

# BHLms Network Analysis

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```
# Charger les bibliothèques nécessaires
```

```
library(readr)
```

```
library(stringr)
```

```
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
```

```
## v dplyr      1.1.2      v purrr      1.0.1
```

```
## v forcats    1.0.0      v tibble    3.2.1
```

```
## v ggplot2    3.4.2      v tidyr     1.3.0
```

```
## v lubridate  1.9.2
```

```
## -- Conflicts ----- tidyverse_conflicts() --
```

```
## x dplyr::filter() masks stats::filter()
```

```
## x dplyr::lag()    masks stats::lag()
```

```
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(knitr)
```

```
library(sna)
```

```
## Le chargement a nécessité le package : statnet.common
```

```
##
```

```
## Attachement du package : 'statnet.common'
```

```
##
```

```
## Les objets suivants sont masqués depuis 'package:base':
```

```
##
```

```
##      attr, order
```

```
##
```

```
## Le chargement a nécessité le package : network
```

```
##
```

```
## 'network' 1.18.1 (2023-01-24), part of the Statnet Project
```

```
## * 'news(package="network")' for changes since last version
```

```
## * 'citation("network")' for citation information
```

```
## * 'https://statnet.org' for help, support, and other information
```

```
##
```

```
## sna: Tools for Social Network Analysis
```

```
## Version 2.7-1 created on 2023-01-24.
```

```
## copyright (c) 2005, Carter T. Butts, University of California-Irvine
```

```
## For citation information, type citation("sna").
```

```
## Type help(package="sna") to get started.
```

```
library(network)
```

```
library(ggnetwork)
```

```

library(ggplot2)

# Importer les data
dossierBHL <- read_csv("dossier-bhl.csv")

## Warning: One or more parsing issues, call `problems()` on your data frame for details,
## e.g.:
##   dat <- vroom(...)
##   problems(dat)

## Rows: 3329 Columns: 9
## -- Column specification -----
## Delimiter: ","
## chr (8): Code dossier BHL, Rubrique courte, Sexe, Statut, Statut religieux, ...
## dbl (1): type.canondate
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
saints <- read_csv("saints-db.csv")

## Rows: 3837 Columns: 7
## -- Column specification -----
## Delimiter: ","
## chr (7): Type de sainteté, Titulaire du dossier, Nom, Statut religieux, Stat...
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
# View(saints)

Quelques stats pour y voir plus clair

saints$fa_sexe <- as.factor(saints$Sexe)
saints$fa_statut <- as.factor(saints$Statut)
saints$fa_statut_rel <- as.factor(saints$`Statut religieux`)

summary(saints$fa_statut)

## ecclésiastique      indéterminé      laïc      n.c.      non pertinent
##           2439              8          1384           1              5

summary(saints$fa_statut_rel)

