type 1 level 1

```r
# note function spreadROIs() doesn't work very well
# data = readFileList(fileList = file_list,fixBF = TRUE) %>% spreadROIs()

rm(list = ls())
library(tidyverse)
```

```
## -- Attaching packages ------------------------------------------------- tidyverse 1.3.0 --
## v ggplot2 3.2.1     v purrr   0.3.3
## v tibble  2.1.3     v dplyr   0.8.3
## v tidyr   1.0.0     v stringr 1.4.0
## v readr   1.3.1     v forcats 0.4.0
## -- Conflicts ------------------------------------------------- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```r
library(MRIcloudT1volumetrics)

load(file = 'raw.rda')

data = data %>% filter(type==1,level==1) %>%
  select(rawid,roi,volume) %>% spread(roi,volume)

# convert the rawid to be compatible with the format in lookup table
data$rawid = sapply(strsplit(data$rawid,"_"),function(x) x[1])

# compositional analysis
data = data %>% lapply(function(x) as.numeric(x)) %>% as.data.frame
data = cbind(data[1],prop.table(as.matrix(data[-1]), margin = 1))
data = data[-1]
```

determinant of concentration matrix close to 0

the matrix is not positive definite ~ singular
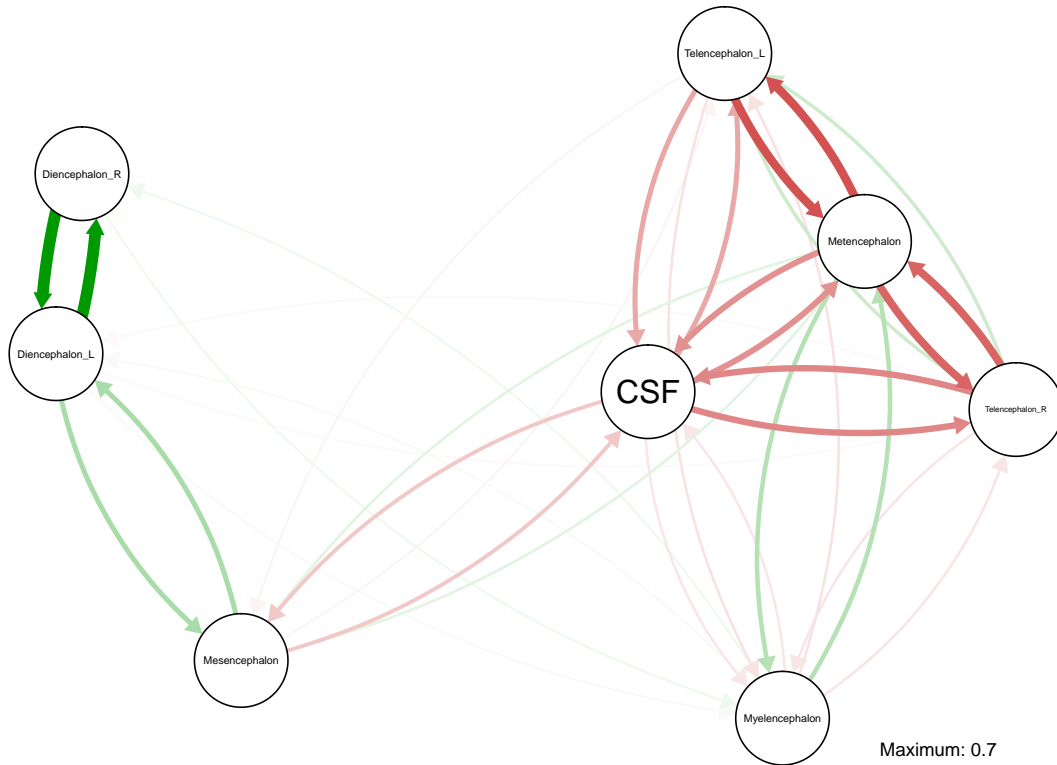
```r
library(glasso)
library(qgraph)
```

```
