UNIVERSIDAD TÉCNICA DE MACHALA

Maestría en Software

Asignatura:

Base de datos NoSQL

Tema:

Workshop Graphs using R Studio

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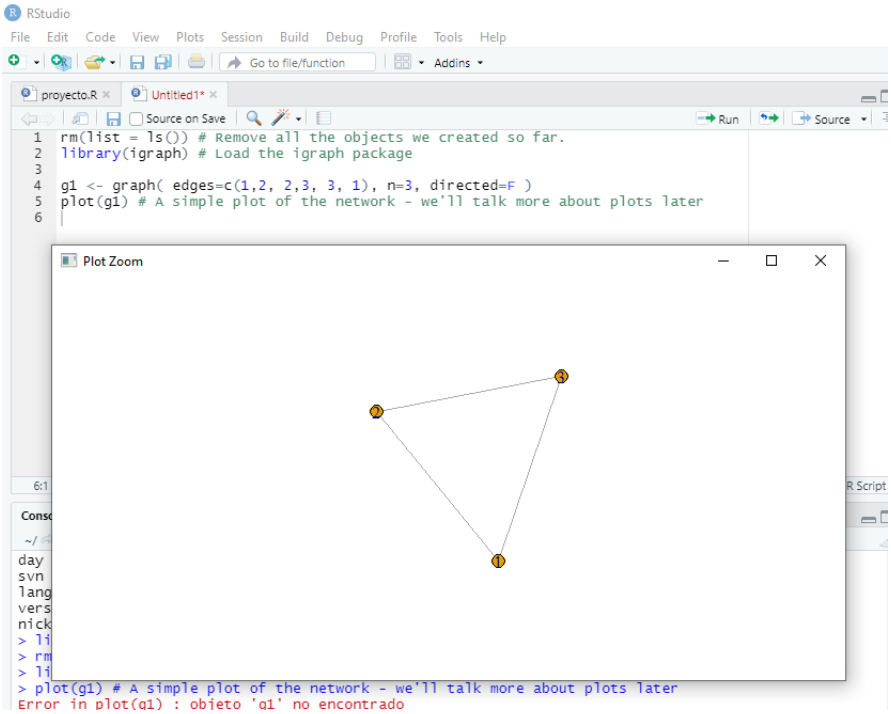
2021-2022

Capítulo 2 - Networks in igraph

Create networks

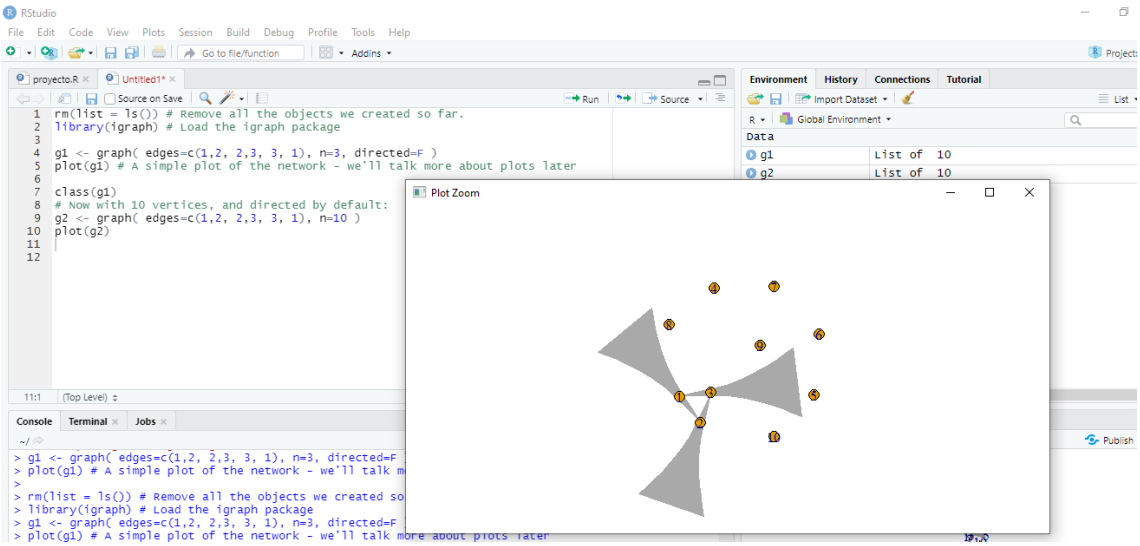
g1 <- graph(edges=c(1,2, 2,3, 3, 1), n=3, directed=F)

plot(g1) # A simple plot of the network - we'll talk more about plots later



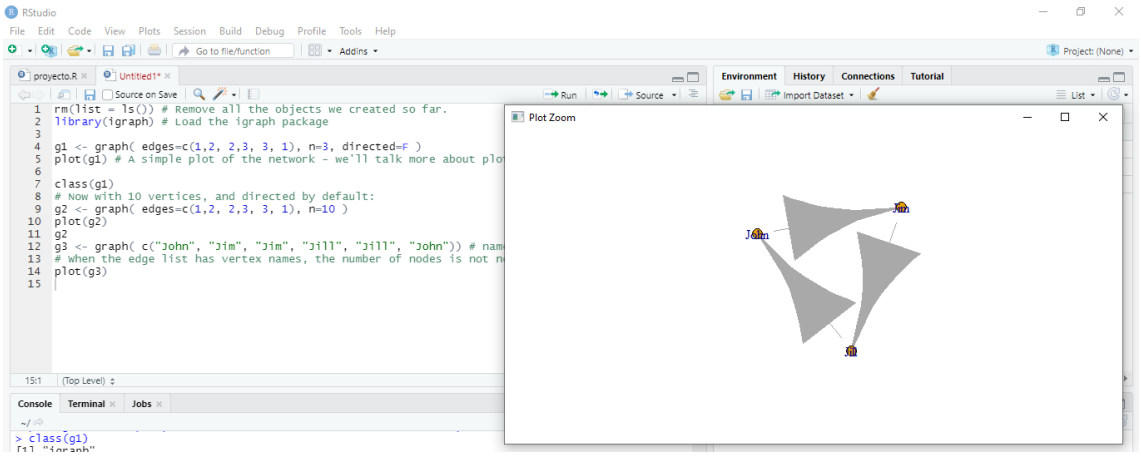
g2 <- graph(edges=c(1,2, 2,3, 3, 1), n=10)

plot(g2)