##   indéterminé non pertinent      régulier      séculier
##           5              5          1038          2789

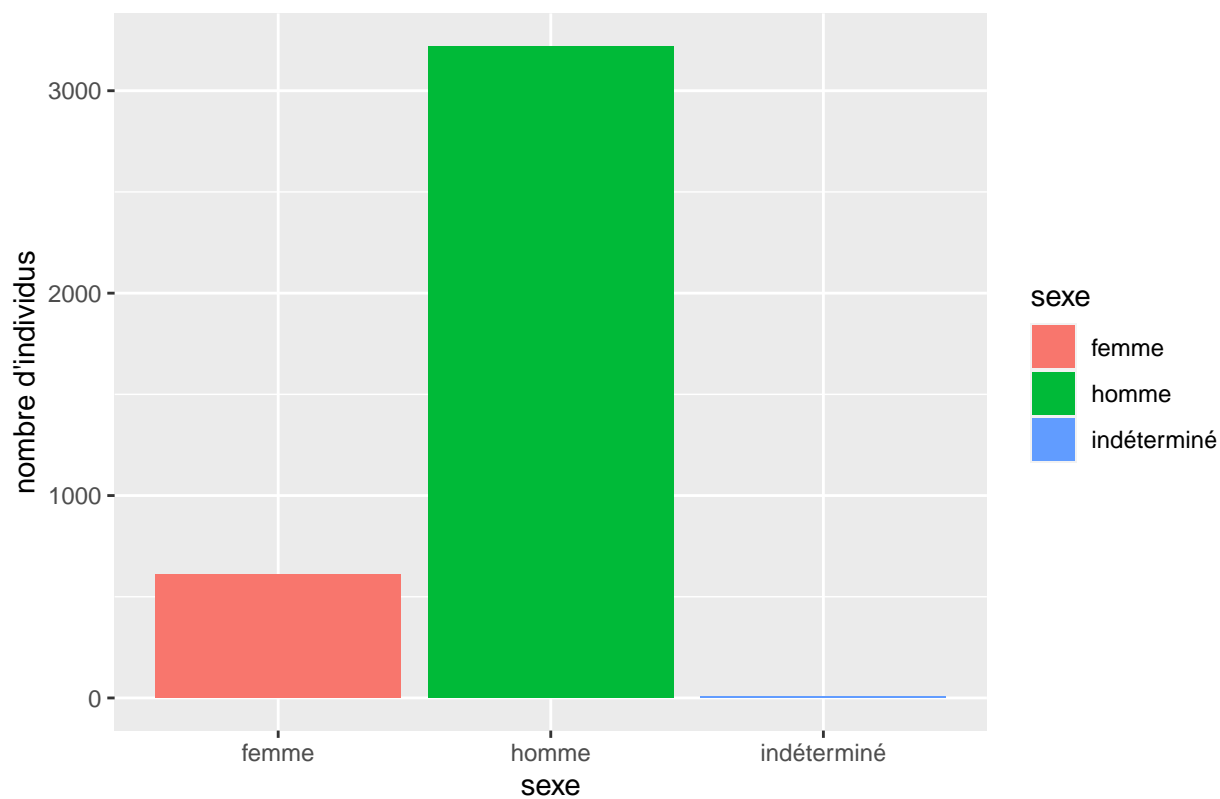
summary(saints$fa_sexe)

##      femme      homme indéterminé
##        611        3221           5

ggplot(saints)+
  geom_bar(mapping = aes(fa_sexe, fill = fa_sexe))+
  ggtitle("Répartition des sexes des saints au sein de la base données")+
  labs(x="sexe", y = "nombre d'individus")+
  labs(fill = "sexe")

