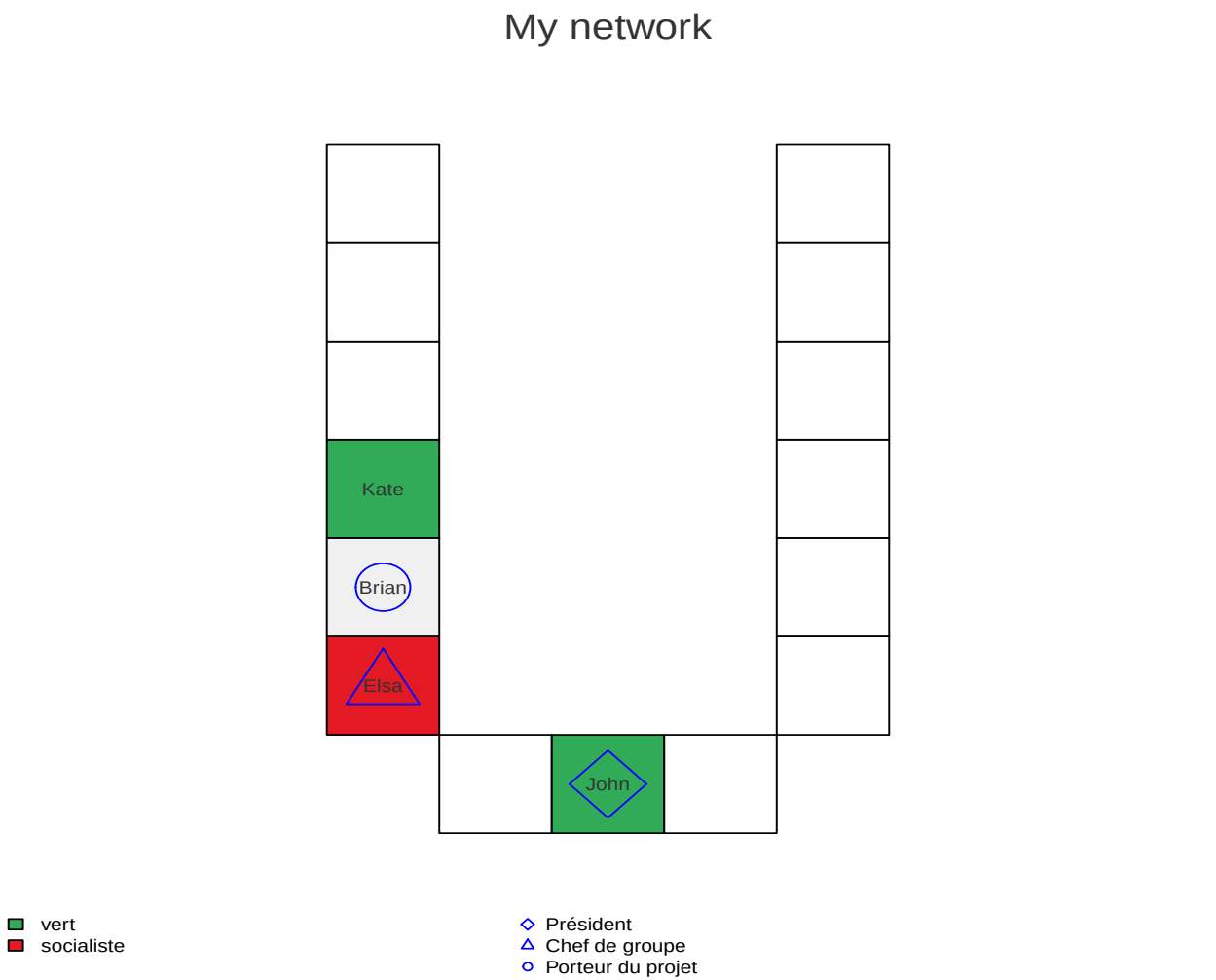
```
plot(net1)
```



```
net1$role <- c('Président', 'Chef de groupe',
               'Porteur du projet', 'partisan')


graph.symbol.variable(net1) <- "role"
graph.symbol.legend(net1) <- c('Président' = 'square.rotated',
                               'Chef de groupe' = 'triangle.up',
                               'Porteur du projet' = 'circle')
graph.symbol.cex(net1) <- 6
graph.symbol.color(net1) <- 'blue'
```

```
net1


## This is a valid 'SpatialNetwork' object.
##
## - Data: (first rows)
##
##    NODE POSITION      parti             role
## 1  John        2       vert        Président
## 2  Elsa        4 socialiste   Chef de groupe
## 3 Brian        6      autre Porteur du projet
## 4  Kate        8       vert          partisan
##
## - Map:
##     Length: 15
##
## - Plotting options:
##     Variable used to colorize: 'parti'
##     Variable used to draw symbols: 'role'
```

```
plot(net1)
```