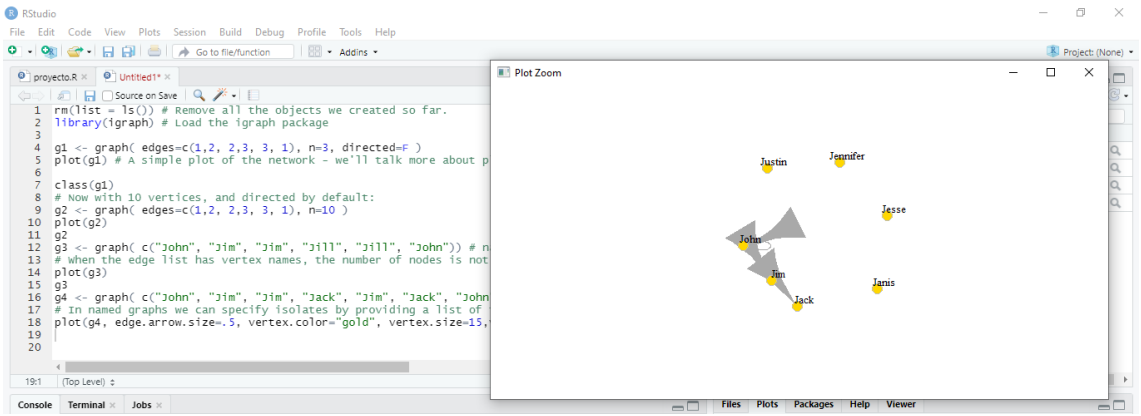
g3 <- graph(c("John", "Jim", "Jim", "Jill", "Jill", "John"))

plot(g3)

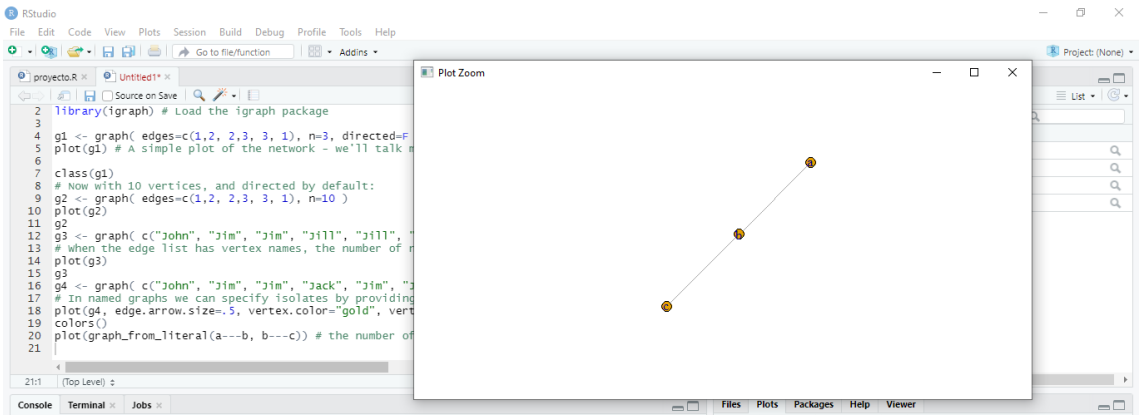


g4 <- graph(c("John", "Jim", "Jim", "Jack", "Jim", "Jack", "John", "John"), isolates=c("Jesse", "Janis", "Jennifer", "Justin"))

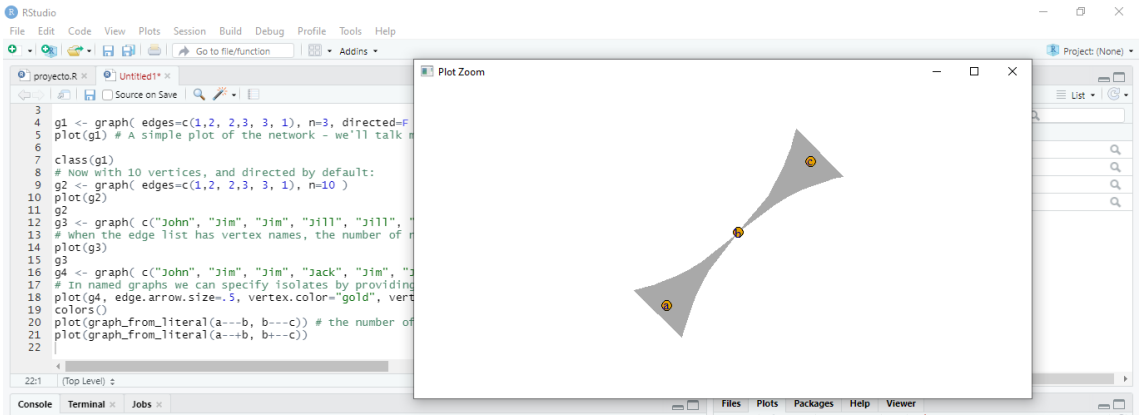
plot(g4, edge.arrow.size=.5, vertex.color="gold", vertex.size=15,vertex.frame.color="gray", vertex.label.color="black",vertex.label.cex=0.8, vertex.label.dist=2, edge.curved=0.2)



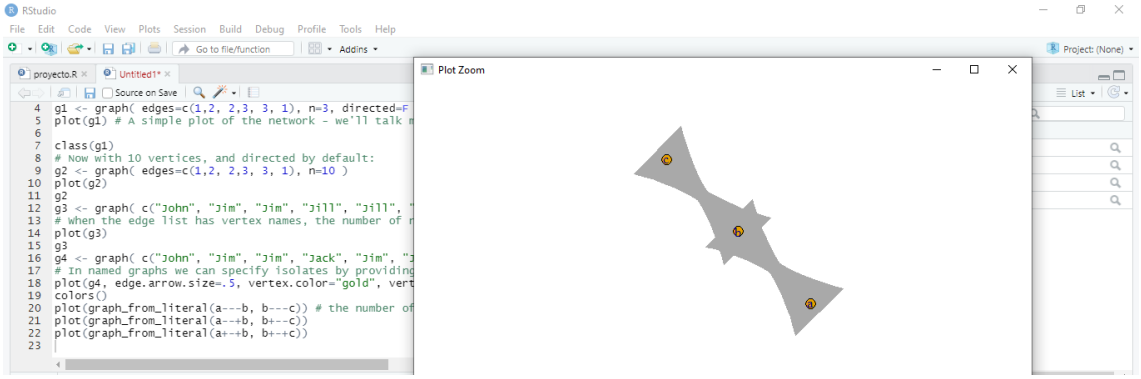
plot(graph_from_literal(a---b, b---c))