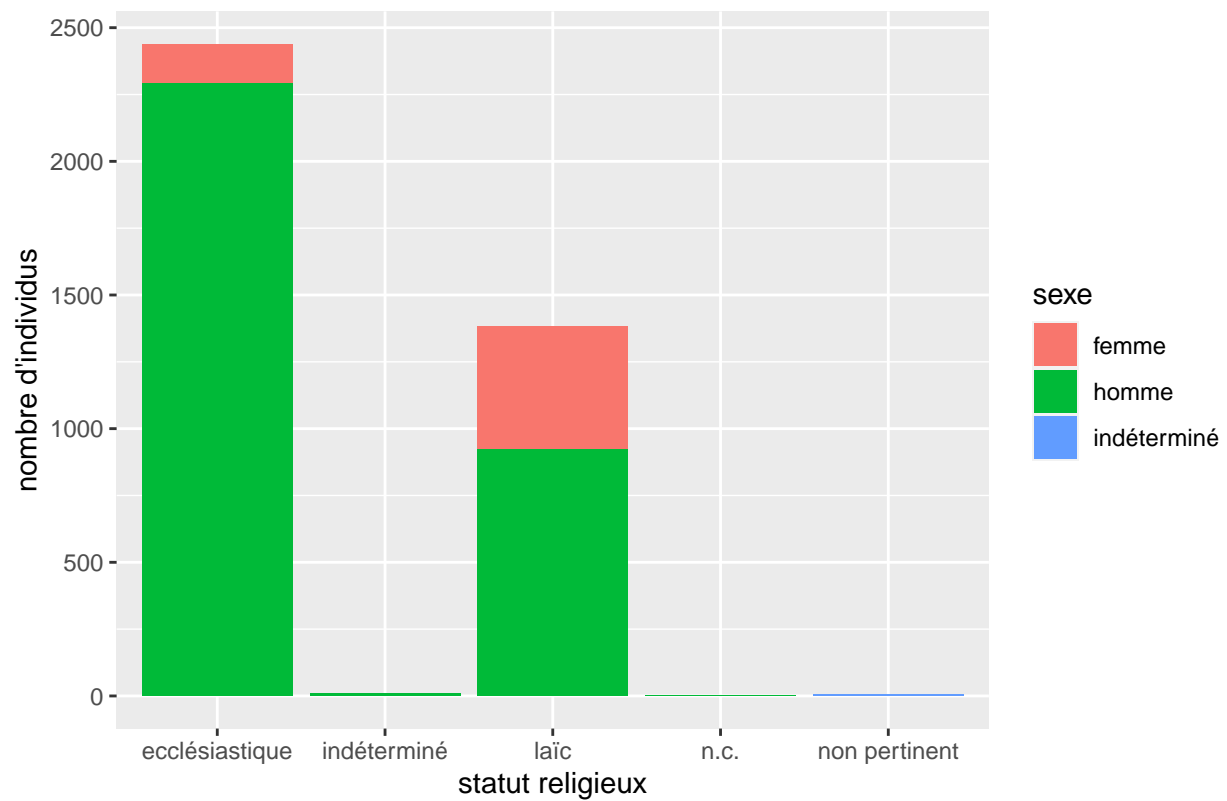
```

## Répartition des sexes des saints au sein de la base données

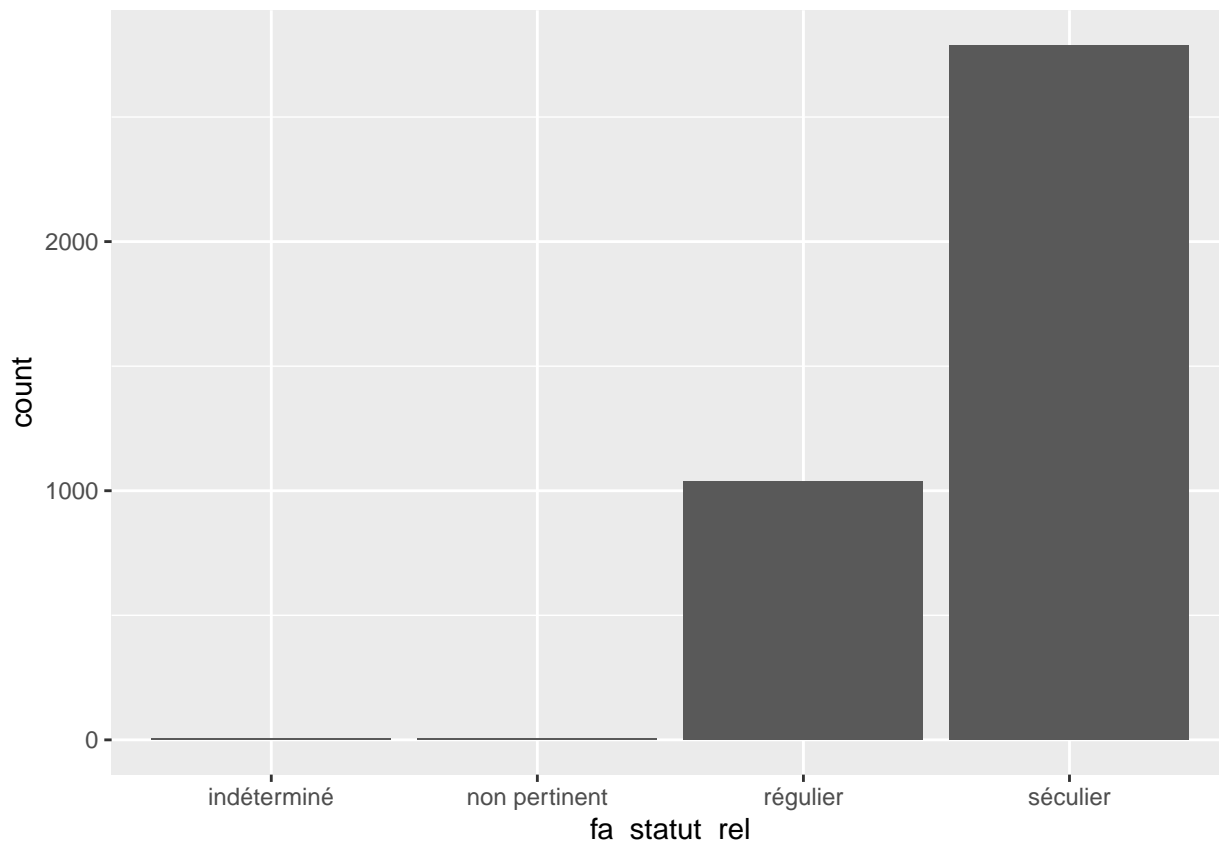