## Registered S3 methods overwritten by 'huge':
##   method     from
##   plot.sim   BDgraph
##   print.sim  BDgraph
```
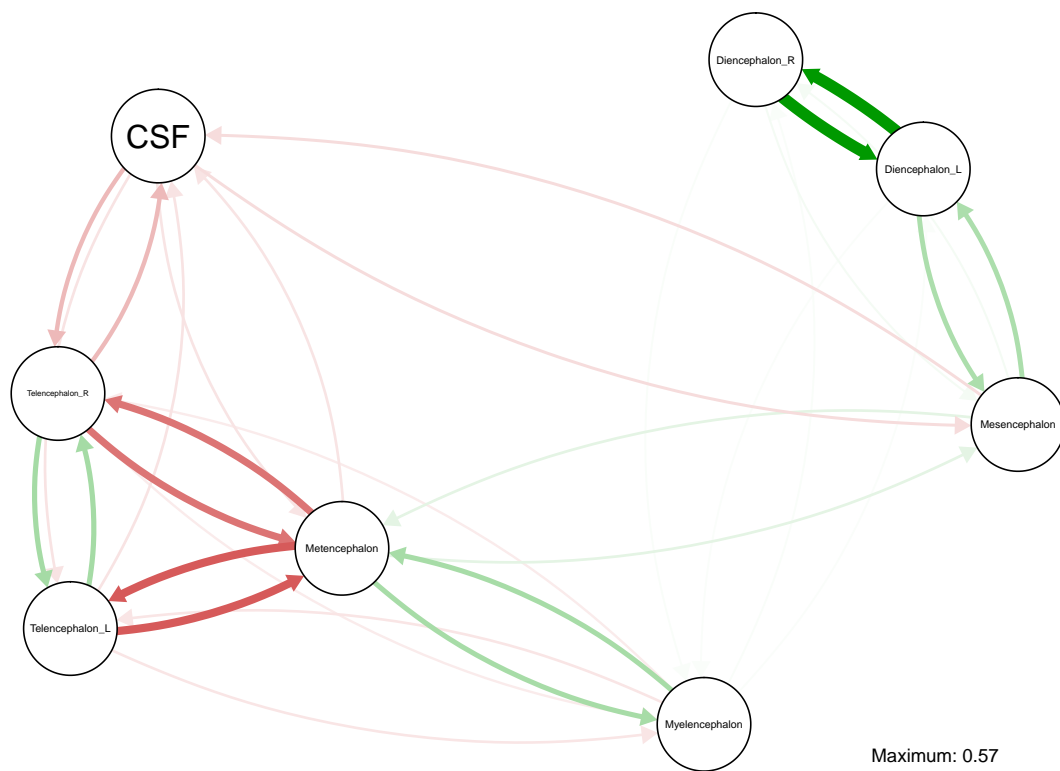
```r
# s = glasso(cor(data),rho = 0.1)
# qgraph(s,
#        labels = colnames(cor(data)),
#        # filetype = 'pdf',
#        details = TRUE,
#        directed = TRUE)
```
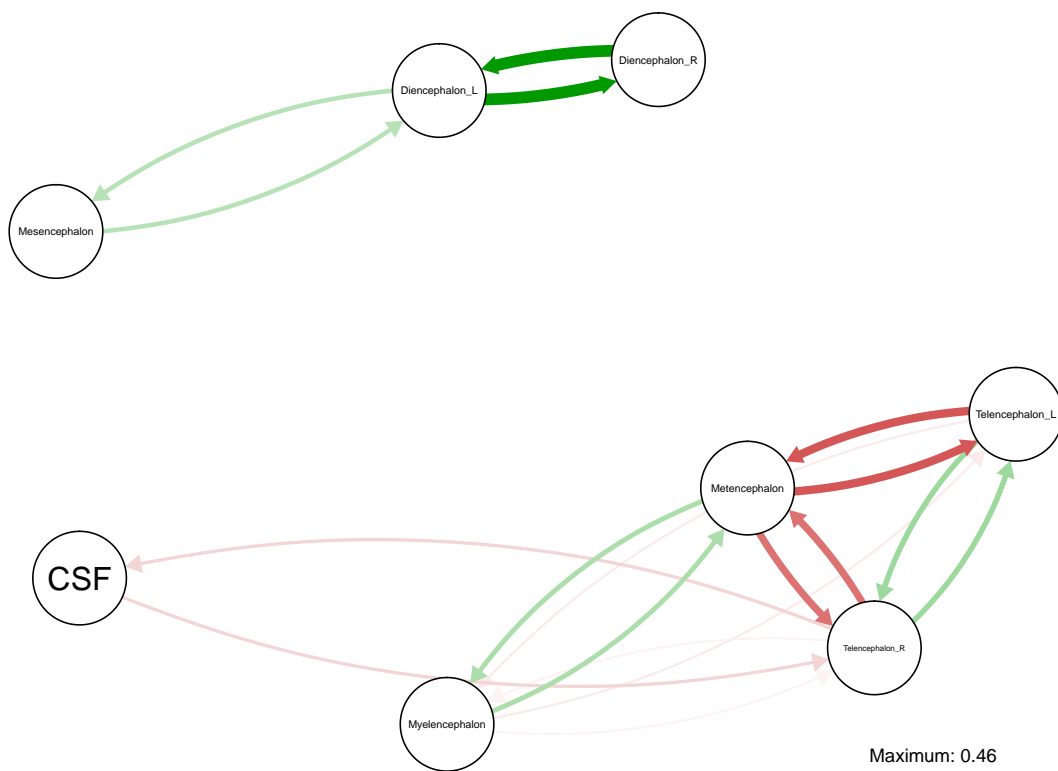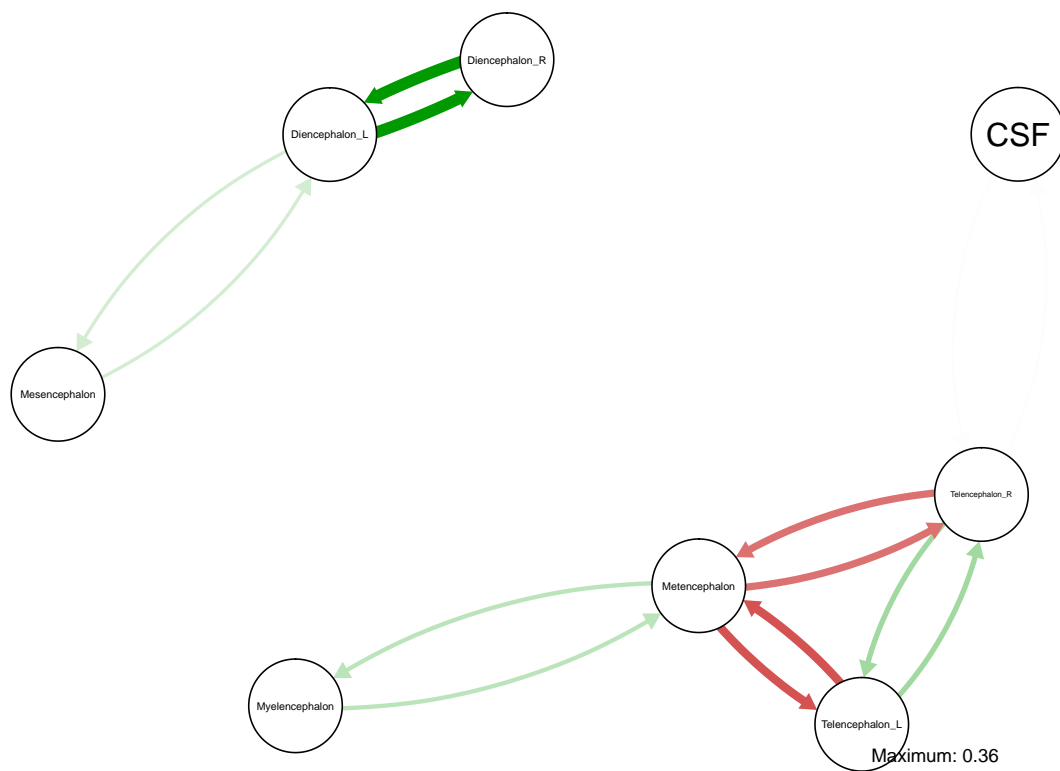
```
lapply(seq(0.1,0.5,0.1), function(i){
  s = glasso(cor(data),rho = i)
  qgraph(s,
      labels = colnames(cor(data)),
      # filetype = 'pdf',
      # filename = paste0('rho=',i),
      details = TRUE,
      directed = TRUE)
})
```