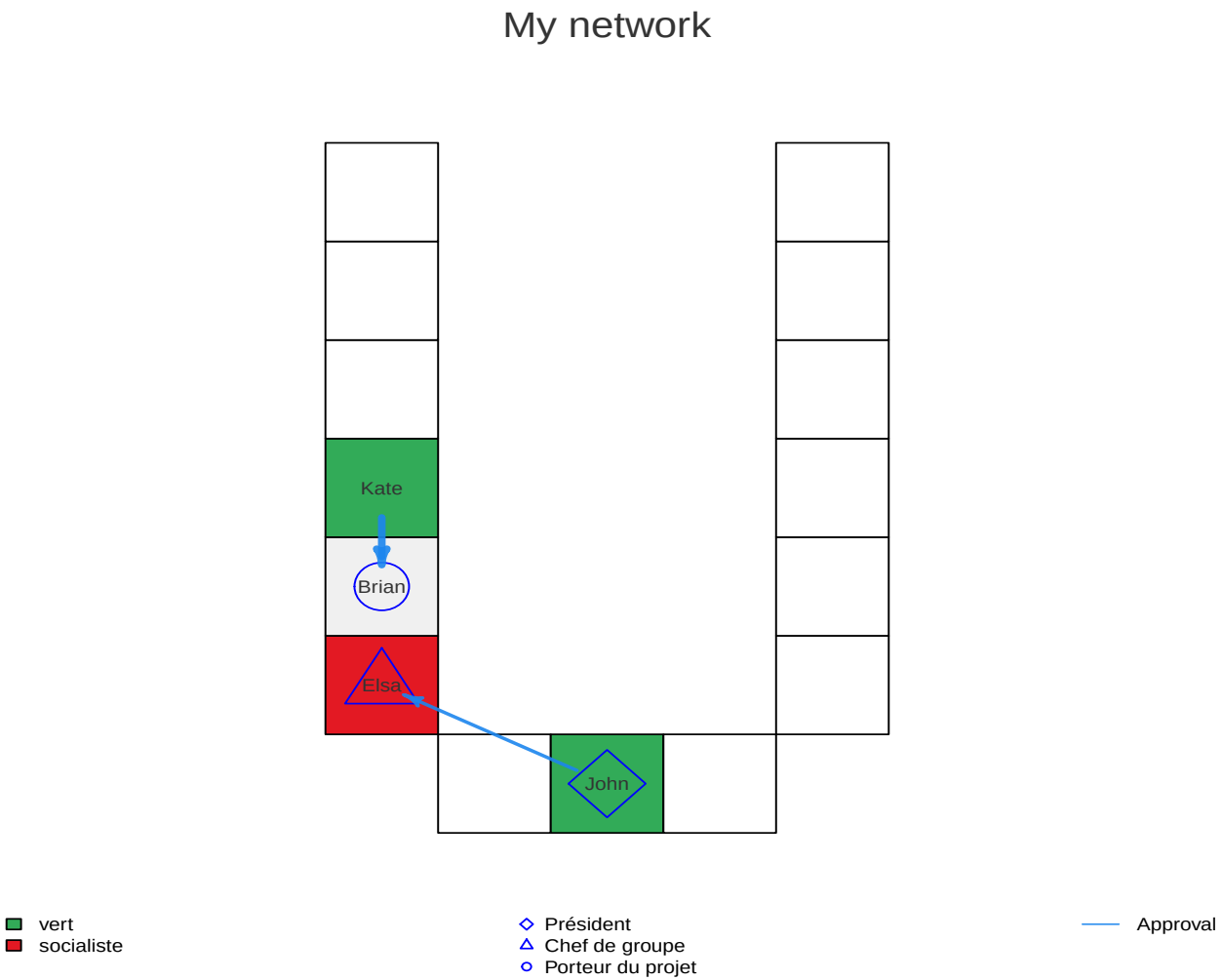

My network
Kate
Brian
Elsa
John
vert
socialiste
Président
Chef de groupe
Porteur du projet

```r
network1 <- matrix(
  rep(0, length(node)^2),
  nrow = length(node),
  dimnames = list(node, node)
)
network1['John', 'Elsa'] <- 1
network1['Kate', 'Brian'] <- 2
network1
```

```
##       John Elsa Brian Kate
## John     0    1     0    0
## Elsa     0    0     0    0
## Brian    0    0     0    0
## Kate     0    0     2    0
```

```
graph.networks.add(net1) <- 'Approval'
graph.network.data(net1, 'Approval') <- network1
net1


## This is a valid 'SpatialNetwork' object.
##
## - Data: (first rows)
##
##    NODE POSITION      parti              role
## 1  John        2       vert         Président
## 2  Elsa        4 socialiste    Chef de groupe
## 3 Brian        6      autre Porteur du projet
## 4  Kate        8       vert          partisan
##
## - Map:
##     Length: 15
##
## - Network data:
##     Number of network(s): 1
##
## - Plotting options:
##     Variable used to colorize: 'parti'
##     Variable used to draw symbols
```

```
plot(net1)
```

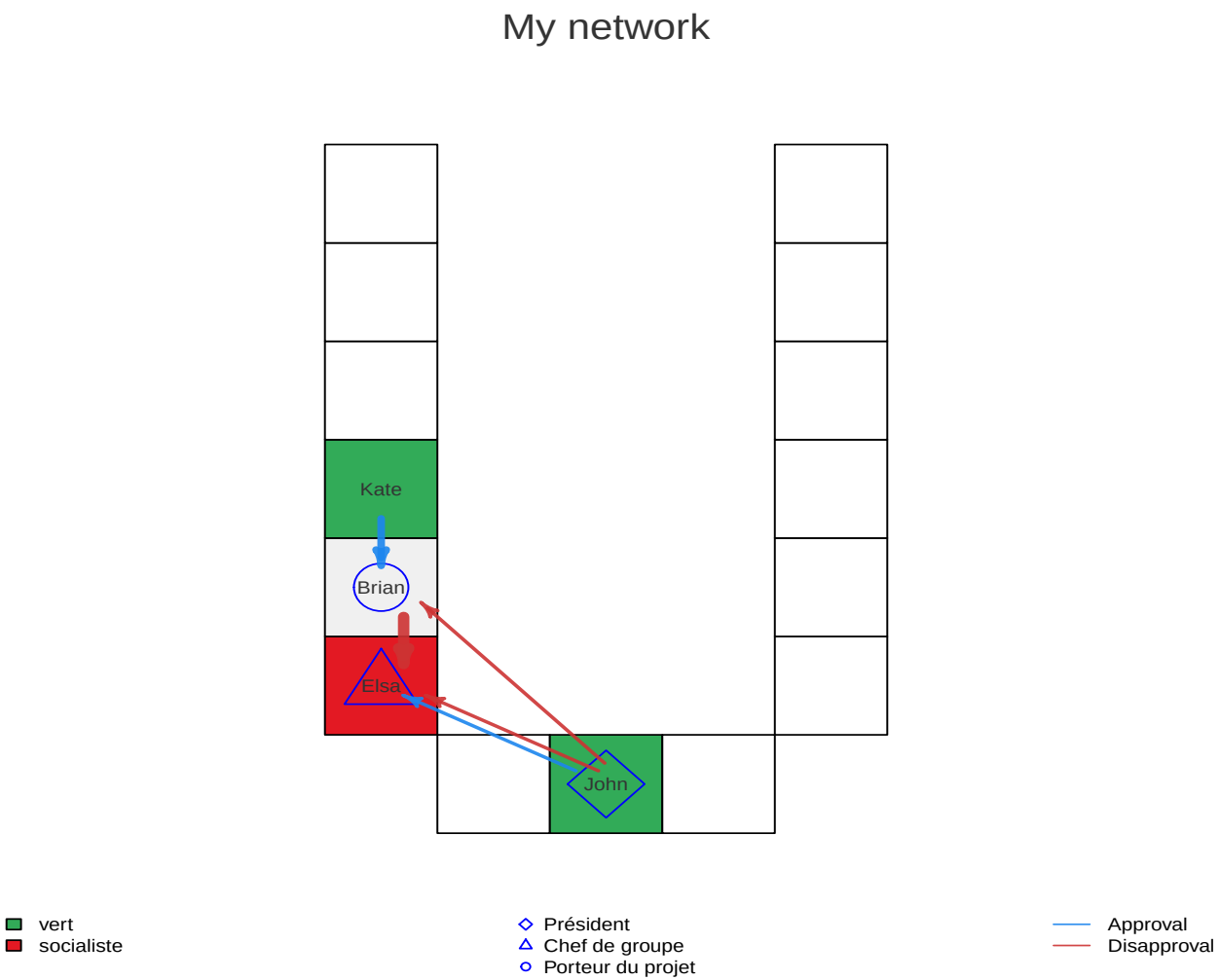

My network
Kate
Brian
Elsa
John
vert
socialiste
Président
Chef de groupe
Porteur du projet
Approval