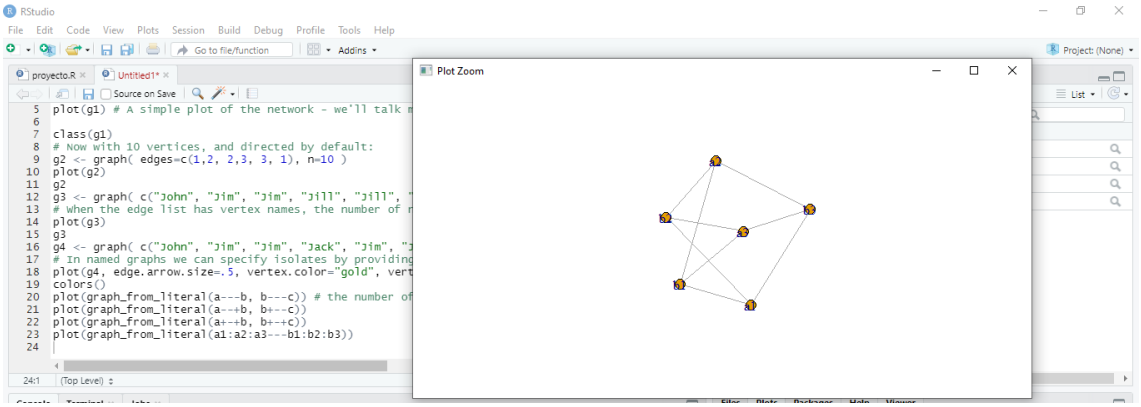
plot(graph_from_literal(a--+b, b+--c))



plot(graph_from_literal(a+-+b, b+-+c))

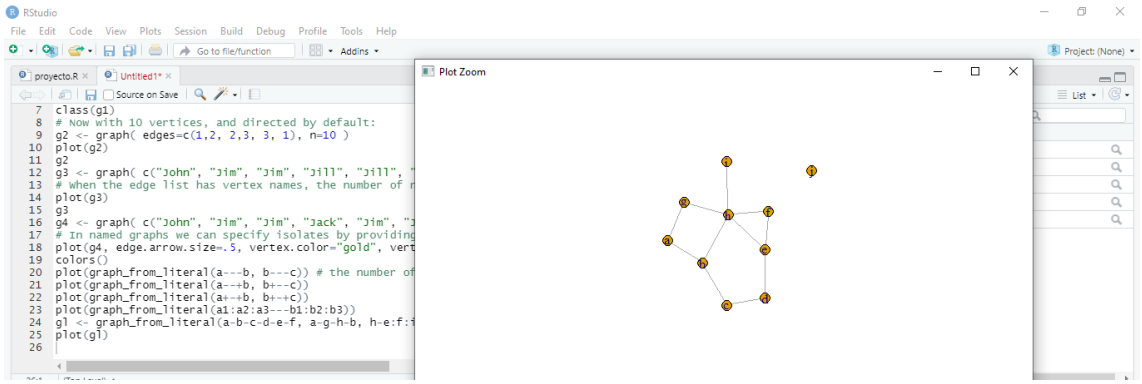


plot(graph_from_literal(a1:a2:a3---b1:b2:b3))



gl <- graph_from_literal(a-b-c-d-e-f, a-g-h-b, h-e:f:i, j)

plot(gl)



Edge, vertex, and network attributes

E(g4) # The edges of the object

V(g4) # The vertices of the object

g4[]

g4[1,]

V(g4)$name

V(g4)$gender <- c("male", "male", "male", "male", "female", "female", "male")

E(g4)$type <- "email" # Edge attribute, assign "email" to all edges

E(g4)$weight <- 10

edge_attr(g4)

vertex_attr(g4)

graph_attr(g4)

g4 <- set_graph_attr(g4, "name", "Email Network")

g4 <- set_graph_attr(g4, "something", "A thing")

graph_attr_names(g4)

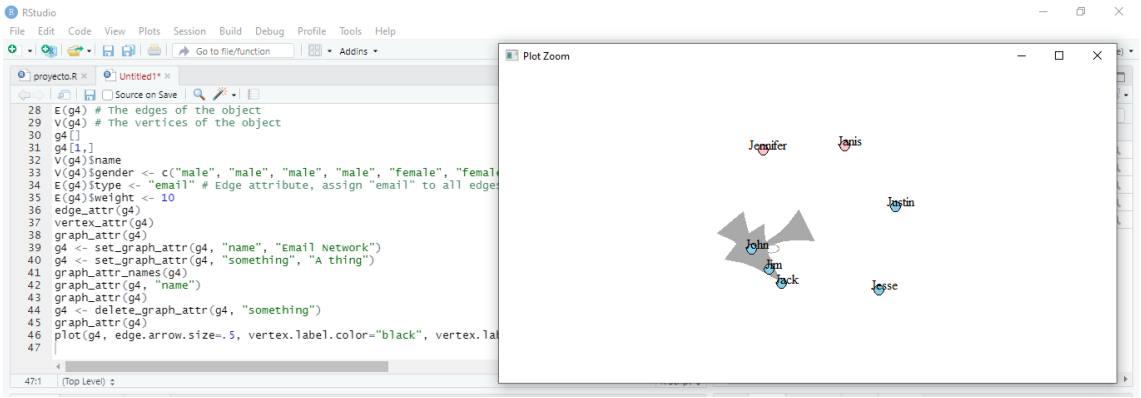
graph_attr(g4, "name")

graph_attr(g4)

g4 <- delete_graph_attr(g4, "something")

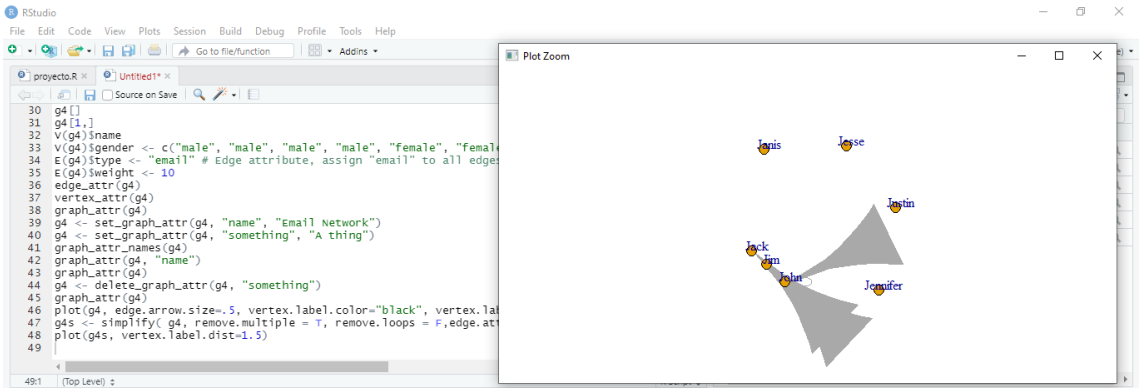
graph_attr(g4)

plot(g4, edge.arrow.size=.5, vertex.label.color="black", vertex.label.dist=1.5,vertex.color=c("pink", "skyblue")[1+(V(g4)$gender=="male")])



g4s <- simplify(g4, remove.multiple = T, remove.loops = F,edge.attr.comb=c(weight="sum", type="ignore"))

plot(g4s, vertex.label.dist=1.5)