Maximum: 0.7

2

Maximum: 0.57

Maximum: 0.46

Diencephalon_R

Diencephalon_L

CSF

Mesencephalon

Telencephalon_R

Metencephalon

Myelencephalon

Telencephalon_L

Maximum: 0.36

5

Maximum: 0.27

```
## [[1]]
## From      To   Weight
## 4     -->   1    -0.15
## 5     -->   1    -0.3
## 6     -->   1    -0.07
## 7     -->   1    -0.24
## 8     -->   1    -0.33
## 3     -->   2    0.7
## 4     -->   2    0.24
## 6     -->   2    0.02
## 8     -->   2    -0.02
## 2     -->   3    0.7
## 4     -->   3    0.01
## 6     -->   3    0.04
## 1     -->   4    -0.15
## 2     -->   4    0.24
## 3     -->   4    0.01
## 5     -->   4    0.08
## 7     -->   4    -0.03
## 1     -->   5    -0.3
## 4     -->   5    0.08
## 6     -->   5    0.2
## 7     -->   5    -0.48
## 8     -->   5    -0.43
## 1     -->   6    -0.07
## 2     -->   6    0.02
```
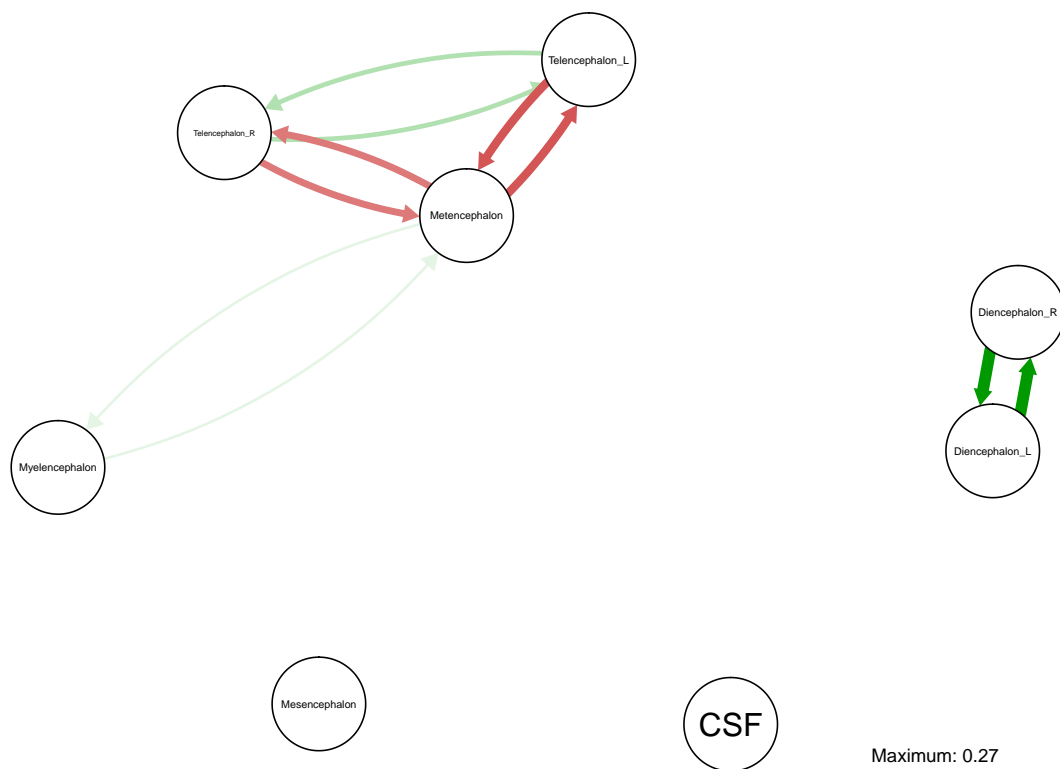
```
## 3        -->    6    0.04
## 5        -->    6    0.2
## 7        -->    6    -0.08
## 8        -->    6    -0.07
## 1        -->    7    -0.24
## 4        -->    7    -0.03
## 5        -->    7    -0.48
## 6        -->    7    -0.08
## 8        -->    7    0.13
## 1        -->    8    -0.33
## 2        -->    8    -0.02
## 5        -->    8    -0.43
## 6        -->    8    -0.07
## 7        -->    8    0.13
##
## [[2]]
## From     To   Weight
## 4        -->    1    -0.08
## 5        -->    1    -0.06
## 7        -->    1    -0.06
## 8        -->    1    -0.16
## 3        -->    2    0.57
## 4        -->    2    0.19
## 6        -->    2    0.01
## 2        -->    3    0.57
## 4        -->    3    0.02
## 6        -->    3    0.01
## 1        -->    4    -0.08
## 2        -->    4    0.19
## 3        -->    4    0.02
## 5        -->    4    0.06
## 1        -->    5    -0.06
## 4        -->    5    0.06
## 6        -->    5    0.2
## 7        -->    