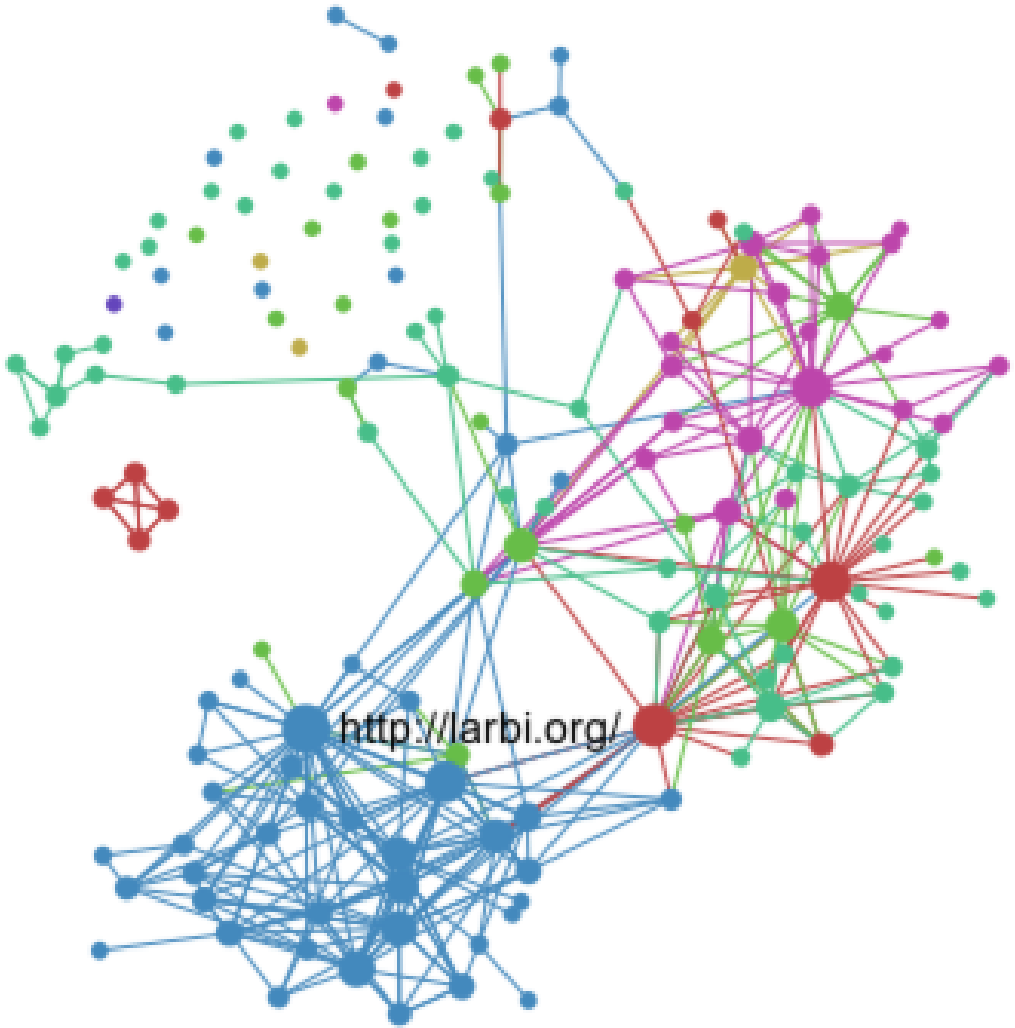
```r
network2 <- matrix(
  rep(0, length(node)^2),
  nrow = length(node),
  dimnames = list(node, node)
)
network2['John', 'Elsa'] <- 1
network2['John', 'Brian'] <- 1
network2['Brian', 'Elsa'] <- 3
network2
```

```
##       John Elsa Brian Kate
## John     0    1     1    0
## Elsa     0    0     0    0
## Brian    0    3     0    0
## Kate     0    0     0    0
```

```
graph.networks.add(net1) <- 'Disapproval'
graph.network.data(net1, 'Disapproval') <- network2
net1


## This is a valid 'SpatialNetwork' object.
##
## - Data: (first rows)
##
##    NODE POSITION      parti              role
## 1  John        2       vert         Président
## 2  Elsa        4 socialiste    Chef de groupe
## 3 Brian        6      autre Porteur du projet
## 4  Kate        8       vert          partisan
##
## - Map:
##     Length: 15
##
## - Network data:
##     Number of network(s): 2
##
## - Plotting options:
##     Variable used to colorize: 'parti'
##     Variable used to draw symbols
```

```
plot(net1)
```


My network
Kate
Brian
Elsa
John
vert
socialiste
Président
Chef de groupe
Porteur du projet
Approval
Disapproval


http://larbi.org/

Mesures réseaux

- Degré
- Coefficients de clustering
- Proximité
- Intermédiarité

Principaux packages R

- igraph (Csardi et Nepusz, 2006)
- sna (Butts, 2014)
- network (Butts et al., 2014).
- network3D (Allaire and al., 2017)

Samantha Tyner, François Briatte, Heike Hofmann. Network Visualization with ggplot2. The R Journal. R Foundation for Statistical Computing. 2017. <https://journal.r-project.org/archive/2017/RJ-2017-023/index.html>.

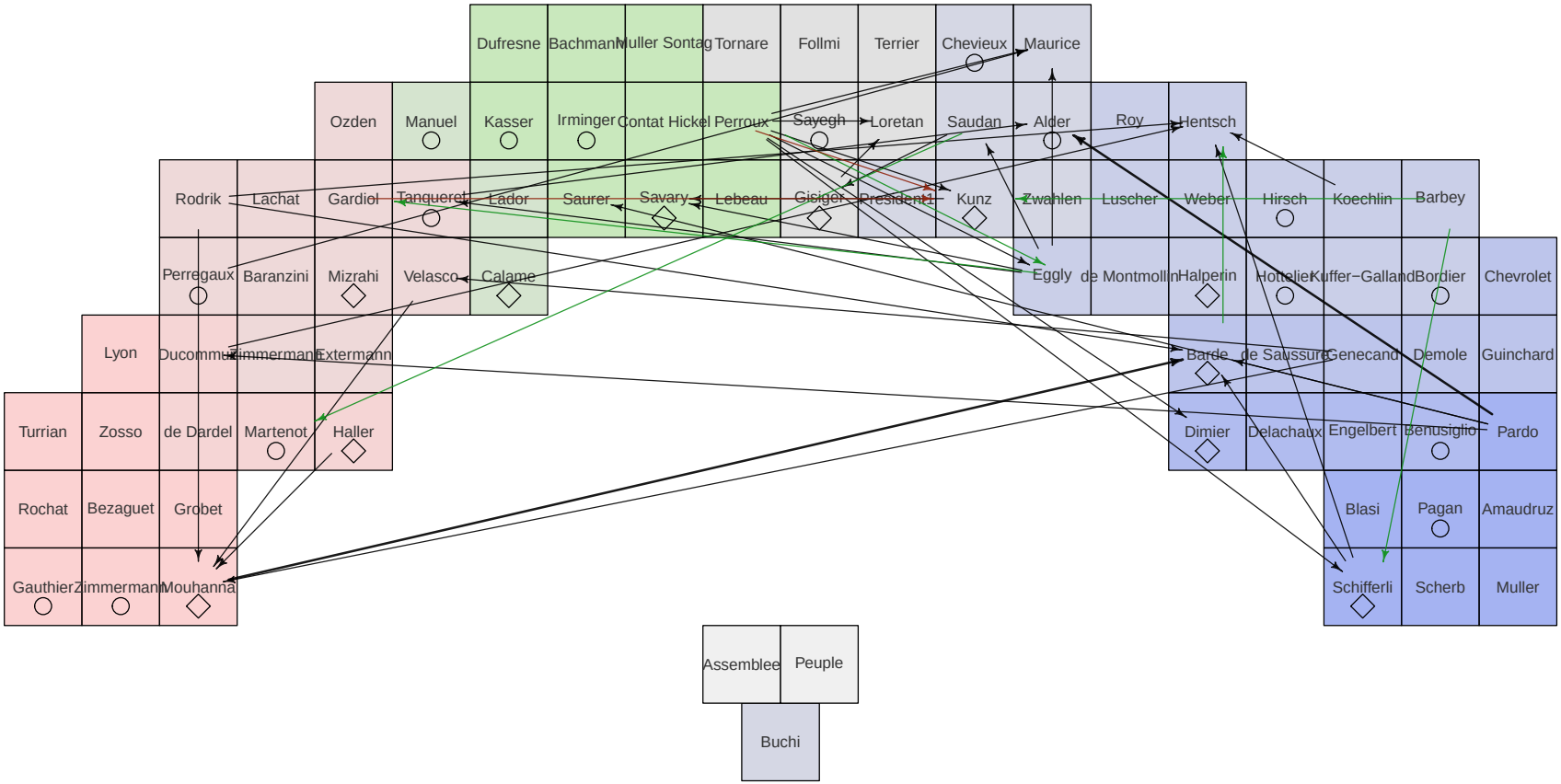
Débat sur les droits politiques des étrangers à la Constituante de Genève

- Bulletins Officiels
- De 2008 à 2012
- 5 débats
- 80 Constituants et 11 groupes parlementaires

Deville M., Rousseaux E. 2014. "A spatial network approach for measuring the differentiation between content and relational dynamics in the political debate".
Deville M. 2017. "Rationalités en débat". London : ISTE.

