Excercises 4 Network Robustness

Roberto Alvarez

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Contents

```r
library(igraph)
```

```
##
## Attaching package: 'igraph'

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

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

Delete vertices from a graph

delete_vertices(graph, v)

graph The input graph. v The vertices to remove, a vertex sequence.
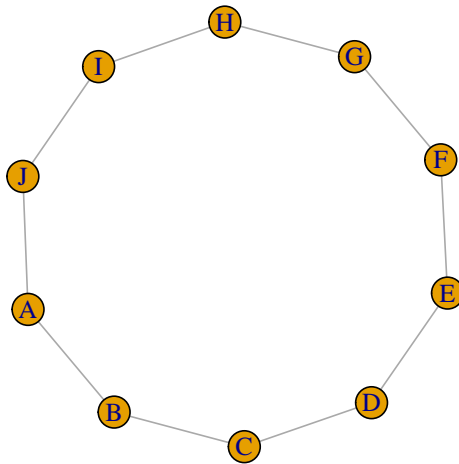
```r
g <- make_ring(10) %>% set_vertex_attr("name", value = LETTERS[1:10])
g
```

```
## IGRAPH a8c9804 UN-- 10 10 -- Ring graph
## + attr: name (g/c), mutual (g/l), circular (g/l), name (v/c)
## + edges from a8c9804 (vertex names):
##  [1] A--B B--C C--D D--E E--F F--G G--H H--I I--J A--J
```

```r
V(g)
```

```
## + 10/10 vertices, named, from a8c9804:
##  [1] A B C D E F G H I J
```
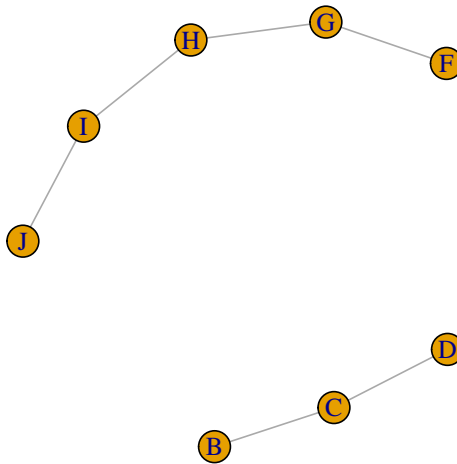
```r
plot(g)
```

```
g2 <- delete_vertices(g, c(1,5))
g2
```

```
## IGRAPH 8bfdf1b UN-- 8 6 -- Ring graph
## + attr: name (g/c), mutual (g/l), circular (g/l), name (v/c)
## + edges from 8bfdf1b (vertex names):
## [1] B--C C--D F--G G--H H--I I--J
```

```
V(g2)
```

```
## + 8/8 vertices, named, from 8bfdf1b:
## [1] B C D F G H I J
```

```
plot(g2)
```

1 Exercises

1. Using the next networks, remove randomly (use the command *sample()*) 1/100 nodes. Calculate the mean of the distance and the diameter. Plot the network. Repeat this process 10 times for each network

```
g100<-barabasi.game(100,directed = FALSE)
g1K<-barabasi.game(1000,directed = FALSE)
g2<-random.graph.game(1000,0.20)
g3<-sample_smallworld(1,1000,p=0.2,nei=3)
```

2. Using the same networks, remove the 10 most connected nodes. Calculate the mean of the distance and the diameter. Plot the network. Repeat this process 10 times for each network.