



NETWORK ANALYSIS IN R

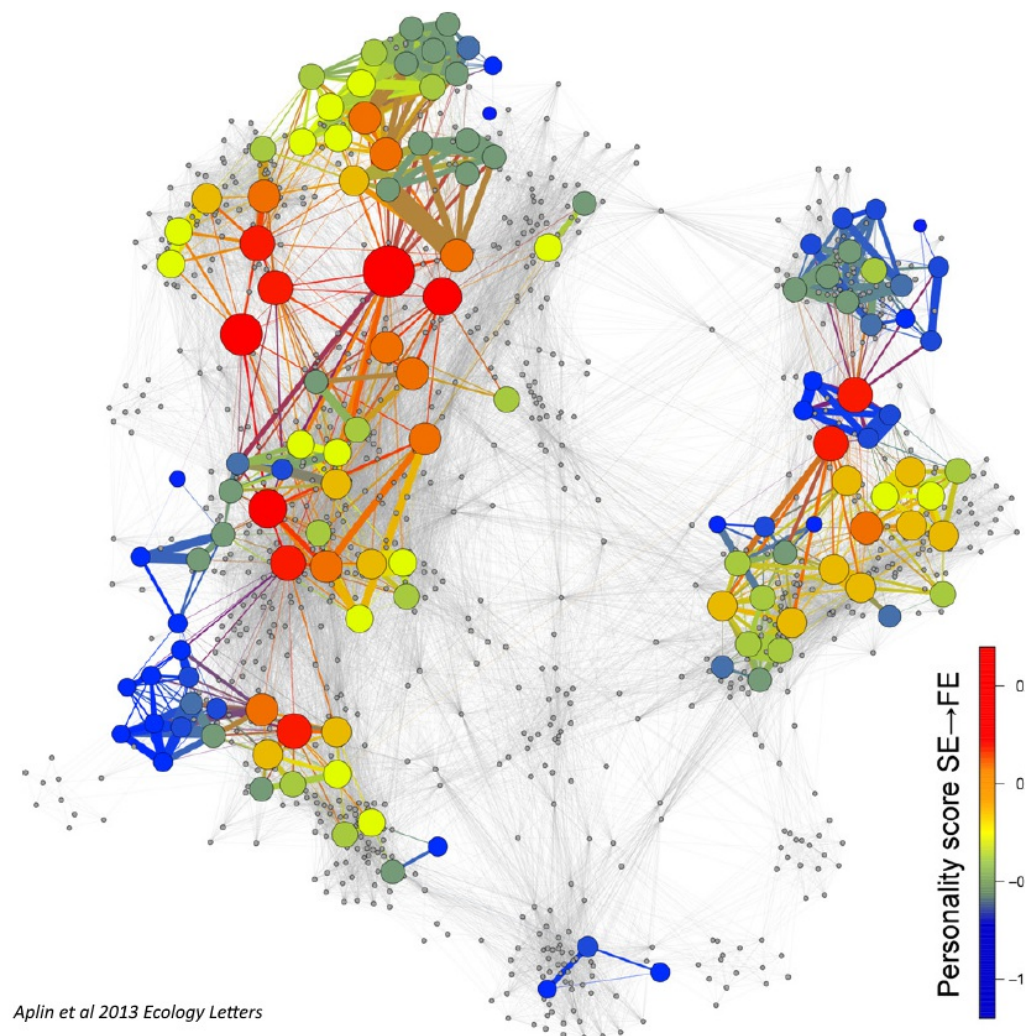
Close Relationships: Assortativity & Reciprocity

