Code

SaSR 8 Tutorial 1.2

Using the Knecht data: solutions

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Preamble

This document was written as an R Markdown (%5Bhttp://rmarkdown.rstudio.com)](http://rmarkdown.rstudio.com (http://rmarkdown.rstudio.com))) Notebook. If you are reading a html or pdf version of this, you can just keep reading, and if you want to run any of the code yourself, you need to copy and paste the code to your own R-script.

If you are reading this in the .rmd format: Try executing this chunk by clicking the *Run* button within the chunk or by placing your cursor inside it and pressing *Ctrl+Shift+Enter*. When you save the notebook, an HTML file containing the code and output will be saved alongside it (click the *Preview* button or press *Ctrl+Shift+K* to preview the HTML file).

This is what we had:

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```
library(haven) #For reading Stata files
library(network) #For data handling of network data
library(xUCINET)
library(tidyverse) # because Tidyverse!



PupilsWaveV <- read_dta(file = "PupilsWaveV.dta")
m <- PupilsWaveV  %>%
  filter(schoolnr == "12b") %>% # keep only one class
  select(namenr, friend1:friend12)  # select only the " best friends"  network


m <- as.matrix(m)  # so that the next line works as intended; cbind() works in specific wa
ys on matrix objects, which we exploit here.

m<- cbind(m[,1],c(m[,-1])) %>%
  as_tibble(m) %>% # So that we can easily filter
  filter(!is.na(V2)) # Now it is an edge list



g <- as.network.matrix(m,matrix.type = "edgelist") #from network package


a <- as.matrix.network(g, matrix.type = "adjacency" ) #again, from the network package

Knecht_W_12b_net <- xCreateProject(NetworkName = " Friends",

                        NETFILE1 = a,

                        FileType = "Robject",

                        InFormatType = "AdjMat",

                        References = "No references"
)
```

```
 ------ FUNCTION: xCreateProject --------------------------


 - Basic checks performed on the argument for "xCreateProject".

 - Data imported: [ 0 0 1 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 1
1 0 1 0 0 0 0 0 1 0 0 0 0 0 1 0 0 1 0 0 0 0 1 1 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 1 0 0 0 0 1 1 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0 0 0 1 0 1 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 1 0 0 0 0 0 1 0 0 1 0 0
0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 1 1 0 1 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 1 0 0 1 1 0 0 0 1 0 0 0 0 0 1 0 0 0 0 1 0 0 0
0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0
1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 1 1 0 0 0 0 0 0 0 0
1 0 0 0 1 0 1 0 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 0 0 ] and named as: [  Friends ]
 ---------------------------------------------------------------
```

Assignment

1. Add the “practical support” network (for this school class!) as a second network to the project.

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```
m_sup <- PupilsWaveV  %>%
  filter(schoolnr == "12b") %>% # keep only one class
  rename(pracsup10=pracsu10) %>% # names are inconsistent! Need to fix first
  rename(pracsup11=pracsu11) %>% # there's probably a way to do this faster...
  rename(pracsup12=pracsu12) %>%
  select(namenr, pracsup1:pracsup12)  # now select only the "practical support"  network


m_sup <- as.matrix(m_sup)

m_sup <- cbind(m_sup[,1],c(m_sup[,-1])) %>%
  as_tibble(m_sup) %>% # So that we can easily filter
  filter(!is.na(V2)) # Now it is an edge list

g_sup <- as.network.matrix(m_sup,matrix.type = "edgelist") #from network package

a_sup <- as.matrix.network(g_sup, matrix.type = "adjacency" ) #again, from the network pac
kage
```

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```
Knecht_W_12b_net <- xAddToProject(
                            ProjectName=Knecht_W_12b_net,
                             NetworkName="Support",
                             NETFILE1=a_sup,
                             FileType="Robject" ,
                             NetworkDescription="Support network",
                             Mode=c("People"),
                             Directed=TRUE,
                             Loops=FALSE,
                             Values="Binary",
                             Class="matrix"

)
```

```
 ------ FUNCTION: xAddToProject --------------------------

ProjectName: Knecht_W_12b_netNumber of existing networks: 1
NetworkName: Support
 - Basic checks performed on the argument for "xAddToProject".