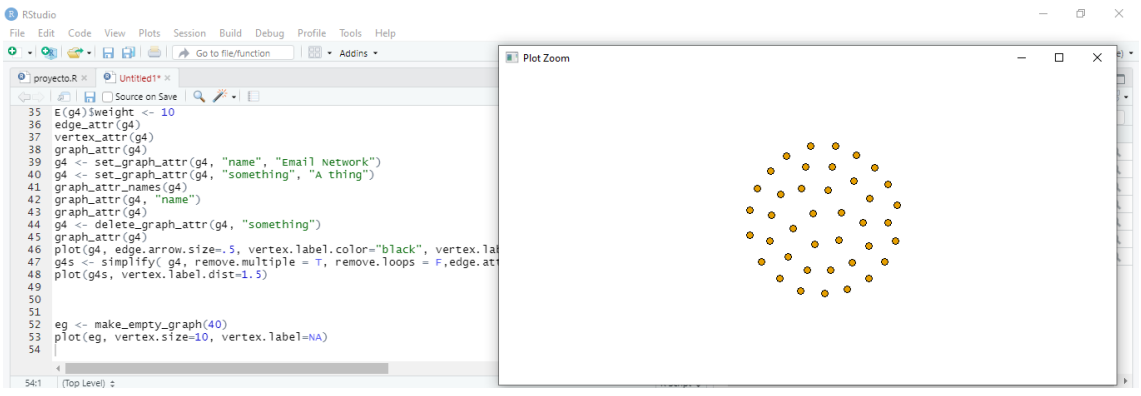


Specific graphs and graph models

Empty graph

eg <- make_empty_graph(40)

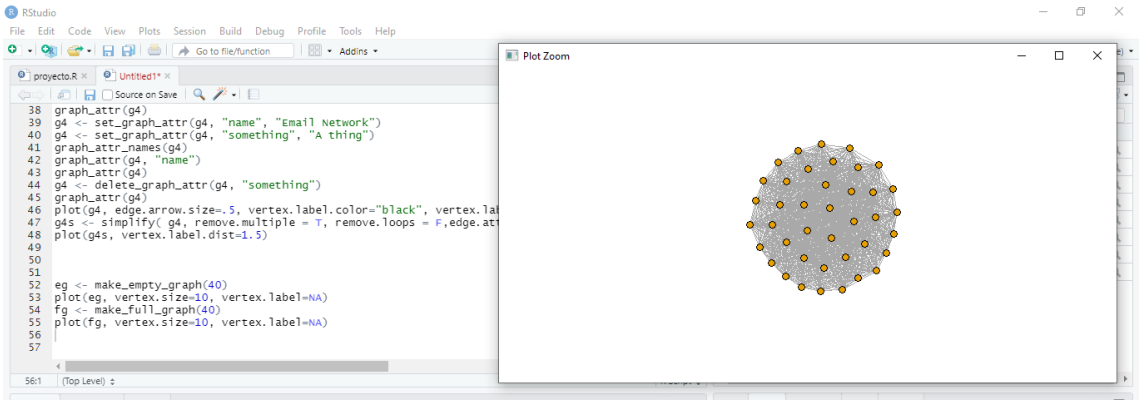
plot(eg, vertex.size=10, vertex.label=NA)



Full graph

fg <- make_full_graph(40)

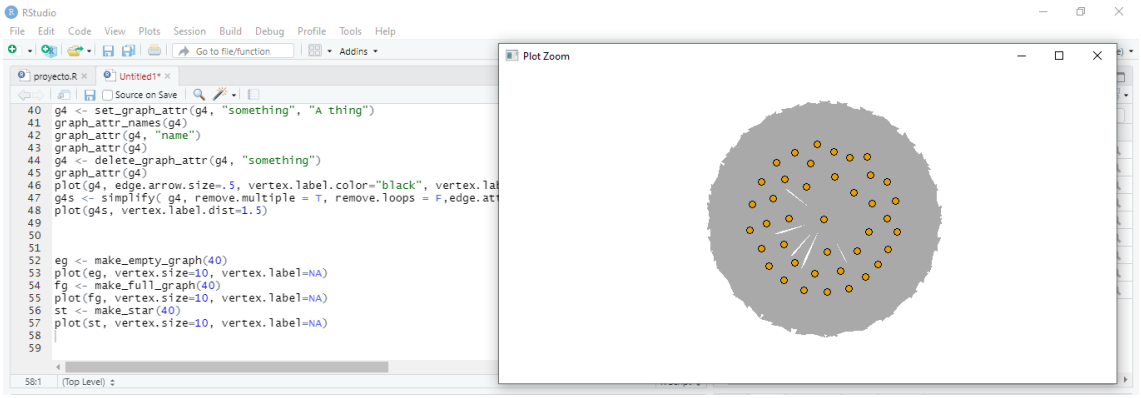
plot(fg, vertex.size=10, vertex.label=NA)



Simple star graph

st <- make_star(40)

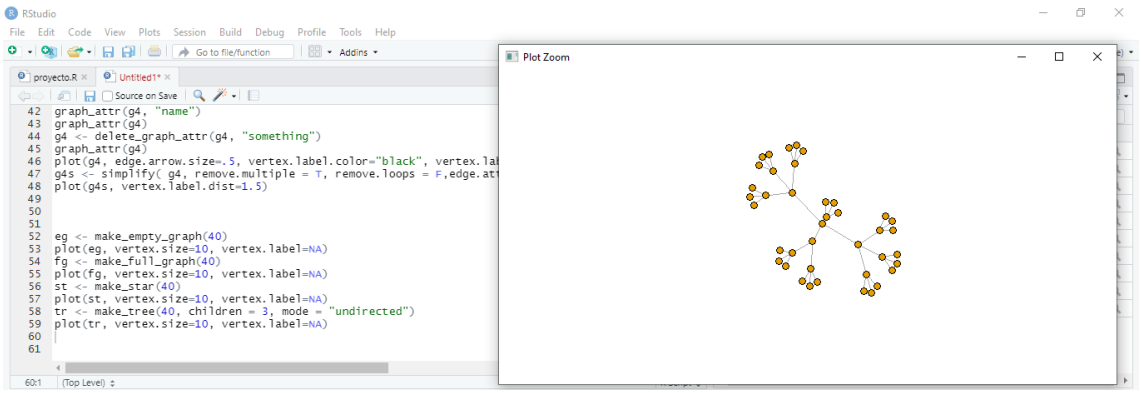
plot(st, vertex.size=10, vertex.label=NA)