James Curley

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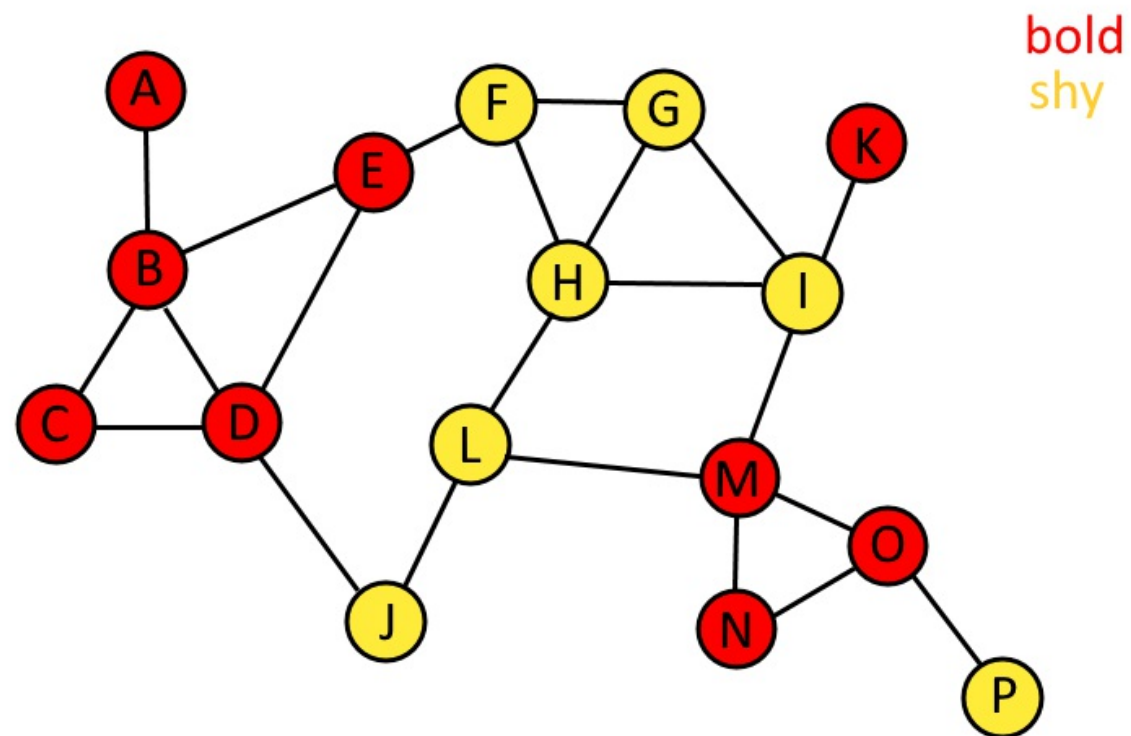
Assortativity

The preferential attachment of vertices to other vertices that are similar in numerical or categorical attributes.



Aplin et al 2013 Ecology Letters

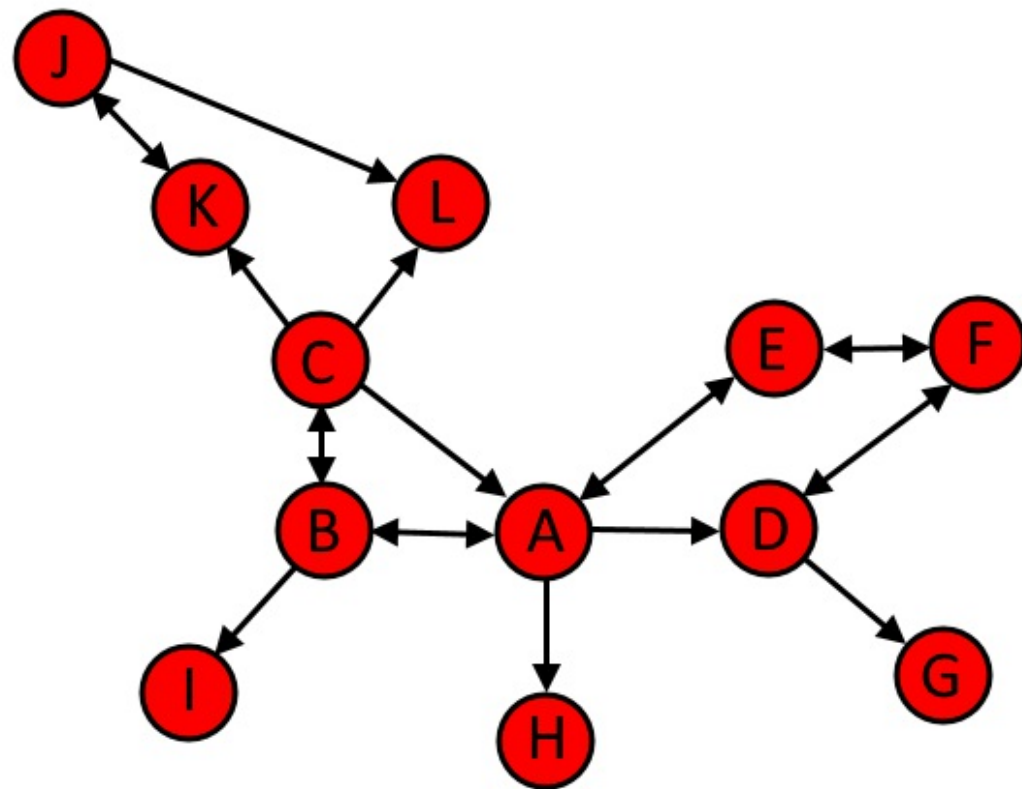
Assortativity



```
assortativity(g, values)
0.45

assortativity.degree(
  g,
  directed = FALSE
)
-0.31
```

Reciprocity



```
reciprocity(g)  
0.6
```



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Let's practice!



