

Week 13 - Social Network Mining

James Quacinella

11/14/2015

10.2.1

10.2.2 (section 10.2.6)

Exercise 10.4.1

For the graph of Fig. 10.9, construct:

- (a) The adjacency matrix.
- (b) The degree matrix.
- (c) The Laplacian matrix.

Answer

```
# Setup the degree matrix
D = matrix(c(2,0,0,0,0,0,0,0,0,
             0,3,0,0,0,0,0,0,0,
             0,0,3,0,0,0,0,0,0,
             0,0,0,3,0,0,0,0,0,
             0,0,0,0,3,0,0,0,0,
             0,0,0,0,0,2,0,0,0,
             0,0,0,0,0,0,3,0,0,
             0,0,0,0,0,0,0,3,0,
             0,0,0,0,0,0,0,0,2), ncol=9)

# Setup col and row names
colnames(D)<-c('A','B','C','D','E','F','G','H','I')
rownames(D)<-c('A','B','C','D','E','F','G','H','I')

# Write up the adjacency matrix
#   A B C D E F G H I
A = matrix(c(0,1,1,0,0,0,0,0,0, # A
             1,0,1,0,0,0,0,1,0, # B
             1,1,0,1,0,0,0,0,0, # C
             0,0,1,0,1,1,0,0,0, # D
             0,0,0,1,0,1,1,0,0, # E
             0,0,0,1,1,0,0,0,0, # F
             0,0,0,0,1,0,0,1,1, # G
             0,1,0,0,0,0,1,0,1, # H
             0,0,0,0,0,0,1,1,0), ncol=9)

# Setup col and row names
colnames(A)<-c('A','B','C','D','E','F','G','H','I')
rownames(A)<-c('A','B','C','D','E','F','G','H','I')

# Calculate Laplacian
L = D - A
```

```
# Print results
```

```
D
```

```
##  A B C D E F G H I
## A 2 0 0 0 0 0 0 0 0
## B 0 3 0 0 0 0 0 0 0
## C 0 0 3 0 0 0 0 0 0
## D 0 0 0 3 0 0 0 0 0
## E 0 0 0 0 3 0 0 0 0
## F 0 0 0 0 0 2 0 0 0
## G 0 0 0 0 0 0 3 0 0
## H 0 0 0 0 0 0 0 3 0
## I 0 0 0 0 0 0 0 0 2
```

```
A
```

```
##  A B C D E F G H I
## A 0 1 1 0 0 0 0 0 0
## B 1 0 1 0 0 0 0 0 1
## C 1 1 0 1 0 0 0 0 0
## D 0 0 1 0 1 1 0 0 0
## E 0 0 0 1 0 1 1 0 0
## F 0 0 0 1 1 0 0 0 0
## G 0 0 0 0 1 0 0 1 1
## H 0 1 0 0 0 0 1 0 1
## I 0 0 0 0 0 0 1 1 0
```

```
L
```

```
##  A B C D E F G H I
## A 2 -1 -1 0 0 0 0 0 0
## B -1 3 -1 0 0 0 0 -1 0
## C -1 -1 3 -1 0 0 0 0 0
## D 0 0 -1 3 -1 -1 0 0 0
## E 0 0 0 -1 3 -1 -1 0 0
## F 0 0 0 -1 -1 2 0 0 0
## G 0 0 0 0 -1 0 3 -1 -1
## H 0 -1 0 0 0 0 -1 3 -1
## I 0 0 0 0 0 0 -1 -1 2
```