Tree graph

tr <- make_tree(40, children = 3, mode = "undirected")

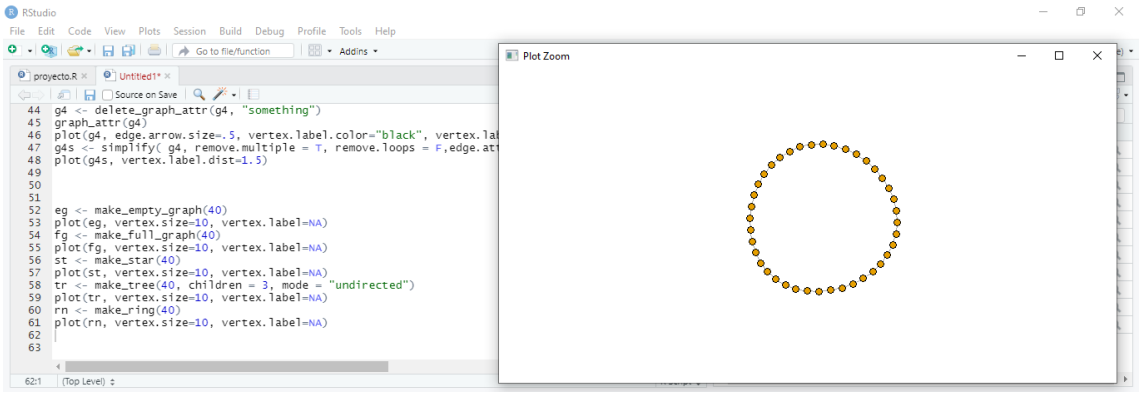
plot(tr, vertex.size=10, vertex.label=NA)



Ring graph

rn <- make_ring(40)

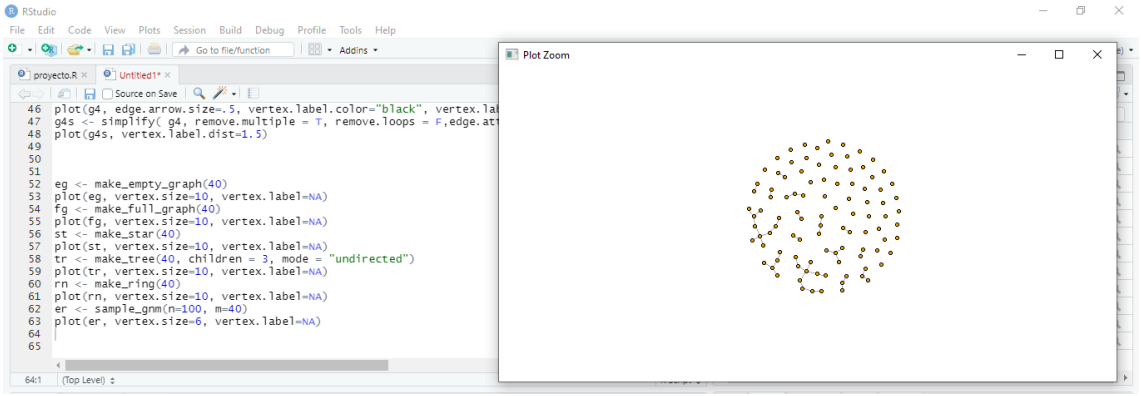
plot(rn, vertex.size=10, vertex.label=NA)



Erdos-Renyi random graph model

er <- sample_gnm(n=100, m=40)

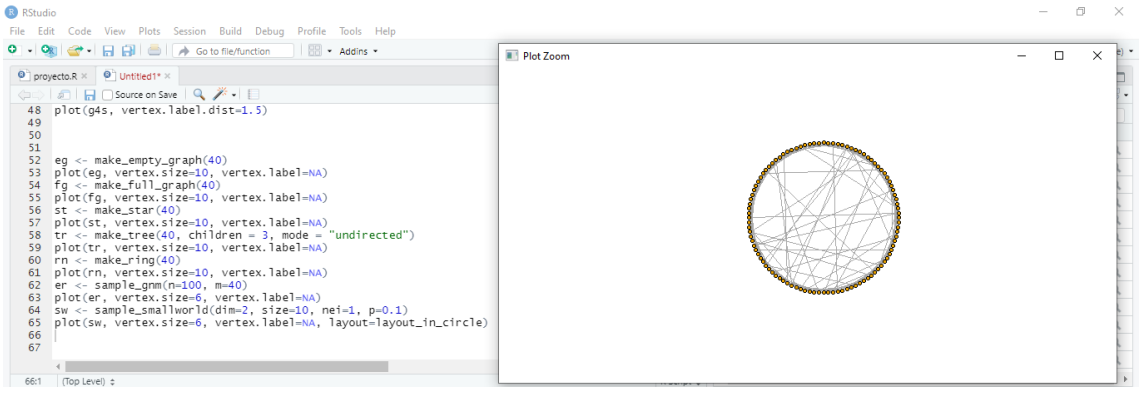
plot(er, vertex.size=6, vertex.label=NA)



Watts-Strogatz small-world model

sw <- sample_smallworld(dim=2, size=10, nei=1, p=0.1)

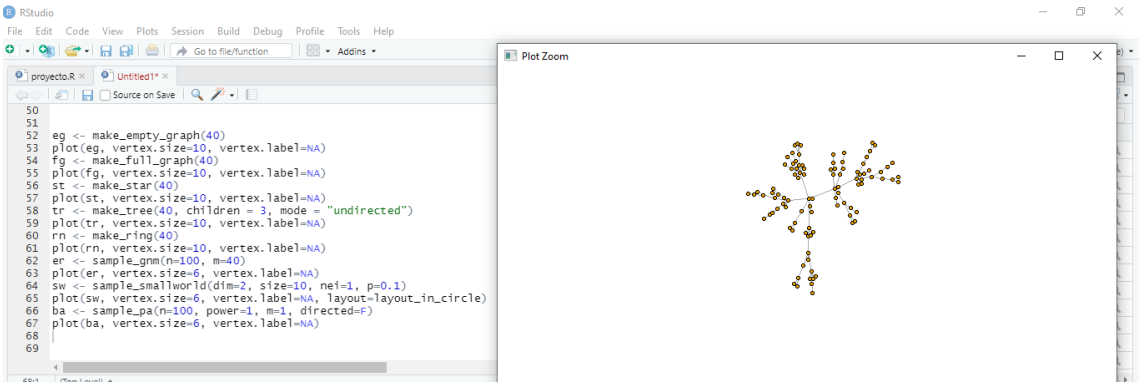
plot(sw, vertex.size=6, vertex.label=NA, layout=layout_in_circle)