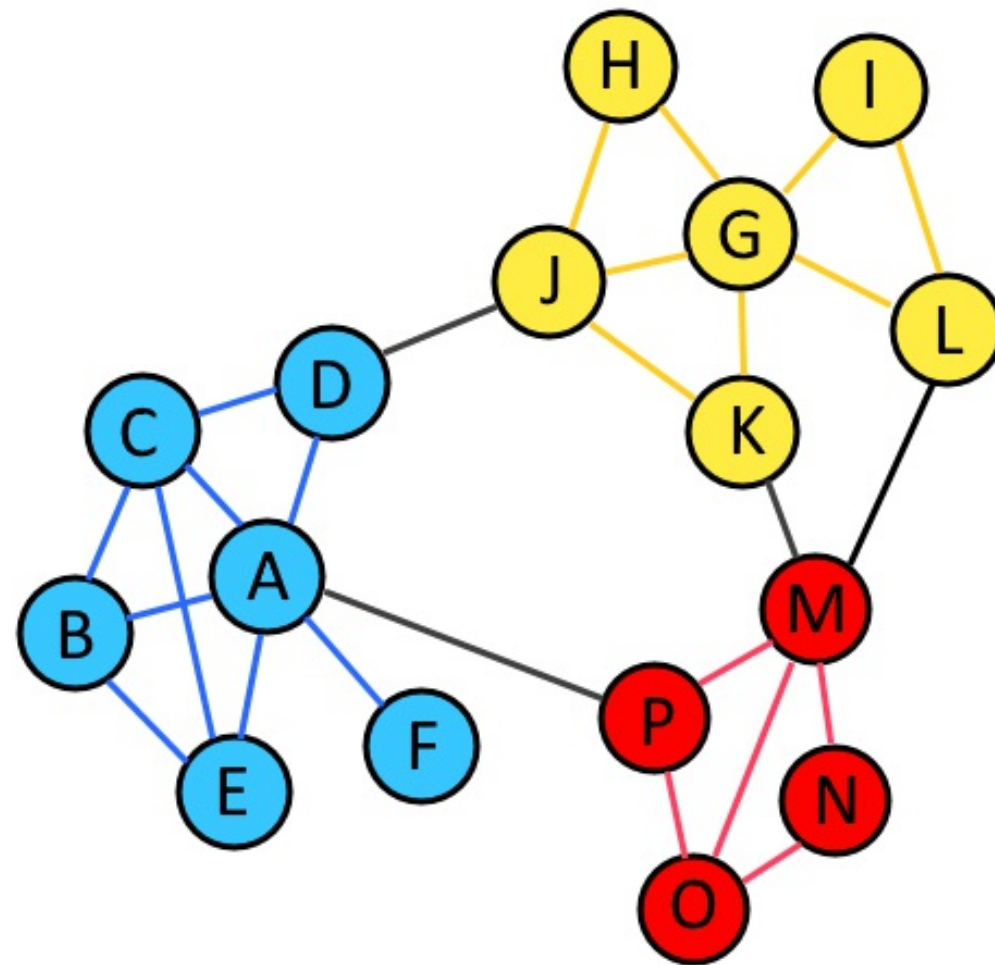
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Community Detection

