

Network Analysis Using R and igraph

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- 1 Network Analysis using R and igraph
 - Based on
 - Using igraph

http://www.kateto.net/wp-content/uploads/2016/01/NetSciX_2016_Workshop.pdf

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Create networks (1)

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

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

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

g3 <- graph( c("A", "B", "C", "D", "E", "F"))
plot(g3)
g3
```

Create networks (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(a:b:c---c:d:e))
```

```
g1 <- graph_from_literal(a-b-c-d-e-f, a-g-h-b, h-e:f:i, j)  
plot(g1)
```

Edge, vertex, and network attributes (1)

```
E(g4)
V(g4)
g4[]
g4[1,]
V(g4)$name
V(g4)$gender <- c("male", "male", "male", "female", "female", "male")
E(g4)$type <- "email"
E(g4)$weight <- 10

edge_attr(g4)
vertex_attr(g4)
graph_attr(g4)
```

Edge, vertex, and network attributes (2)

```
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(gr)
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")])
g4<-simplify(g4, remove.ulitple=T, reomve.loop=F,
            edge.attr.comb=c(weight="sum", type="ignore"))
plot(g4s, vertex.label.dist=1.5)
g4s
```

graph and graph models (1)

```
eg <- make_empty_graph(40)
plot(eg, vertex.size=10, vertex.label=NA)
fg <- make_full_graph(40)
plot(fg, vertex.size=10, vertex.label=NA)
st <- make_star(40)
plot(st, vertex.size=10, vertex.label=NA)
tr <- make_tree(40, children=3, mode="undirected")
plot(tr, vertex.size=10, vertex.label=NA)
rn <- make_ring(40)
plot(rn, vertex.size=10, vertex.label=NA)
er <- sample_gnm(n=100, m=40)
plot(er, vertex.size=6, vertex.label=NA)
```


graph and graph models (2)

```
sw <- sample_smallworld(dim=2, size=10, nei=1,p=0.1)
plot(sw, vertex.size=6, vertex.label=NA, layout=layout_in_circle)
ba <- sample_pa(n=100, power=1, m=1, directed=F)
plot(ba, vertex.size=6, vertex.label=NA)
ach <- graph("Zachary")
plot(zach, vertex.size=10, vertex.label=NA)
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)
```