Barabasi-Albert preferential attachment model for scale-free graphs

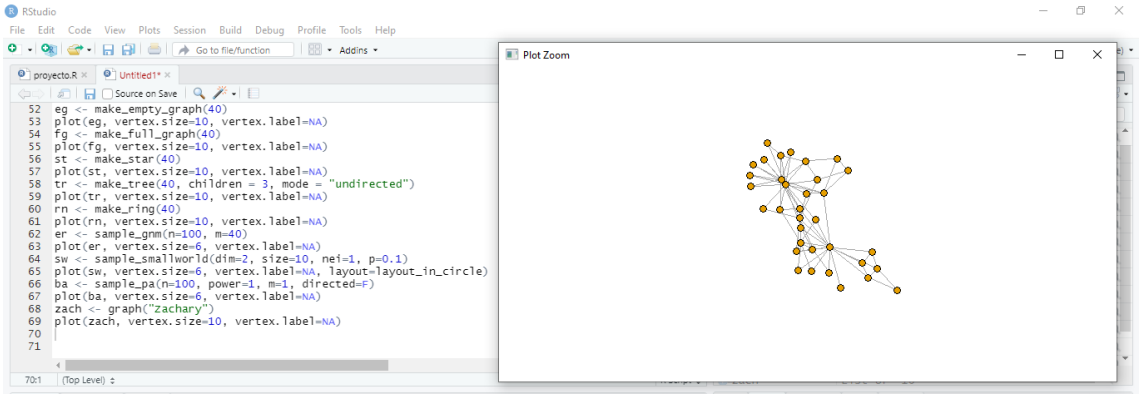
ba <- sample_pa(n=100, power=1, m=1, directed=F)

plot(ba, vertex.size=6, vertex.label=NA)



zach <- graph("Zachary")

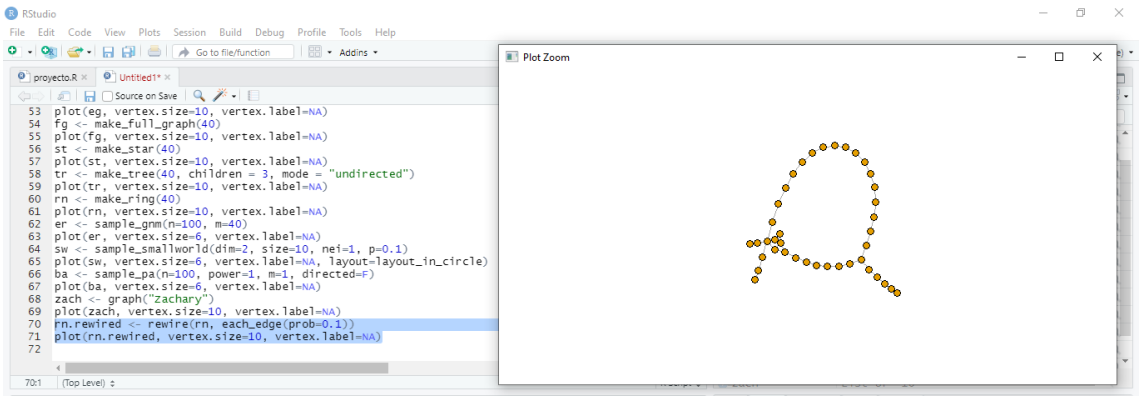
plot(zach, vertex.size=10, vertex.label=NA)



Rewiring a graph

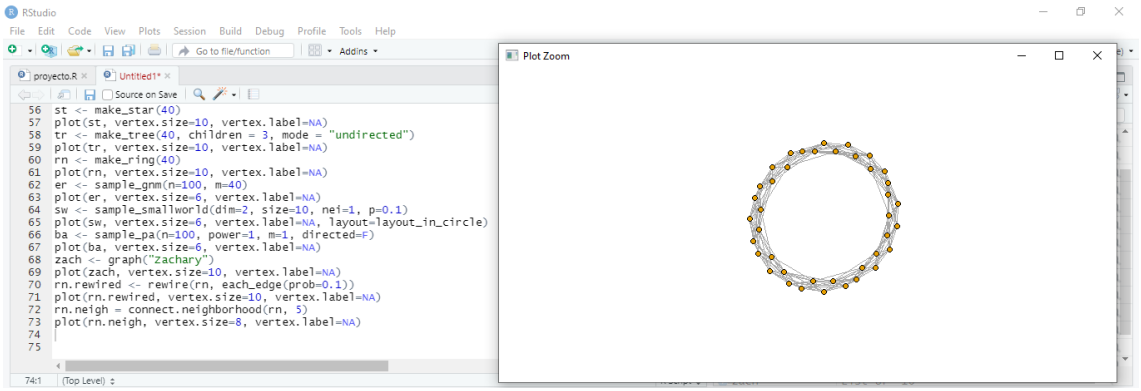
rn.rewired <- rewire(rn, each_edge(prob=0.1))

plot(rn.rewired, vertex.size=10, vertex.label=NA)

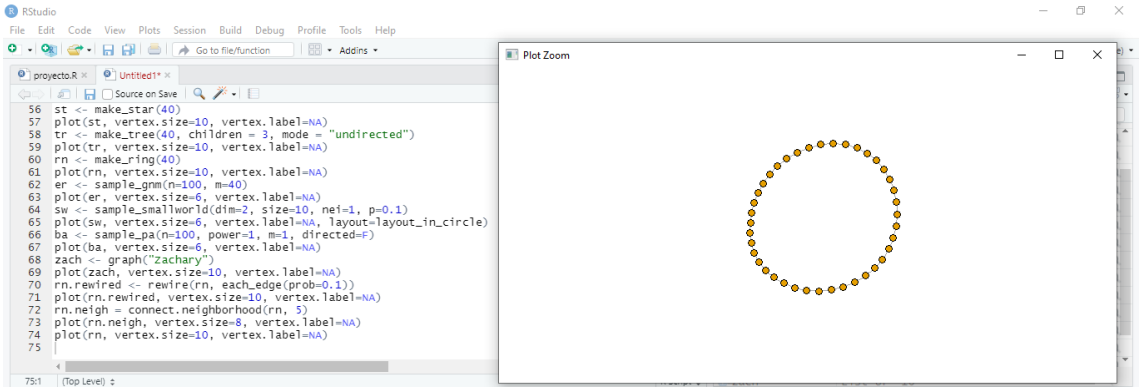


rn.neigh = connect.neighborhood(rn, 5)