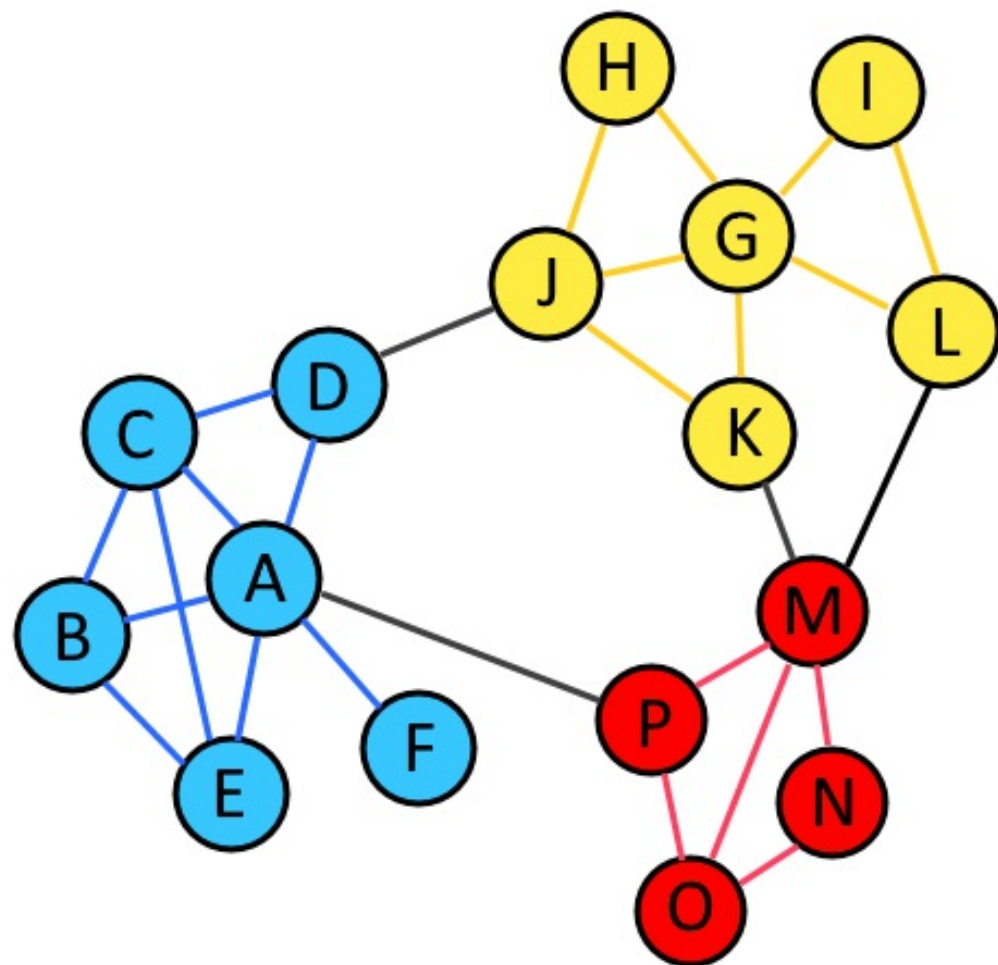
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Community Detection in Networks



Fast-Greedy Detection



```
fastgreedy.community(g)
```

```
IGRAPH clustering fast greedy,  
groups: 3, mod: 0.5
```

```
+ groups:
```

```
$`1`
```

```
[1] "A" "B" "C" "D" "E" "F"
```

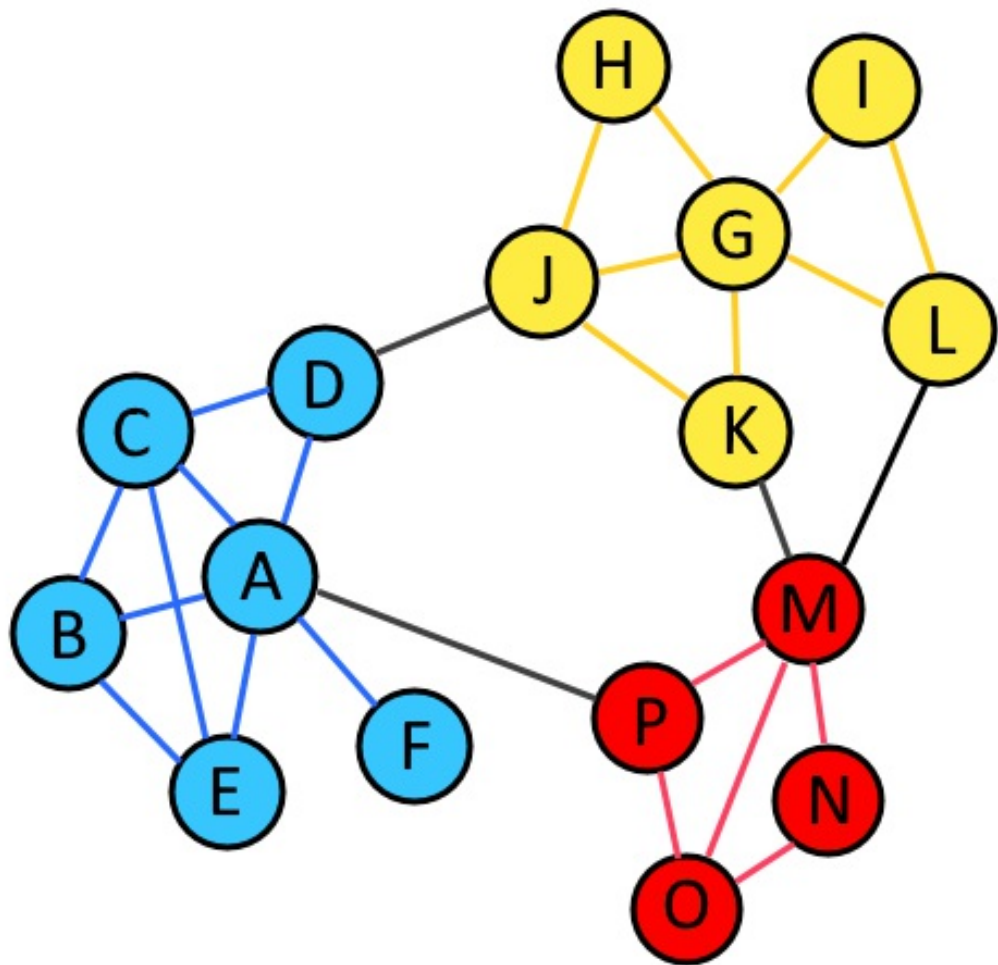
```
$`2`
```

```
[1] "J" "G" "H" "I" "K" "L"
```

```
$`3`
```

```
[1] "M" "N" "O" "P"
```