```
ggplot(saints)+  
  geom_bar(mapping = aes(fa_statut, fill = fa_sexe))+  
  ggtitle("Répartition des saints selon leur statut dans l'Eglise et leur sexe")+  
  labs(x="statut religieux", y = "nombre d'individus", fill = "sexe")
```

Répartition des saints selon leur statut dans l'Eglise et leur sexe



```
ggplot(saints)+  
  geom_bar(mapping = aes(fa_statut_rel))
```



```
# Nettoyage des données
saints_list <- str_replace_all(dossierBHL$`Relations : Dossiers BHL / Saints`, "[\\[\\]'", "") %>%
  str_split(", ") %>%
  set_names(seq_along(.))

# Création d'une liste de toutes les paires de saints dans chaque entrée
pairs_list <- lapply(saints_list, function(x) {
  if (length(x) > 1) {
    combn(x, 2, simplify = FALSE)
  }
})

# Supprimer les NULL dans la liste de paires
pairs_list <- pairs_list[!sapply(pairs_list, is.null)]

# Création d'un dataframe à partir de la liste de paires
edges_df <- do.call(rbind, lapply(pairs_list, function(x) do.call(rbind, x))) %>%
  as_tibble() %>%
  set_names(c("from", "to"))

## Warning: The `x` argument of `as_tibble.matrix()` must have unique column names if
## `.name_repair` is omitted as of tibble 2.0.0.
## i Using compatibility `.name_repair`.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_lifecycle_warnings()` to see where this warning was
## generated.
```

```

# Sélectionnez les colonnes nécessaires et filtrez les lignes pour ne garder que les saints qui se trou
sub_db <- saints%>%
  select(Id, fa_sexe, fa_statut, fa_statut_rel) %>%
  filter(Id %in% edges_df$from)

# Pour Gephi : write.csv(edges_df, file = "edges.csv", row.names = FALSE)
#               write.csv(sub_db, file = "nodes.csv", row.names = FALSE)

saints_net <- as.network(edges_df, matrix.type = "edgelist", directed = FALSE, multiple = FALSE, edge.cl

```

Voir : [https://matteo.gagliolo.web.ulb.be/SOCAD460/centrality.html#2\\_Closeness](https://matteo.gagliolo.web.ulb.be/SOCAD460/centrality.html#2_Closeness)

```
gden(saints_net)
```

```
## [1] 0.002039967
```

```
max(degree(saints_net))
```

```
## [1] 12
```

```
n_saint <- nrow(edges_df)
```

```

linked_saint <- data.frame(Degree = degree(saints_net, gmode = "graph"),
  StdCloseness = closeness(saints_net, gmode = "graph"),
  Betweenness = betweenness(saints_net, gmode = "graph"))

```