- R package “spnet” http://emmanuel.rousseaux.me/r-package-spnet-vignette
- Noeud: Constituants puis groupes parlementaires
- Liens: type et nombre de références

Rousseaux E. Deville M. and Ritschard G. (2014) Package R 'spnet': Plotting social networks on maps. url: http://cran.r-project.org/. 7840 downloads.


Dufresne
Bachmann
Muller Sontag
Tornare
Follmi
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Contat Hickel
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Lebeau
Gisiger
President
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Mouhanna
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Scherb
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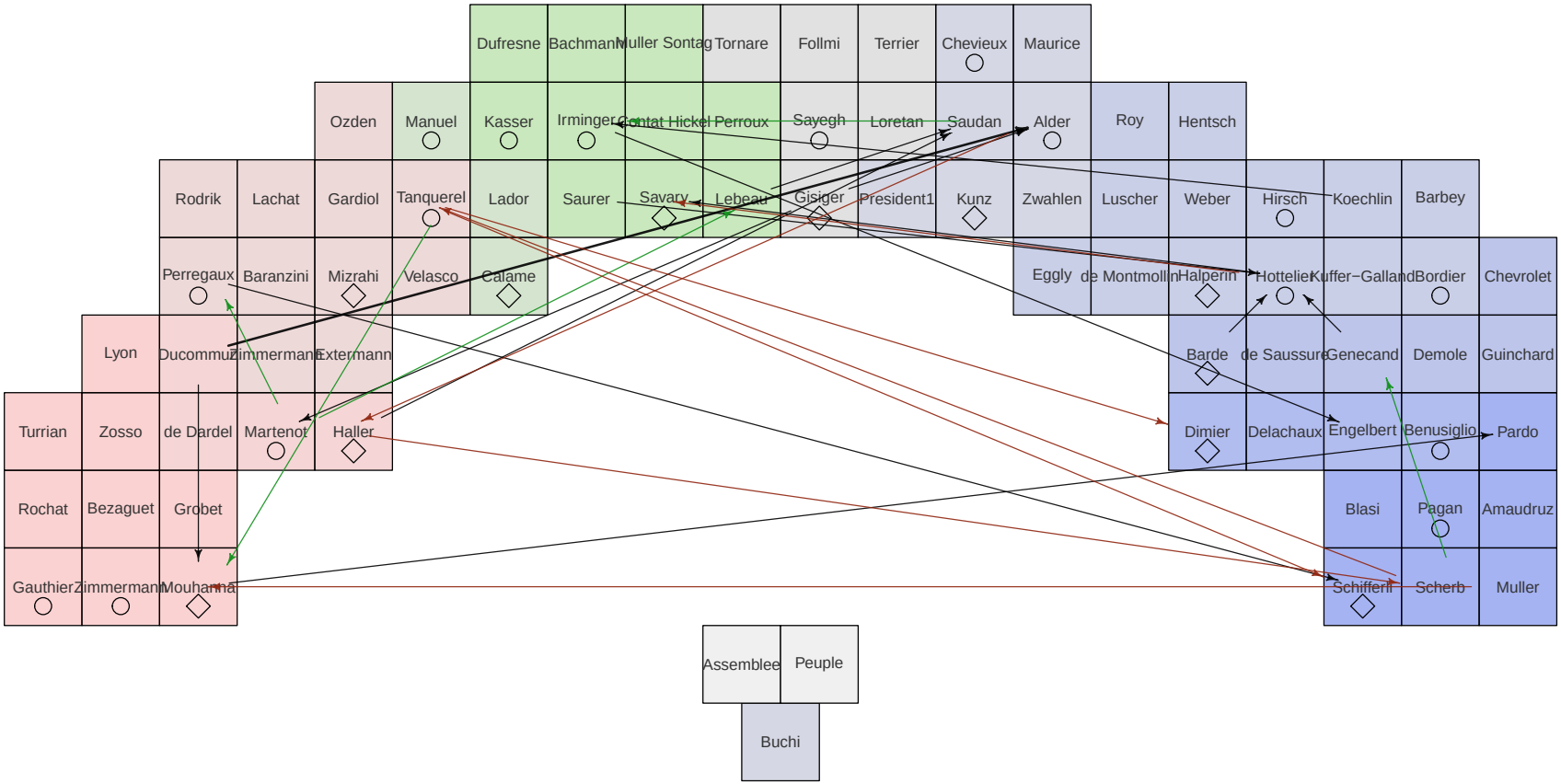
Assemblee
Peuple
Buchi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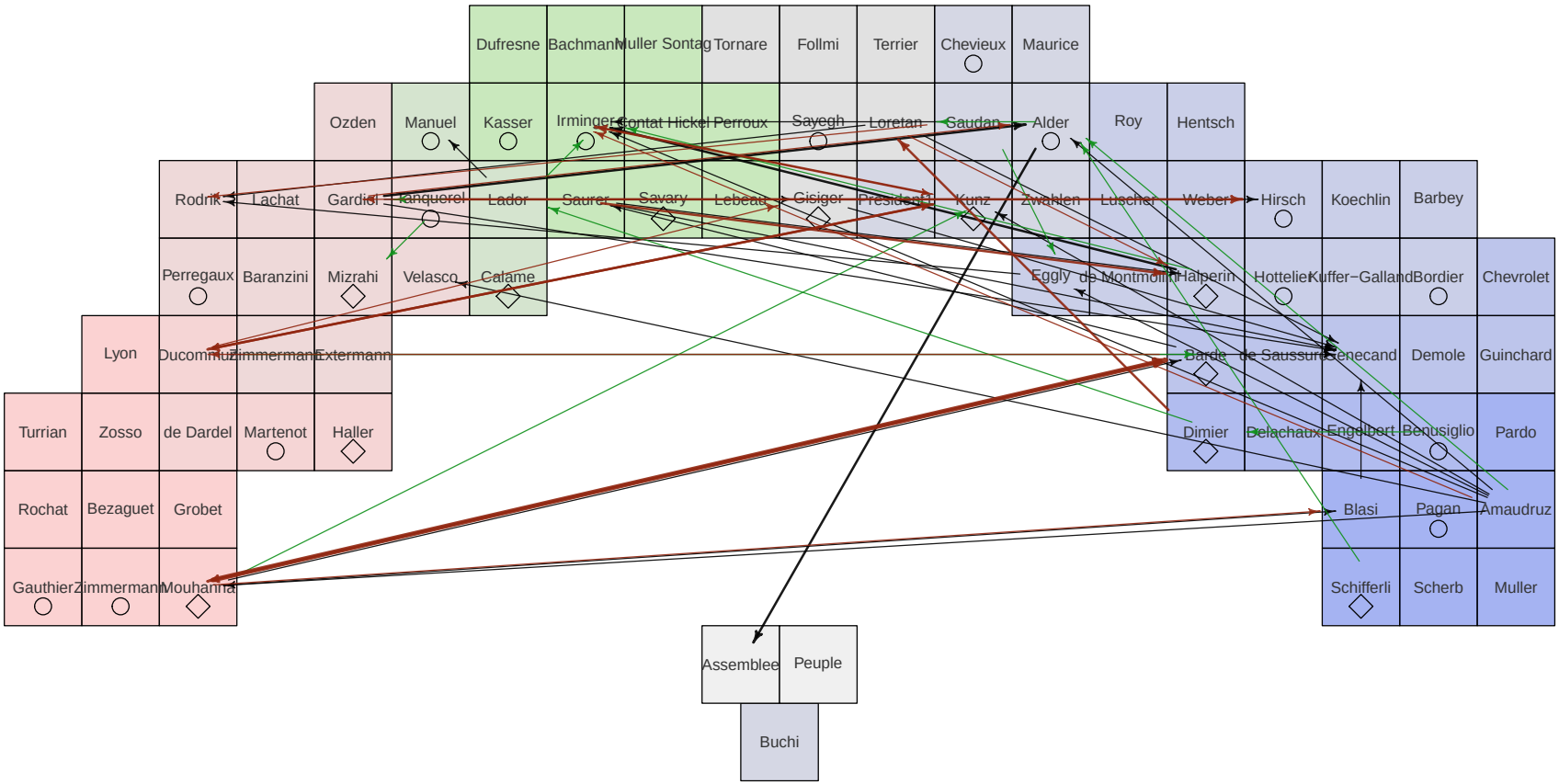