Edge-Betweenness Detection



```
edge.betweenness.community(g)
```

```
IGRAPH clustering edge betweenness,  
groups: 3, mod: 0.5
```

```
+ groups:
```

```
$`1`
```

```
[1] "A" "B" "C" "D" "E" "F"
```

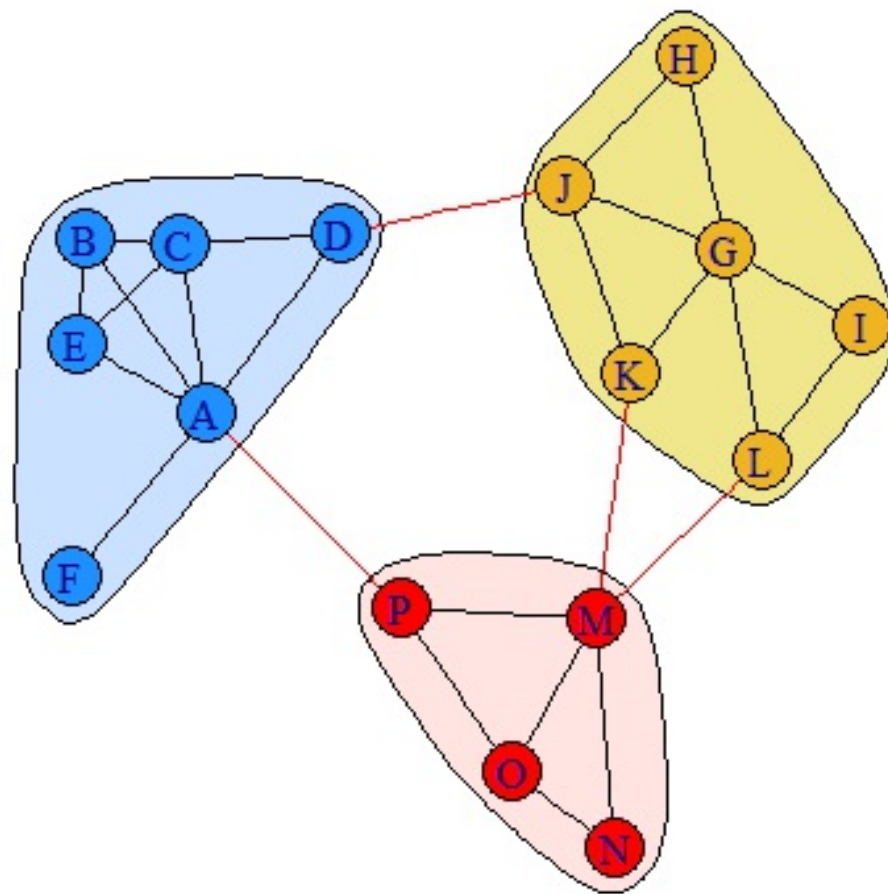
```
$`2`
```

```
[1] "J" "G" "H" "I" "K" "L"
```

```
$`3`
```

```
[1] "M" "N" "O" "P"
```

Getting Community Information



```
x <- fastgreedy.community(g)
```

```
length(x)
[1] 3
```

```
sizes(x)
Community sizes
1 2 3
6 6 4
```

```
membership(x)
A B C D E F J G H I K L M N O P
1 1 1 1 1 1 2 2 2 2 2 2 3 3 3 3
```

```
plot(x, g)
```