5    -0.37
## 8        -->    5    -0.31
## 2        -->    6    0.01
## 3        -->    6    0.01
## 5        -->    6    0.2
## 7        -->    6    -0.06
## 8        -->    6    -0.04
## 1        -->    7    -0.06
## 5        -->    7    -0.37
## 6        -->    7    -0.06
## 8        -->    7    0.2
## 1        -->    8    -0.16
## 5        -->    8    -0.31
## 6        -->    8    -0.04
## 7        -->    8    0.2
##
## [[3]]
## From     To   Weight
## 8        -->    1    -0.08
## 3        -->    2    0.46
```

```
## 4       -->     2    0.13
## 2       -->     3    0.46
## 4       -->     3    0
## 2       -->     4    0.13
## 3       -->     4    0
## 6       -->     5    0.15
## 7       -->     5    -0.3
## 8       -->     5    -0.25
## 5       -->     6    0.15
## 7       -->     6    -0.03
## 8       -->     6    -0.02
## 5       -->     7    -0.3
## 6       -->     7    -0.03
## 8       -->     7    0.18
## 1       -->     8    -0.08
## 5       -->     8    -0.25
## 6       -->     8    -0.02
## 7       -->     8    0.18
##
## [[4]]
## From      To  Weight
## 8       -->     1    0
## 3       -->     2    0.36
## 4       -->     2    0.06
## 2       -->     3    0.36
## 2       -->     4    0.06
## 6       -->     5    0.1
## 7       -->     5    -0.24
## 8       -->     5    -0.2
## 5       -->     6    0.1
## 5       -->     7    -0.24
## 8       -->     7    0.13
## 1       -->     8    0
## 5       -->     8    -0.2
## 7       -->     8    0.13
##
## [[5]]
## From      To  Weight
## 3       -->     2    0.27
## 2       -->     3    0.27
## 6       -->     5    0.03
## 7       -->     5    -0.18
## 8       -->     5    -0.14
## 5       -->     6    0.03
## 5       -->     7    -0.18
## 8       -->     7    0.08
## 5       -->     8    -0.14
## 7       -->     8    0.08
```

garbage code

Weighted Covariance Matrices