```
kable(linked_saint)
```

Degree	StdCloseness	Betweenness
1	0	0
2	0	0
2	0	0
1	0	0
1	0	0
2	0	0
2	0	0
1	0	0
3	0	0
3	0	0
3	0	0
1	0	0
1	0	0
1	0	0
1	0	0
2	0	0
2	0	0
1	0	0
4	0	0
4	0	0
4	0	0
4	0	0
2	0	0
2	0	0
3	0	0
3	0	0

Degree	StdCloseness	Betweenness
3	0	0
3	0	0
3	0	0
3	0	0
1	0	0
1	0	0
4	0	0
4	0	0
4	0	0
4	0	0
4	0	0
3	0	0
3	0	0
3	0	0
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Degree	StdCloseness	Betweenness
2	0	0
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Degree	StdCloseness	Betweenness
1	0	0
3	0	0
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Degree	StdCloseness	Betweenness
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Degree	StdCloseness	Betweenness
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2	0	0
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Degree	StdCloseness	Betweenness
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Degree	StdCloseness	Betweenness
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Degree	StdCloseness	Betweenness
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2	0	0
4	0	0
1	0	0





Degree	StdCloseness	Betweenness
1	0	0
1	0	0
2	0	0
1	0	0
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1	0	0
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2	0	0

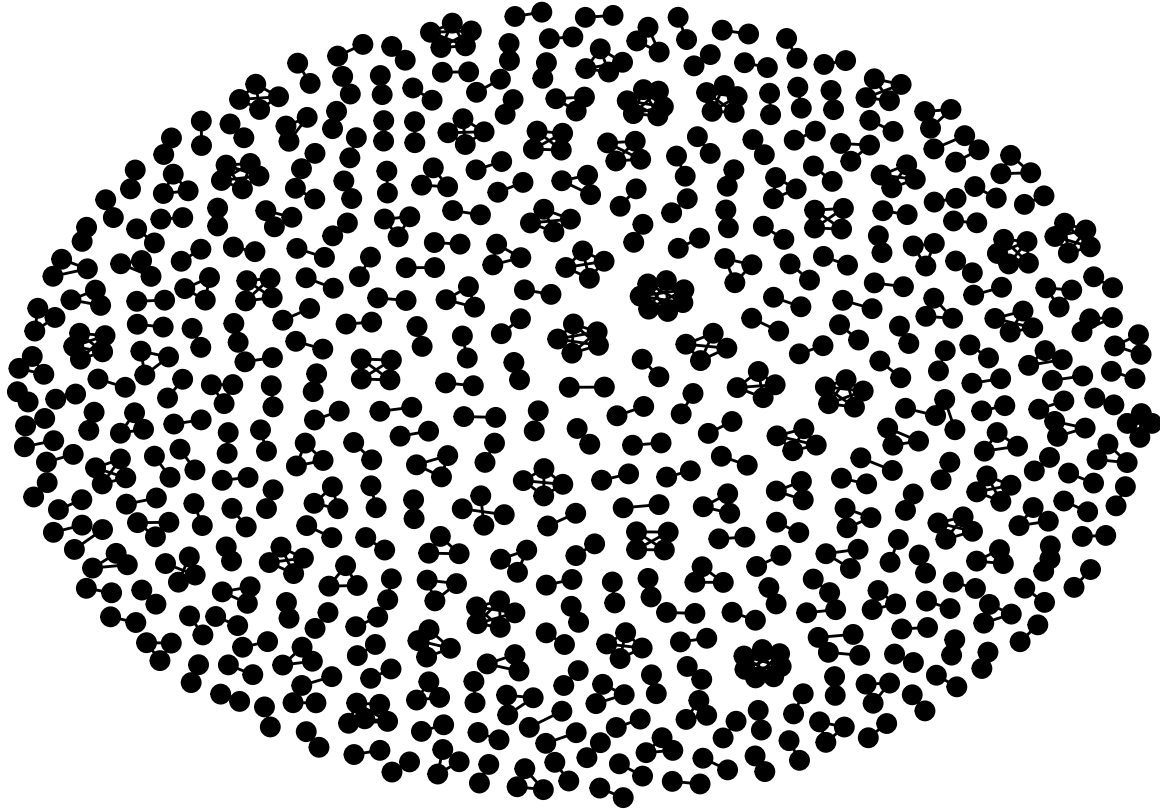
Degree	StdCloseness	Betweenness
1	0	0
3	0	0
3	0	0
1	0	0
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1	0	0
1	0	0
1	0	0
1	0	0
2	0	0
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1	0	0
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2	0	0
3	0	0
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2	0	0
1	0	0
1	0	0
3	0	0
1	0	0
1	0	0
2	0	0
1	0	0
1	0	0
6	0	0
1	0	0
1	0	0
1	0	0





Degree	StdCloseness	Betweenness
2	0	0
1	0	0
2	0	0
2	0	0
2	0	0
1	0	0
1	0	0
2	0	0
1	0	0
1	0	0
1	0	0
2	0	0
1	0	0
1	0	0
1	0	0
2	0	0
1	0	0
2	0	0
1	0	0
1	0	0
1	0	0
6	0	0
2	0	0
1	0	0
1	0	0
1	0	0
1	0	0
1	0	0
1	0	0
1	0	0
2	0	0
1	0	0
2	0	0
1	0	0
1	0	0
1	0	0
1	0	0
1	0	0
1	0	0
2	0	0
1	0	0
1	0	0
1	0	0
1	0	0
1	0	0
2	0	0
1	0	0
1	0	0
1	0	0
1	0	0
3	0	0
1	0	0

```
ggplot(data = saints_net,
       aes(x = x, y = y, xend = xend, yend = yend)) +
  geom_edges(color = "black") +
  geom_nodes(size = 3) +
  theme_void()
```



*#lien vers le réseau en ligne : <https://ouestware.gitlab.io/retina/beta/#/graph?url=https%3A%2F%2Fgist>*