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Interactive Network Visualizations

James Curley

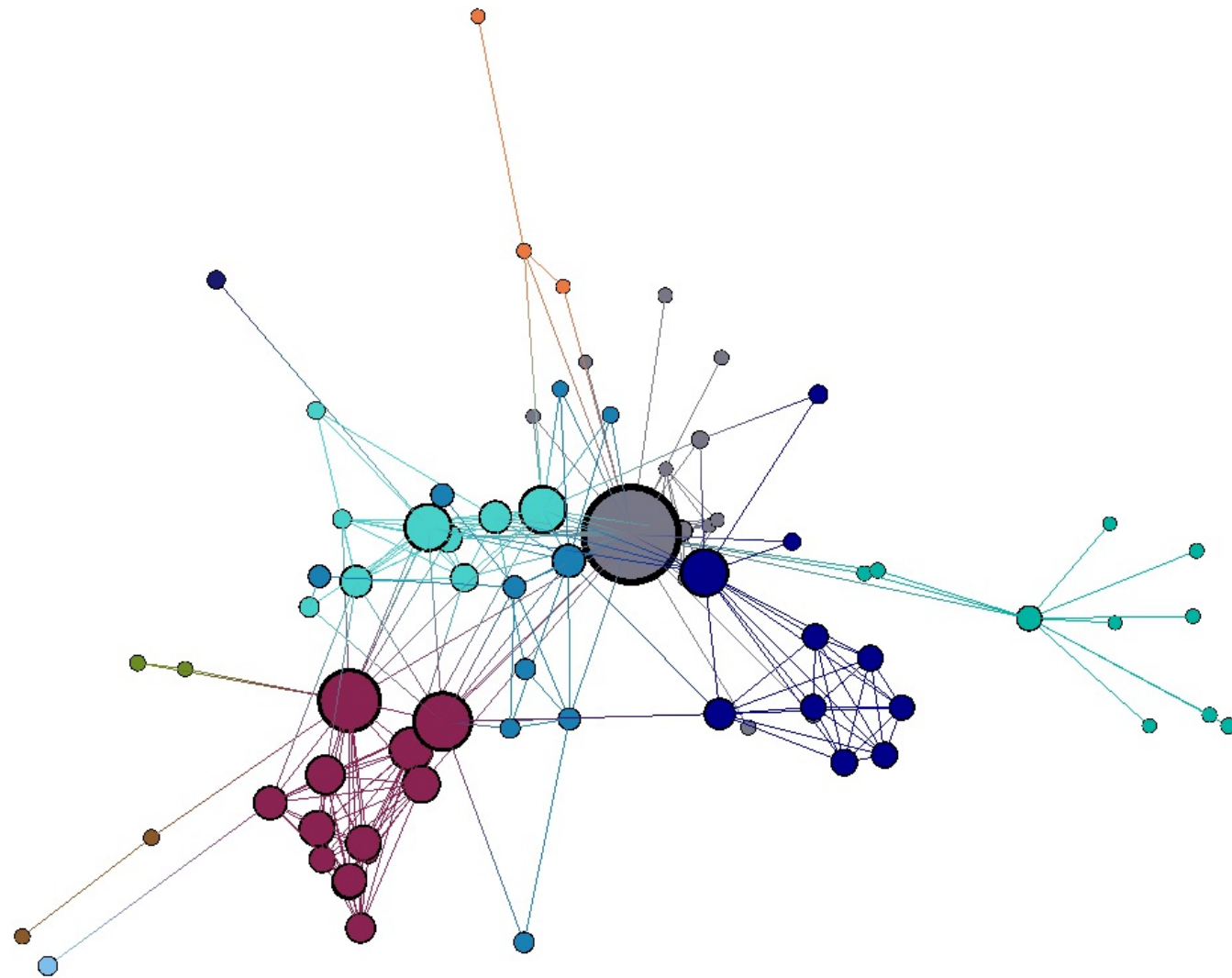
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R Network Visualization Packages