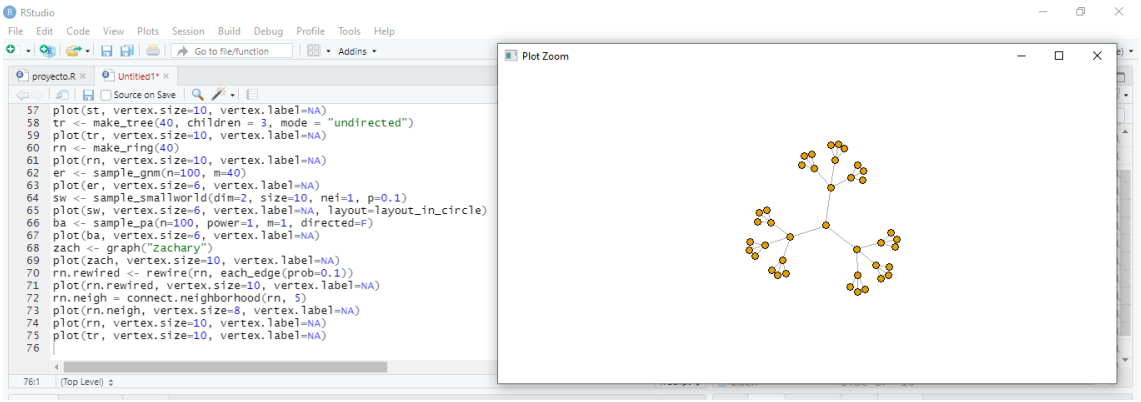
plot(rn.neigh, vertex.size=8, vertex.label=NA)



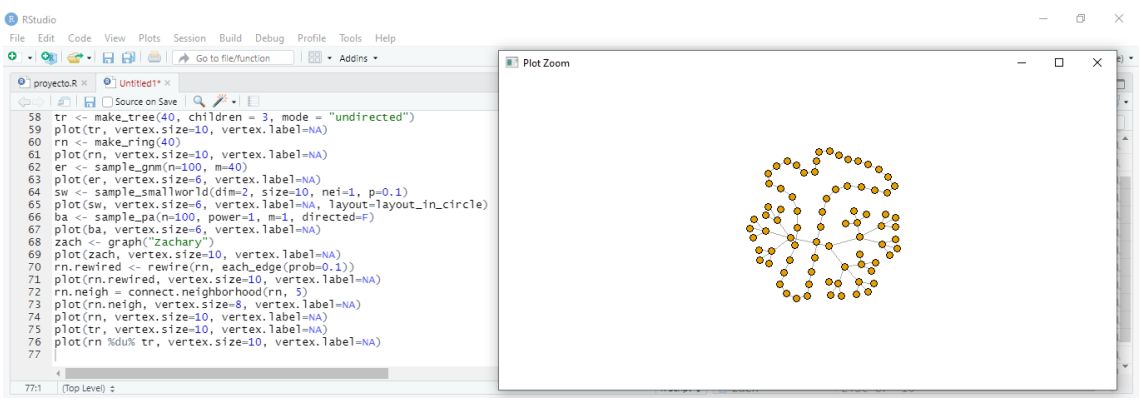
plot(rn, vertex.size=10, vertex.label=NA)



plot(tr, vertex.size=10, vertex.label=NA)



plot(rn %du% tr, vertex.size=10, vertex.label=NA)



Capítulo 3 - Reading network data

nodes <- read.csv("D:\\Maestria de Sofware\\Maestria-de-Sofware\\Base de datos no sql\\R\\Data files\\Dataset1-Media-Example-NODES.csv", header=T, as.is=T)

links <- read.csv("D:\\Maestria de Sofware\\Maestria-de-Sofware\\Base de datos no sql\\R\\Data files\\Dataset1-Media-Example-EDGES.csv", header=T, as.is=T)

head(nodes)

head(links)

nrow(nodes); length(unique(nodes$id))

nrow(links); nrow(unique(links[,c("from", "to")]))

```
> head(nodes)
  id              media media.type type.label audience.size
1 s01          NY Times          1  Newspaper            20
2 s02    Washington Post          1  Newspaper            25
3 s03 Wall Street Journal          1  Newspaper            30
4 s04          USA Today          1  Newspaper            32
5 s05           LA Times          1  Newspaper            20
6 s06      New York Post          1  Newspaper            50
> head(links)
  from  to weight      type
1  s01 s02     10 hyperlink
2  s01 s02     12 hyperlink
3  s01 s03     22 hyperlink
4  s01 s04     21 hyperlink
5  s04 s11     22   mention
6  s05 s15     21   mention
> nrow(nodes); length(unique(nodes$id))
[1] 17
[1] 17
> nrow(links); nrow(unique(links[,c("from", "to")]))
[1] 52
[1] 49
>
```

links <- aggregate(links[,3], links[,-3], sum)

links <- links[order(links$from, links$to),]

colnames(links)[4] <- "weight"

rownames(links) <- NULL

```
> nrow(links); nrow(unique(links[,c("from", "to")]))
[1] 52
[1] 49
> links <- aggregate(links[,3], links[,-3], sum)
> links <- links[order(links$from, links$to),]
> colnames(links)[4] <- "weight"
> rownames(links) <- NULL
>
```

library(igraph)

net <- graph_from_data_frame(d=links, vertices=nodes, directed=T)

class(net)

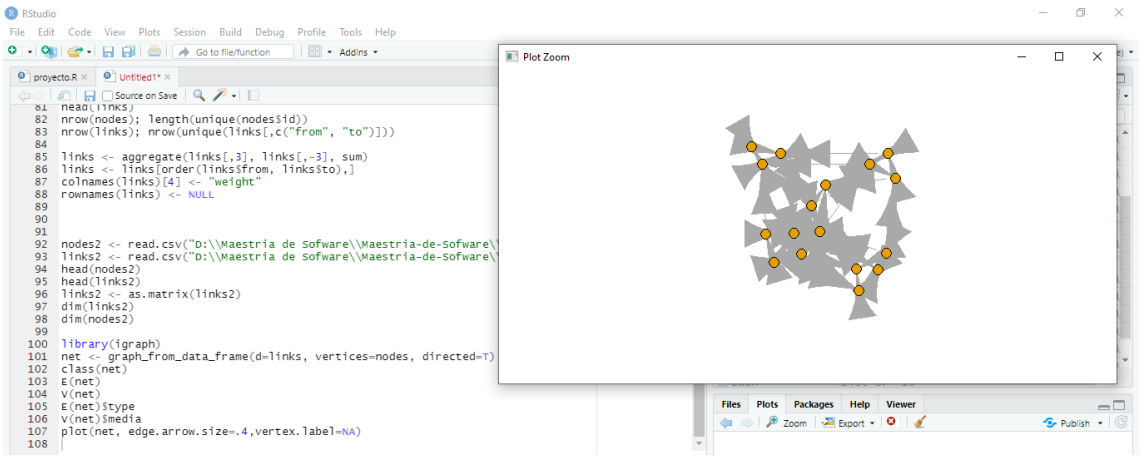
E(net)

