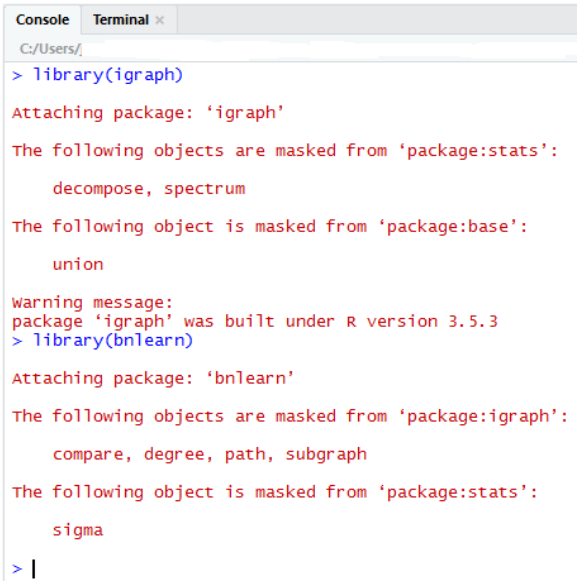
Manual for Windows Users

This manual tells you how to use the functions for learning Markov blankets in an LWF chain graph from a causally sufficient faithful presented in the Under Review Paper for UAI 2020.

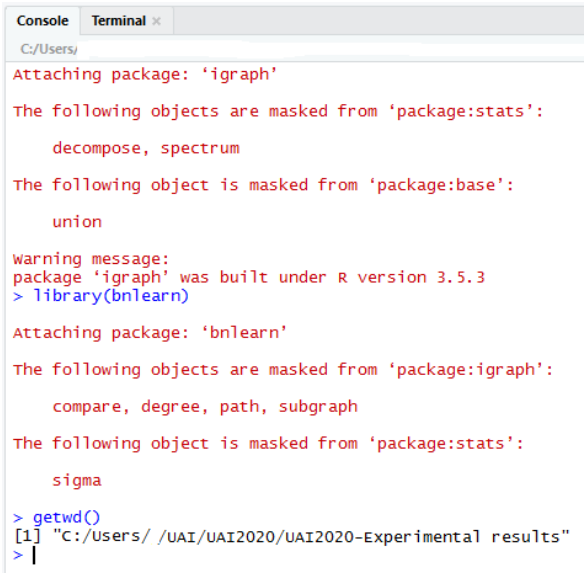
RUNNING THE R CODE:

1. Download and Install R from https://cran.r-project.org/bin/windows/base/.
2. Install RStudio 1.1.463 - Windows Vista/7/8/10.
3. Run the RStudio software.
4. Install the R package bnlearn (copy and paste the following line in your RStudio Console panel and press Enter):
   ## Download and install the package
   install.packages("https://www.bnlearn.com/releases/bnlearn_latest.tar.gz")
5. Install the following R package: igraph (copy and paste the following line in your RStudio Console panel and press Enter):
   ## Download and install the package
   install.packages("igraph")

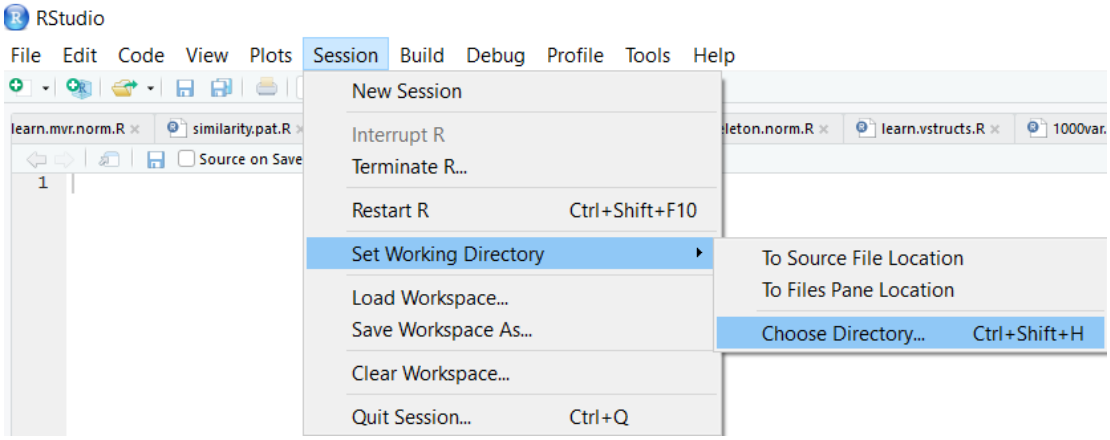
6. Load the following library: bnlearn and igraph



7. R is always pointed at a directory on your computer. You can find out which directory by running the getwd (get working directory) function; this function has no arguments.



To change your working directory, use the following instruction and specify the path to the desired folder.



8. Download the R code and csv files, and put them in the working directory.

Examples

```
# load the R code source
source("mbcsp.R")

#plot the LWF chain graph "toy.graph"
plotCG(toy.graph)

# read the dataset "toy_graph3000_01.csv"
ds<-read.csv("toy_graph3000_01.csv")

# Learn Markov blankets via MBC-CSP algorithm (pvalue =0.01)
mbcsp(ds,alpha = 0.01,max.sx = 10)
```

```
# Parallel structure learning
# First, we need to load the parallel package and initialize the cluster of
slave processes, called “cl” below.

#load the library parallel
library(parallel)
#initial the cluster
cl = parallel::makeCluster(4)

# read the dataset “toy_graph3000_01.csv”
ds<-read.csv("toy_graph3000_01.csv")

# Learn Markov blankets via MBC-CSP algorithm (pvalue =0.01)
mbs <- mbcsp(ds,alpha = 0.01,max.sx = 10, cluster =cl)

# We may want to stop the cluster and kill the slave processes when we are
# done.
parallel::stopCluster(cl)

#print the Markov blankets in the console panel of the RStudio
mbs
```