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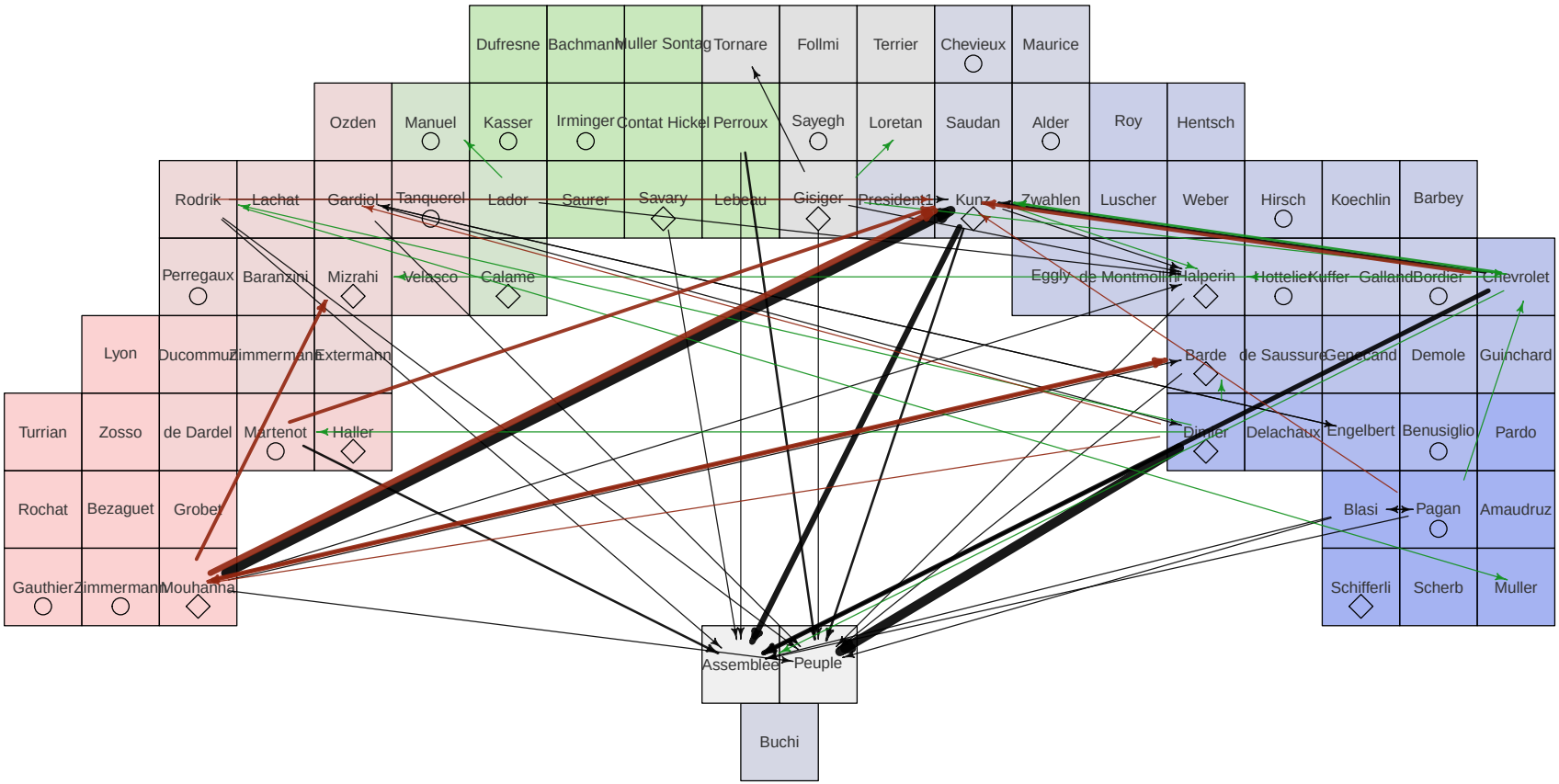
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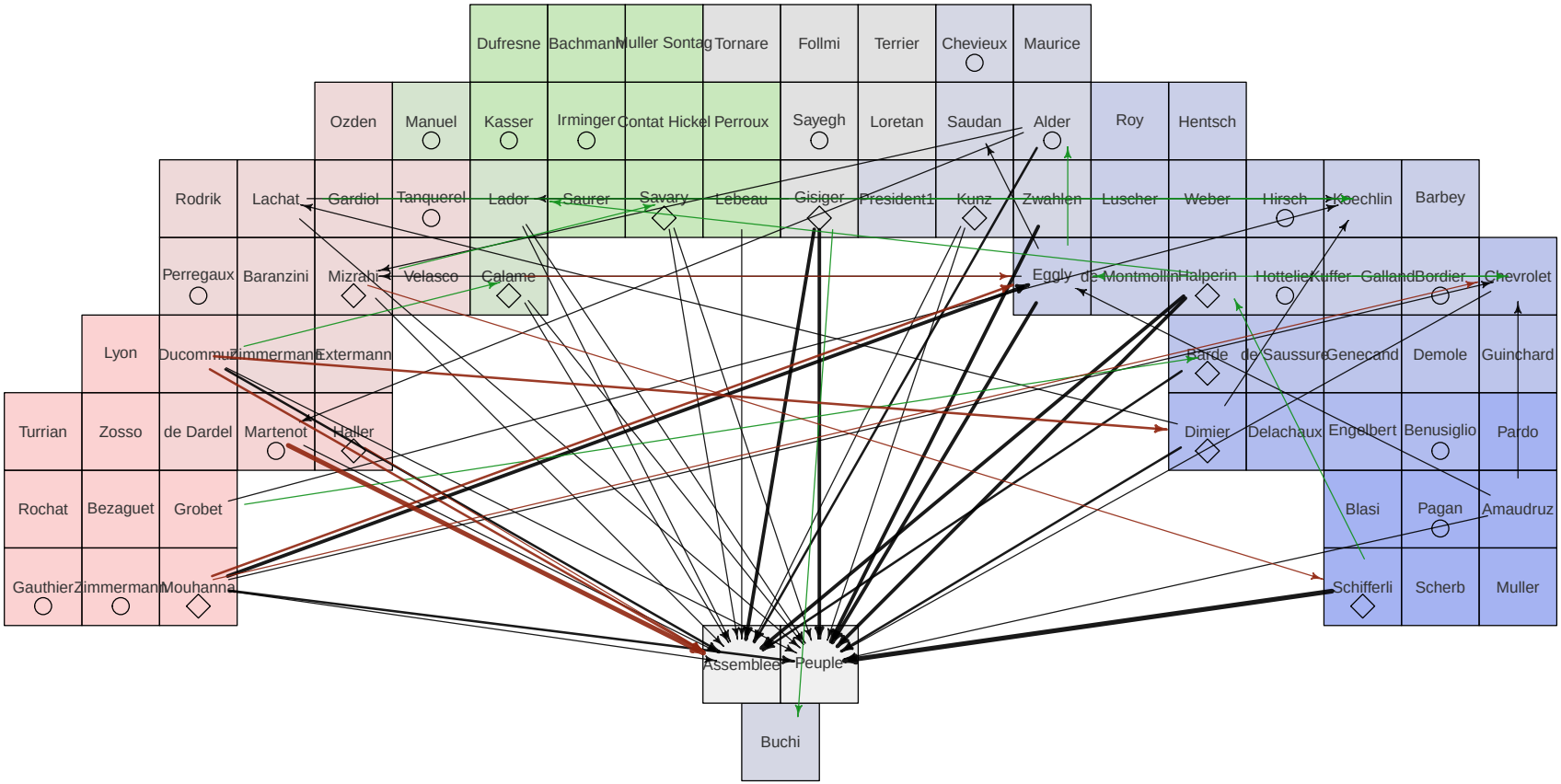
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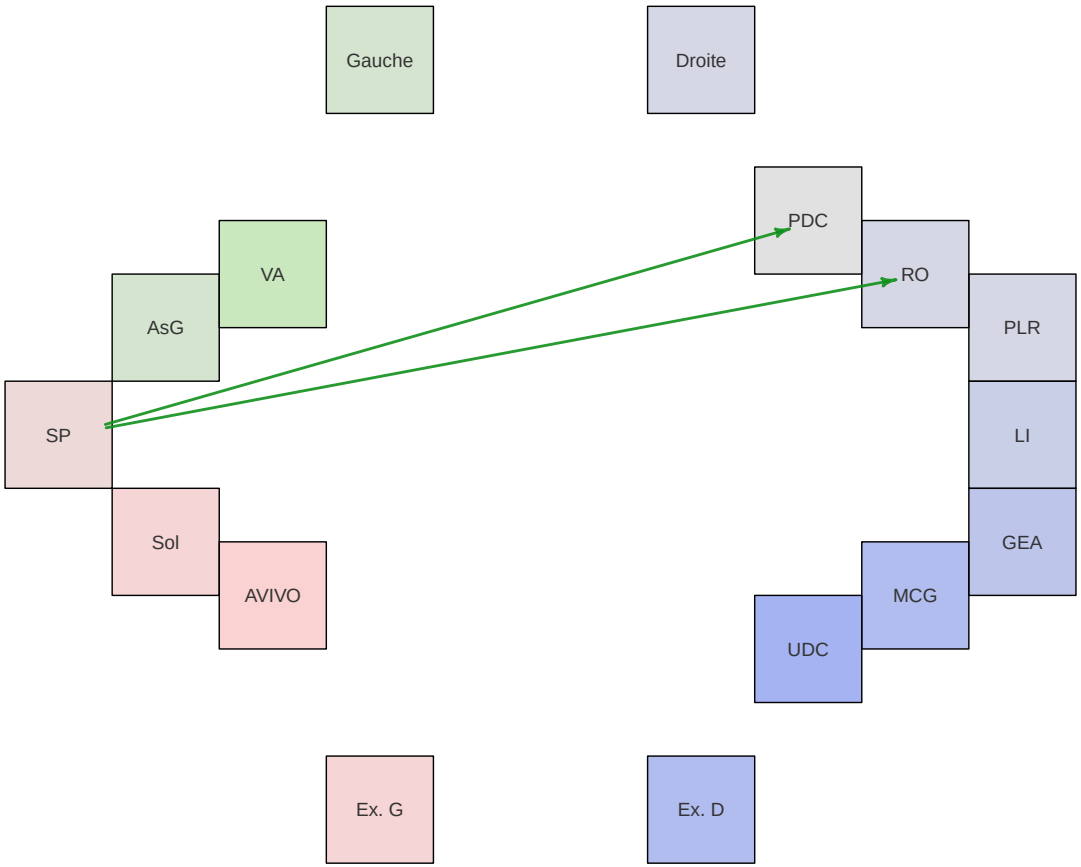
Gauche
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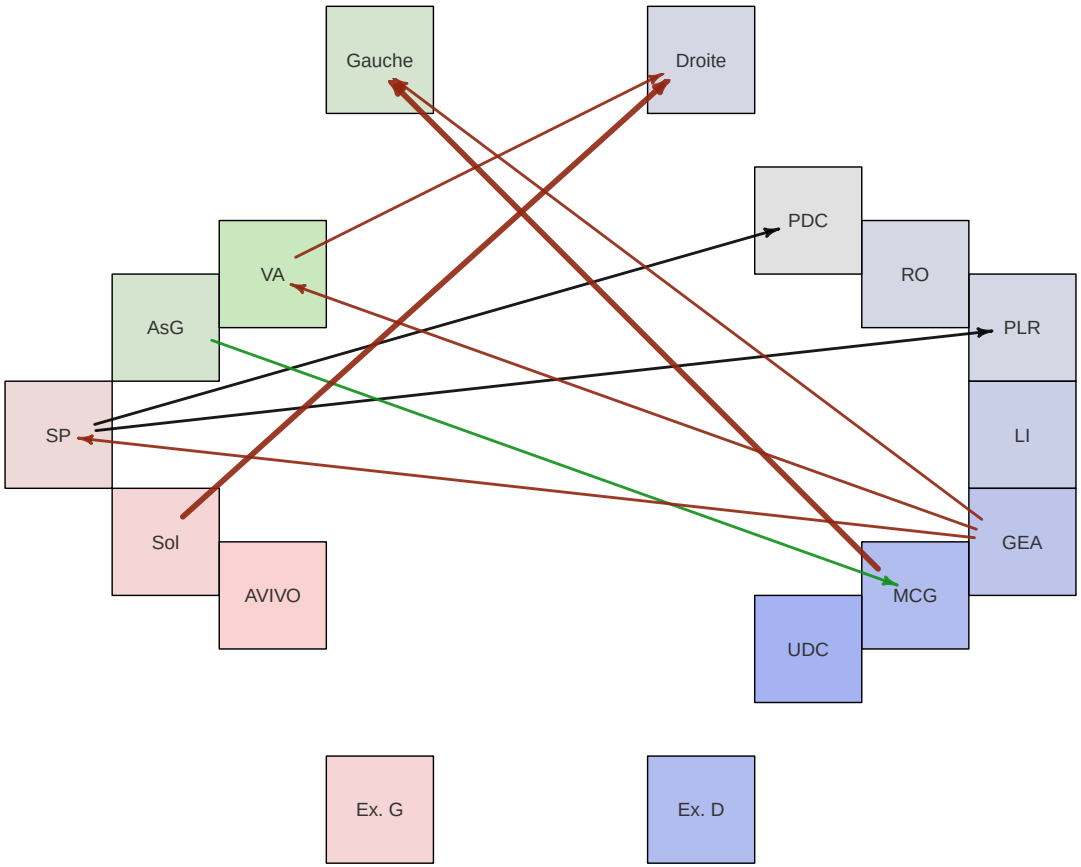
PDC
RO
VA
AsG