V(net)

E(net)$type

V(net)$media

plot(net, edge.arrow.size=.4,vertex.label=NA)



nodes2 <- read.csv("D:\\Maestria de Sofware\\Maestria-de-Sofware\\Base de datos no sql\\R\\Data files\\Dataset1-Media-Example-NODES.csv", header=T, as.is=T)

links2 <- read.csv("D:\\Maestria de Sofware\\Maestria-de-Sofware\\Base de datos no sql\\R\\Data files\\Dataset1-Media-Example-EDGES.csv", header=T, as.is=T)

head(links2)

head(links2)

net2 <- graph_from_incidence_matrix(links2)

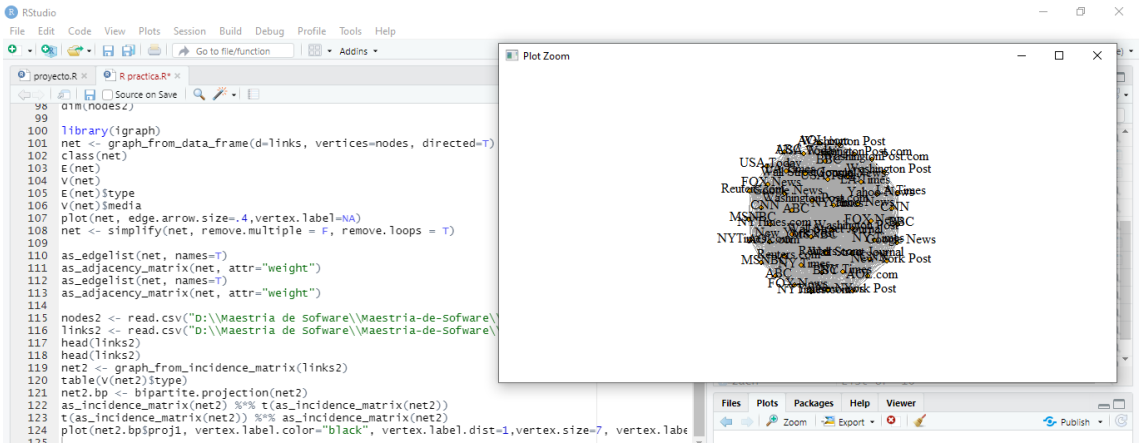
table(V(net2)$type)

net2.bp <- bipartite.projection(net2)

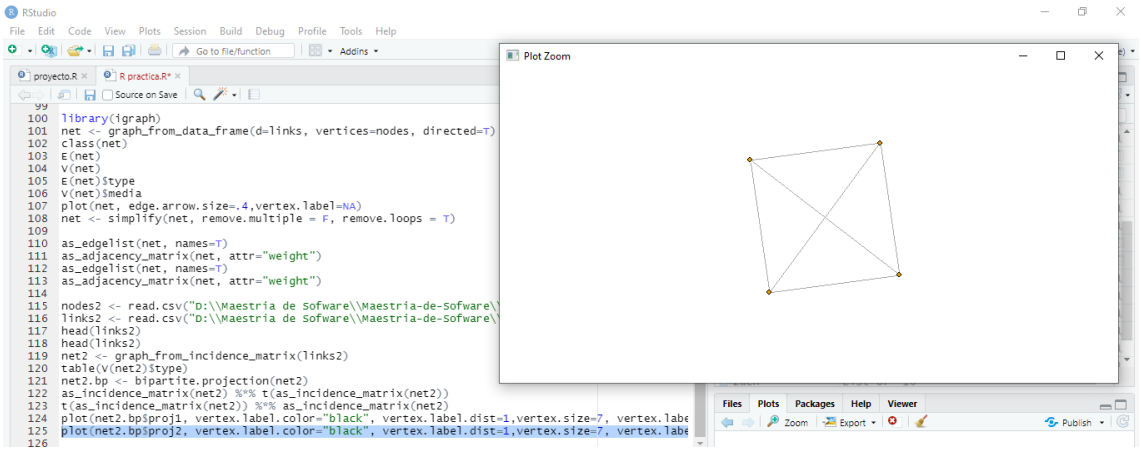
as_incidence_matrix(net2) %*% t(as_incidence_matrix(net2))

t(as_incidence_matrix(net2)) %*% as_incidence_matrix(net2)

plot(net2.bp$proj1, vertex.label.color="black", vertex.label.dist=1,vertex.size=7, vertex.label=nodes2$media[!is.na(nodes2$media.type)])



plot(net2.bp$proj2, vertex.label.color="black", vertex.label.dist=1,vertex.size=7, vertex.label=nodes2$media[is.na(nodes2$media.type)])


RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function
Addins
proyecto.R
R practica.R*
Source on Save
library(igraph)
net <- graph_from_data_frame(d=links, vertices=nodes, directed=T)
class(net)
E(net)
V(net)
E(net)$type
V(net)$media
plot(net, edge.arrow.size=.4,vertex.label=NA)
net <- simplify(net, remove.multiple = F, remove.loops = T)
as_edgelist(net, names=T)
as_adjacency_matrix(net, attr="weight")
as_edgelist(net, names=T)
as_adjacency_matrix(net, attr="weight")
nodes2 <- read.csv("D:\\Maestria de Sofware\\Maestria-de-Sofware\\
links2 <- read.csv("D:\\Maestria de Sofware\\Maestria-de-Sofware\\
head(links2)
head(links2)
net2 <- graph_from_incidence_matrix(links2)
table(V(net2)$type)
net2.bp <- bipartite.projection(net2)
as_incidence_matrix(net2) %*% t(as_incidence_matrix(net2))
t(as_incidence_matrix(net2)) %*% as_incidence_matrix(net2)
plot(net2.bp$proj1, vertex.label.color="black", vertex.label.dist=1,vertex.size=7, vertex.labe
plot(net2.bp$proj2, vertex.label.color="black", vertex.label.dist=1,vertex.size=7, vertex.labe
Plot Zoom
Files Plots Packages Help Viewer
Zoom
Export
Publish