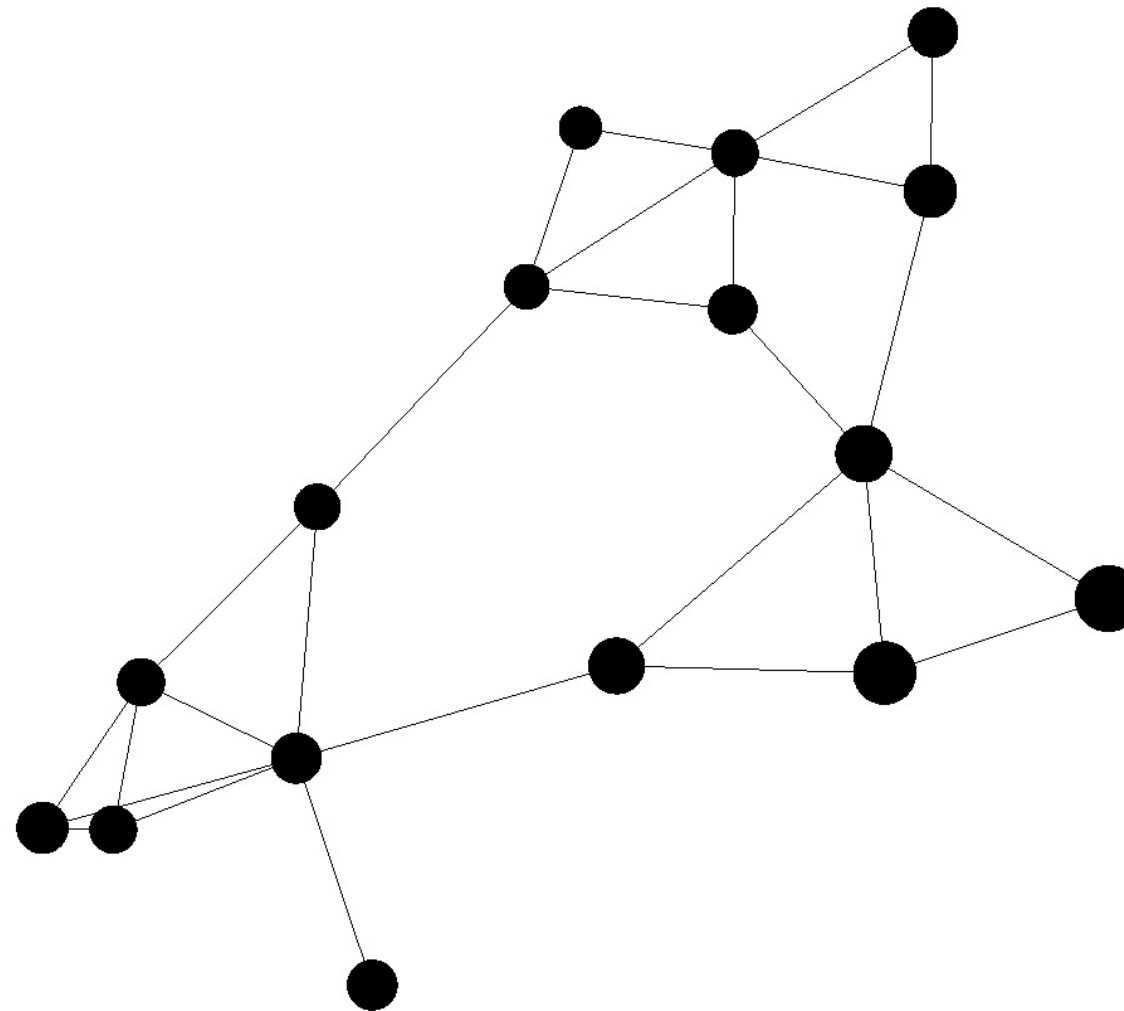
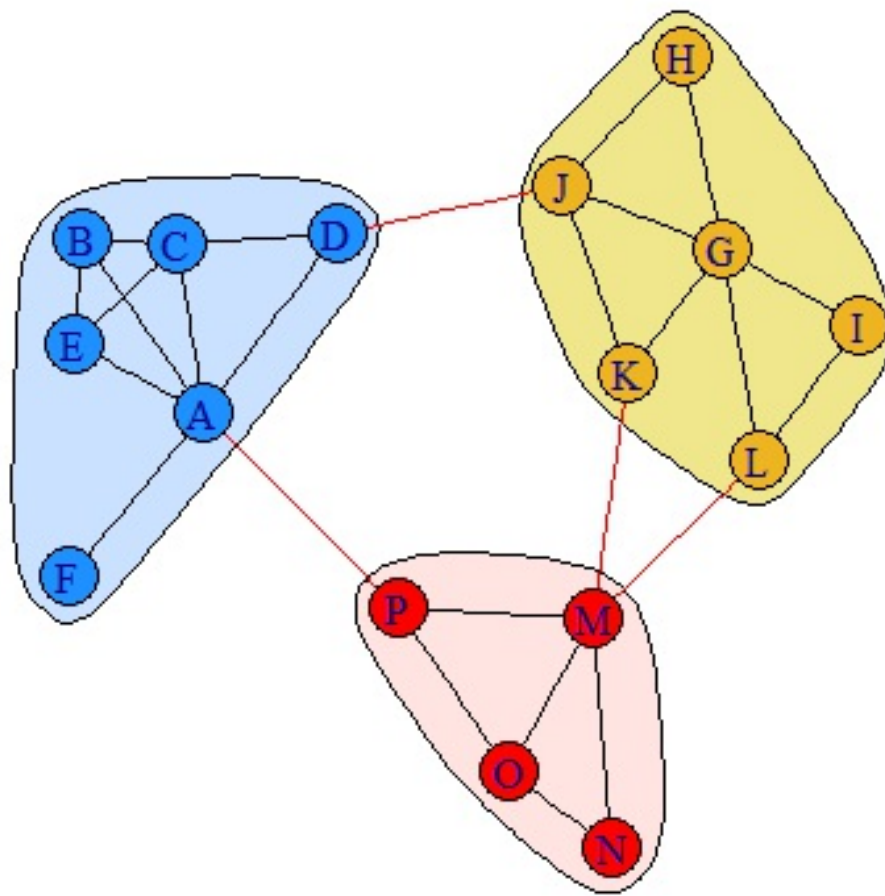
- igraph
- statnet
- ggnet
- ggnetwork
- ggraph
- visNetwork
- networkD3
- visNetwork
- sigma
- rgexf (igraph to Gephi)
- **threejs**