PLR
SP
LI
Sol
GEA
AVIVO
MCG
UDC
Ex. G
Ex. D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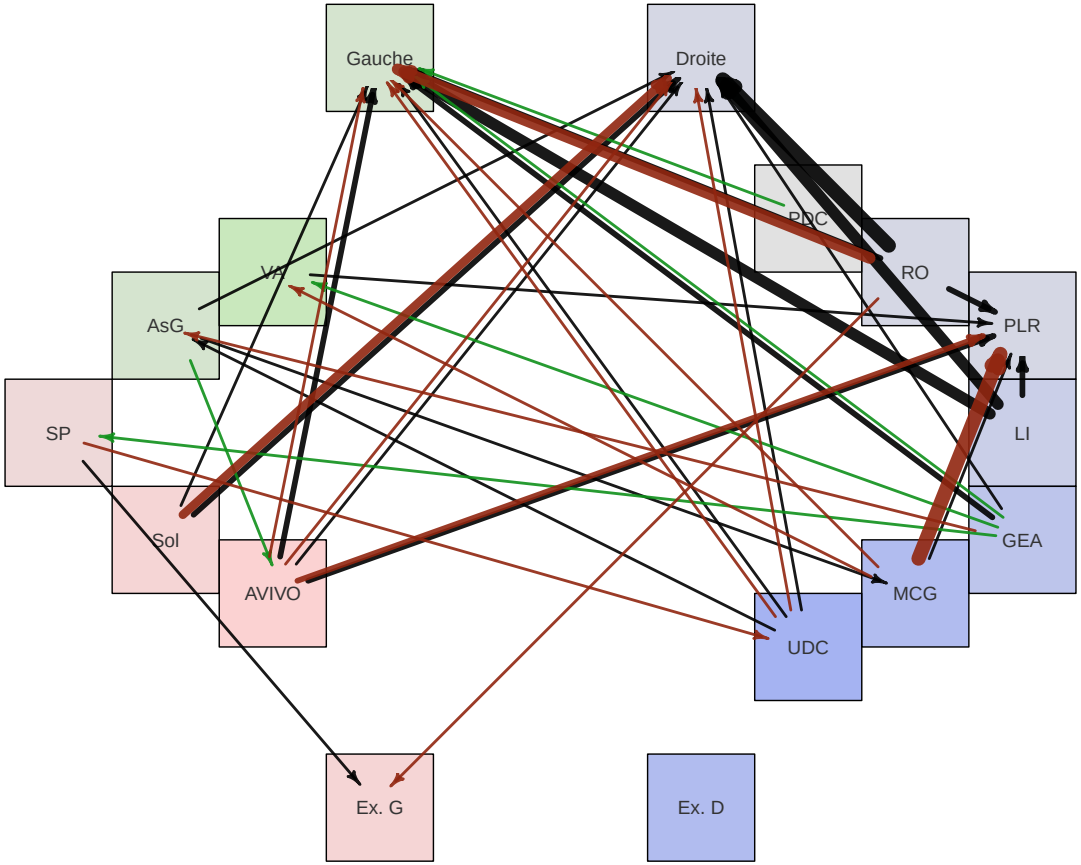
MCG
UDC
Ex. G
Ex. D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Droite
PDC
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AsG
PLR
SP
LI
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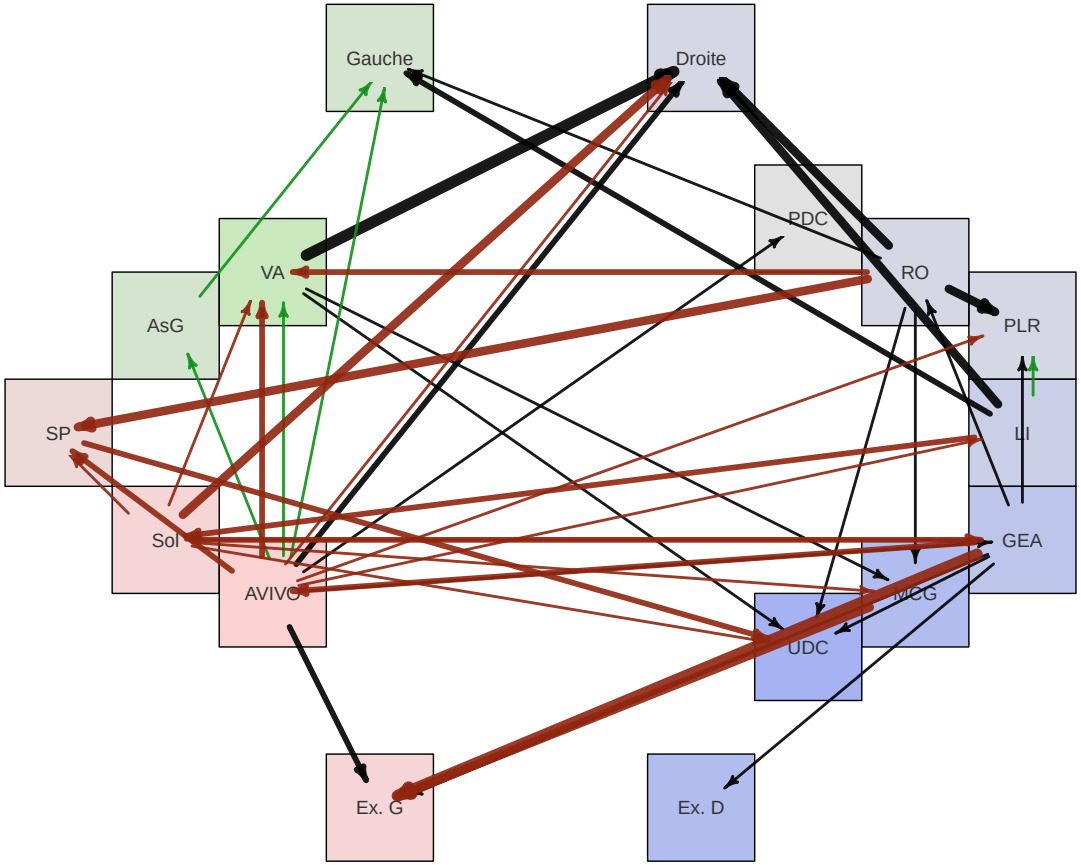
GEA
AVIVO
MCG
UDC
Ex. G
Ex. D