 - Data imported: [ 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0
1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 0 ] and named: [ Support ]
 ---------------------------------------------------------------
```

Note that if you want to redo the `xAddToProject()` operation, the package will throw you an error because a network with that name already exists in the project. Unfortunately, there is no option to overwrite to existing network. Instead, you may use the `xRemoveFromProject()` function to remove it first.

2. Add “sex” and ” age” as attribute data.

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```
myatts <- PupilsWaveV %>%
          filter(schoolnr == "12b") %>% # keep only one class
          select(age, sex) %>%  # select only the " best friends"  network
          as.data.frame() # xAddAttributesToProject expects a data frame
```

Some things to notice here:

- In the earlier example we imported attributes from a csv file; here we use the R object directly and specify this in the parameters of the function.
- We use *only* these to variables: there is no “key” variable that identifies the cases (like namenr). Thus, you need to make sure that the data are sorted in the same order!
- `xAddAtttributesToProject()` is rather picky in that it strictly requires the attributes object to be a data frame, which is why we apply `as.data.frame()` in the last line.

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```
Knecht_W_12b_net <- xAddAttributesToProject(ProjectName = Knecht_W_12b_net,
                                ATTFILE1=myatts,
                                FileType = "Robject",
                                Mode = c("People"),
                                AttributesDescription=c("Age in years","Gender (1=Male, 2=
Female)")
)
```

```
 ------ FUNCTION: xAddAttributesToProject ----------------------------

 Getting "dataproject" with name [Knecht_W_12b_net].

 Attribute file [myatts] imported

[1] "A"      "People"
```

3. Combine the friendship and support networks, assuming for the resulting network that there is a (directed) tie if pupil A nominates pupil B as a friend, and/or reports receiving support from B. (Also think: what is really the *direction* of the tie measured by the “personal support” name generator question?)

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```
c<- xCombineTies(Knecht_W_12b_net$` Friends`, Knecht_W_12b_net$Support, Type = "Max")

Knecht_W_12b_net <- xAddToProject(
                             ProjectName=Knecht_W_12b_net,
                              NetworkName="Combined",
                              NETFILE1=c,
                              FileType="Robject" ,
                              NetworkDescription="Combined network",
                              Mode=c("People"),
                              Directed=TRUE,
                              Loops=FALSE,
                              Values="Binary",
                              Class="matrix"

)
```

```
 ------ FUNCTION: xAddToProject --------------------------

ProjectName: Knecht_W_12b_netNumber of existing networks: 2
NetworkName: Combined
 - Basic checks performed on the argument for "xAddToProject".

 - Data imported: [ 0 0 1 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 1 0 1
1 0 1 0 0 0 0 1 1 0 0 0 0 0 1 0 0 1 0 0 0 0 1 1 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 1 0 0 0 0 1 1 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
0 0 0 0 0 1 0 1 0 0 0 0 0 1 0 1 1 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 1 1 0 0 0 0 0 1 0 0 1 0 0
0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 1 1 0 1 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 1 0 0 1 1 0 0 0 1 0 0 0 0 0 1 0 0 0 0 1 0 0 0
0 0 0 0 0 1 0 0 1 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 1 1 0 0 0 0 0 0
0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 1 0 0 0 1 0 0 0 0 1 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0
1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 1 1 0 0 0 0 0 0 0 0 0
1 0 0 0 1 0 1 0 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 0 0 ] and named: [ Combined ]
 ---------------------------------------------------------------
```

4. Try plotting the network.

We'll use the `igraph` package for this, and choose the newly created "Combined" network to visualize. First we export the network from the XUCINET project to an igraph object, and then visualize it

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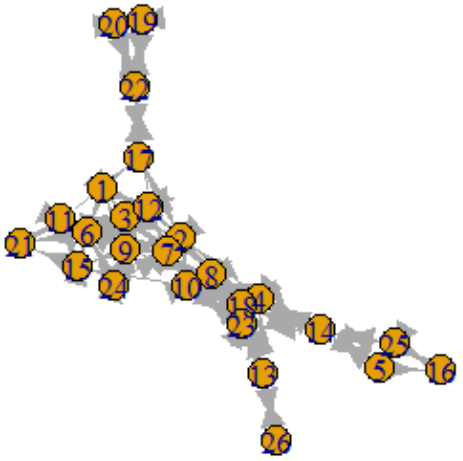
```
library(igraph)

combinet <- graph_from_adjacency_matrix(Knecht_W_12b_net$Combined,
  mode = c("directed"), diag = FALSE)

plot(combinet)
```



We could do the same using `sna`, with somewhat nicer results:

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```
library(sna)

combinet.sna <- as.network(Knecht_W_12b_net$Combined,
  directed = TRUE)

gplot(combinet.sna)
```