

tnet Analysis of Airports

2023-05-01

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## cite sources!
# https://stackoverflow.com/questions/16584948/how-to-create-weighted-adjacency-list-matrix-from-edge-l
# https://kateto.net/netsci2016.html <- used to learn about igraph package
# https://cran.rstudio.com/web/packages/tnet/tnet.pdf <- tnet package info
# debugging <- https://www.statology.org/r-list-object-cannot-be-coerced-to-type-double/
# https://www.r-bloggers.com/2020/03/community-detection-with-louvain-and-infomap/ <- louvain method
# https://stackoverflow.com/questions/49834827/louvain-community-detection-in-r-using-igraph-format-of-

## necessary packages for this analysis
library(tnet)

## Loading required package: igraph
##
## Attaching package: 'igraph'

## The following objects are masked from 'package:stats':
##
##      decompose, spectrum

## The following object is masked from 'package:base':
##
##      union

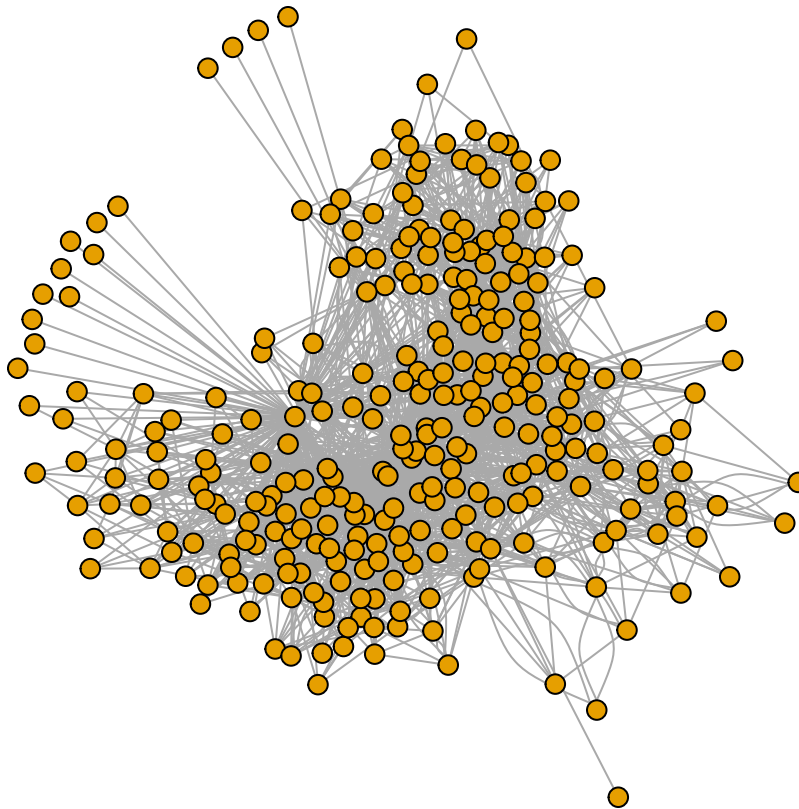
## Loading required package: survival

## tnet: Analysis of Weighted, Two-mode, and Longitudinal networks.
## Type ?tnet for help.

library(igraph)
par(mar=c(0,0,0,0))

## Loading data and creating graph (without communities)
net <- read.table("http://opsahl.co.uk/tnet/datasets/celegans_n306.txt", header=FALSE, col.names = c("v", "e", "w"))
g <- graph.data.frame(net)
adjmat <- get.adjacency(g, sparse=FALSE)