Gauche
Droite
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GEA
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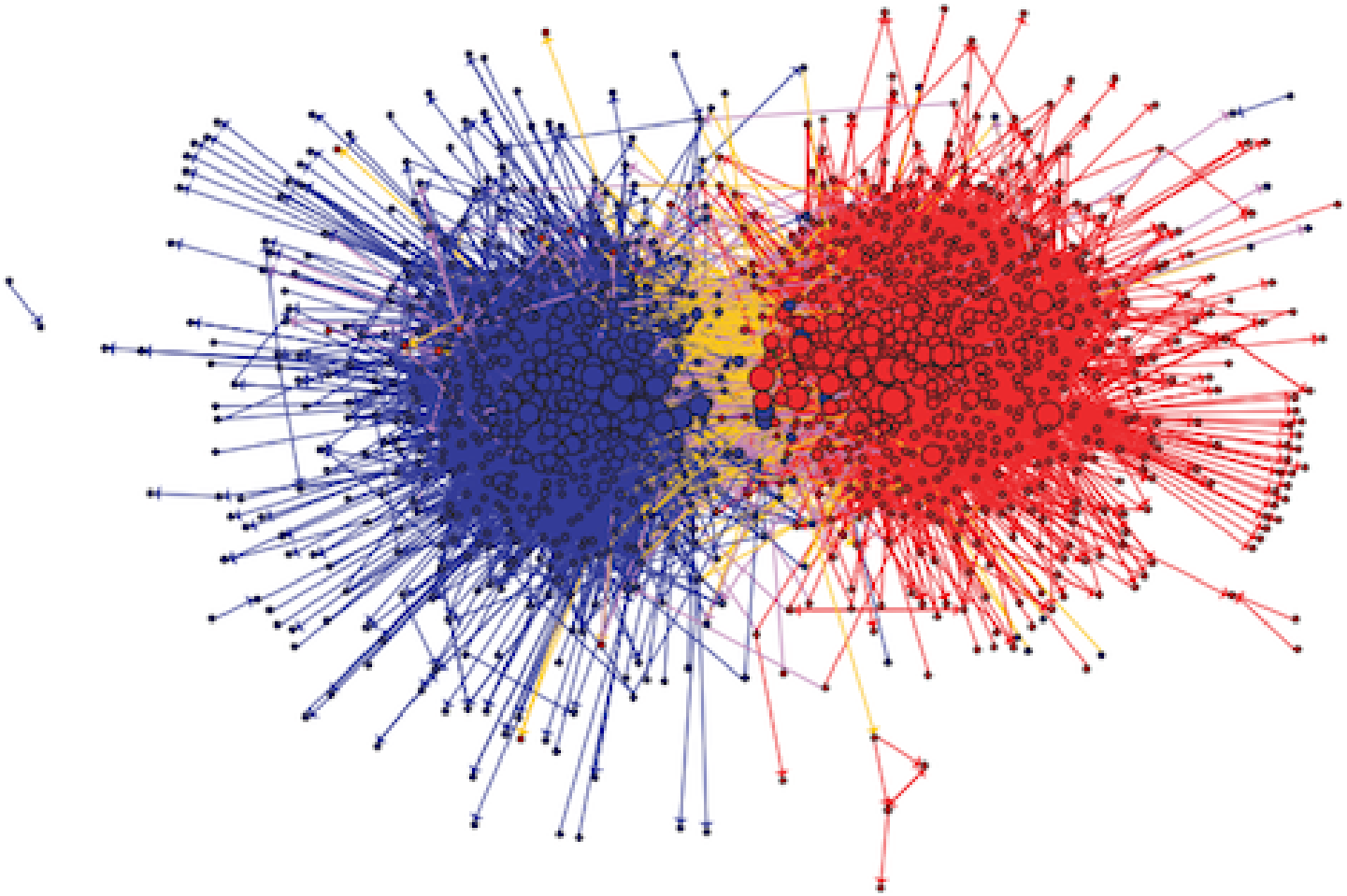
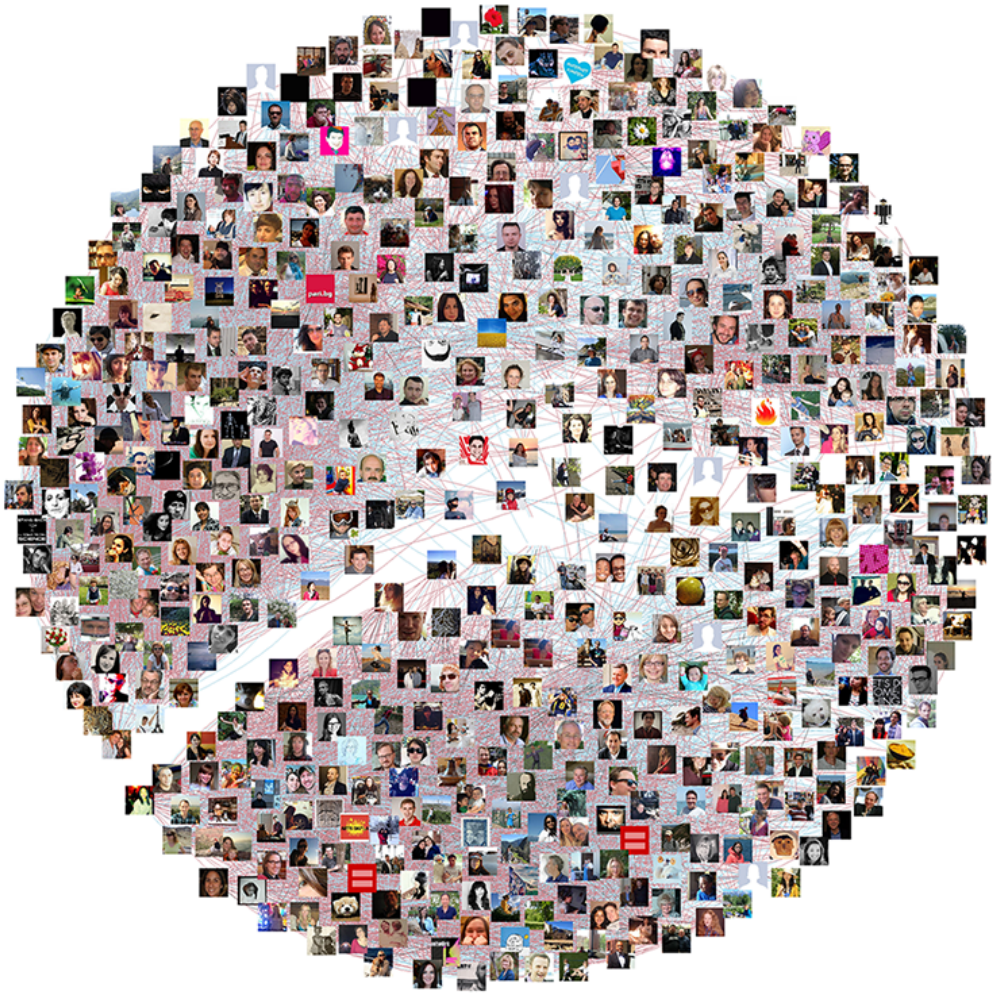
UDC
Ex. G
Ex. D



Adamic and Glance, 2008



Katherine Ognyanova, 2014

https://www.youtube.com/watch?v=VsyLrCBs0wQ

Conclusion

- L'analyse de réseaux très populaire actuellement
- Nombreux packages R: network et sna les plus courants
- Importance centrale de la visualisation
- Nombreux développements en cours

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Marion.Deville@unige.ch

Package R 'spnet':
http://emmanuel.rousseaux.me/r-package-spnet