graphnet <- graph_from_adjacency_matrix(adjmat)
graphnet2 <- as.undirected(graphnet, mode="each")
graphlay <- layout_with_fr(graphnet2)
plot(graphnet2, layout=graphlay, vertex.size=5, size2=1,
      vertex.label=NA)
```

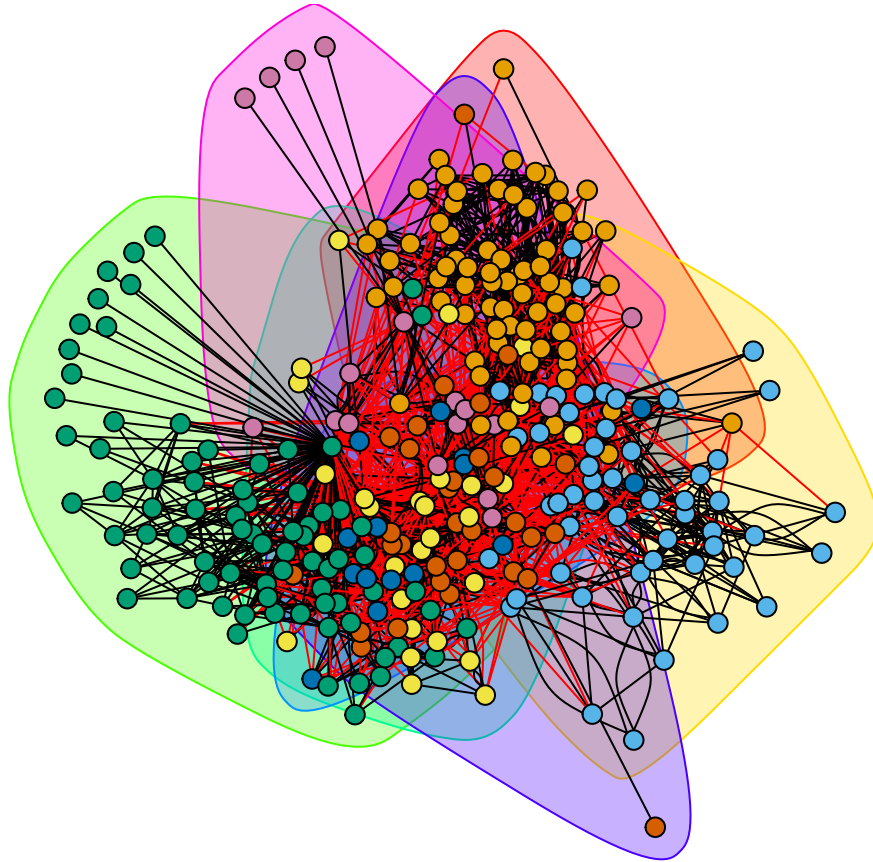


```
## Louvain method
weight <- net$w
commnet <- cluster_louvain(graphnet2, weights=weight)

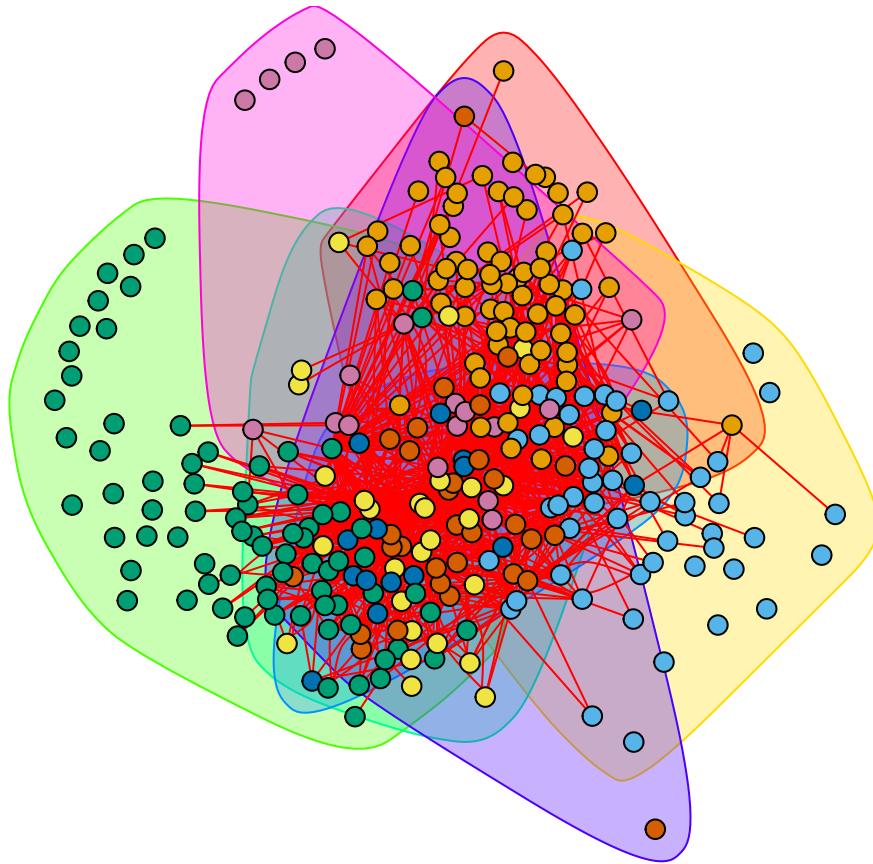
## creating less cluttered graphs
edges <- E(graphnet2)
simple1 <- !crossing(commnet, graphnet2)
simple2 <- crossing(commnet, graphnet2)
simnet1 <- edges[simple1]
simnet2 <- edges[simple2]

simgraph1 <- delete_edges(graphnet2, simnet1)
simgraph2 <- delete_edges(graphnet2, simnet2)

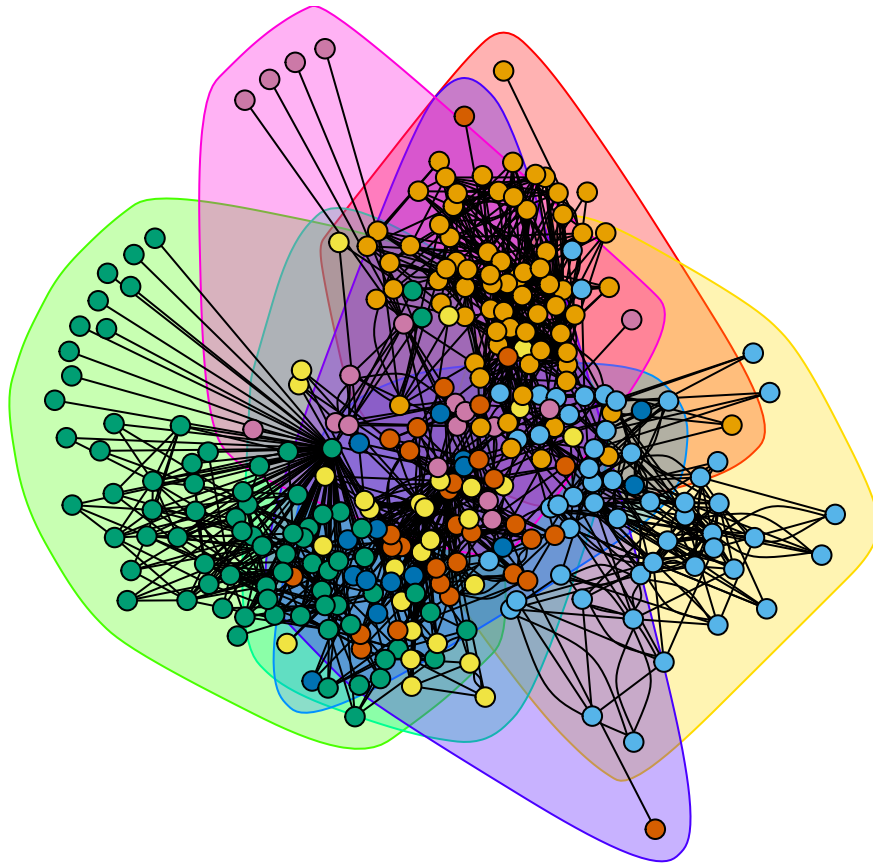
## plotting the results
plot(commnet,
      graphnet2,
      layout=graphlay,
      mark.expand = 20,
      vertex.size=5, size2=1,
      vertex.label=NA)
```



```
plot(commnet,  
      simgraph1,  
      layout=graphlay,  
      mark.expand = 20,  
      vertex.size=5, size2=1,  
      vertex.label=NA)
```



```
plot(commnet,
      simgraph2,
      layout=graphlay,
      mark.expand = 20,
      vertex.size=5, size2=1,
      vertex.label=NA)
```



```
## modularity score  
modularity(commnet)
```

```
## [1] 0.4855559
```