threejs

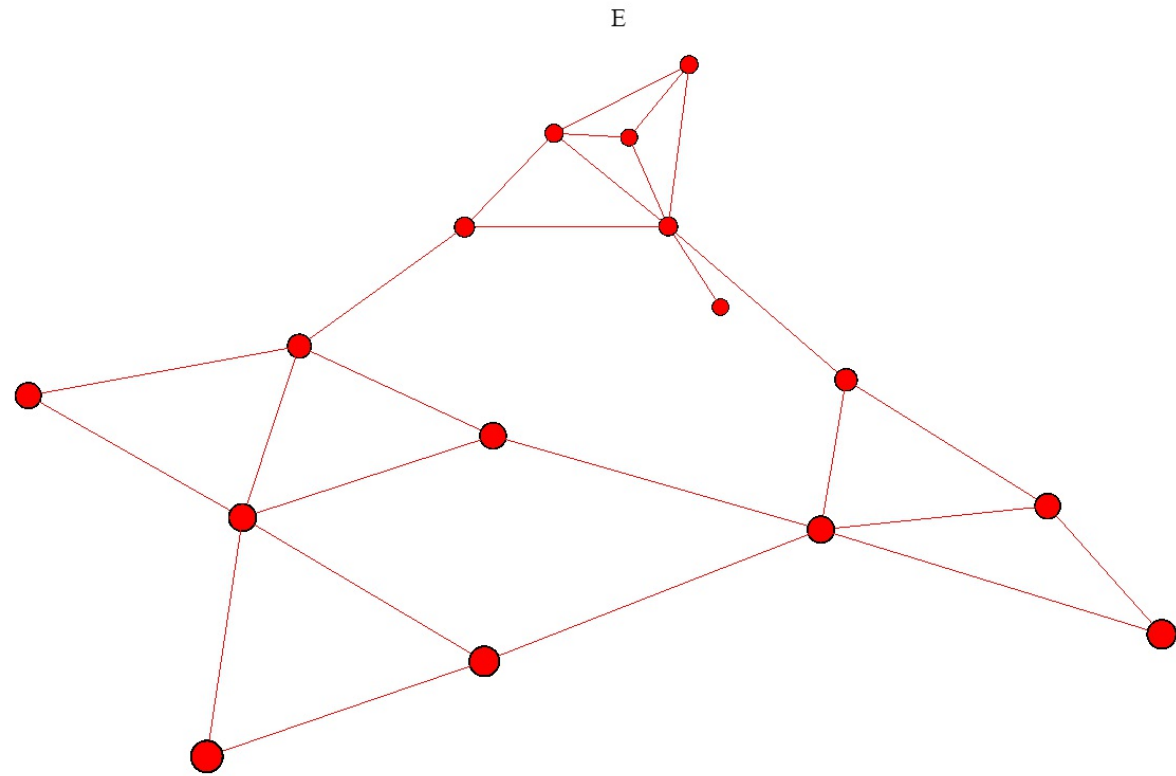


Creating a threejs visualization

```
library(threejs)  
graphjs(g)
```

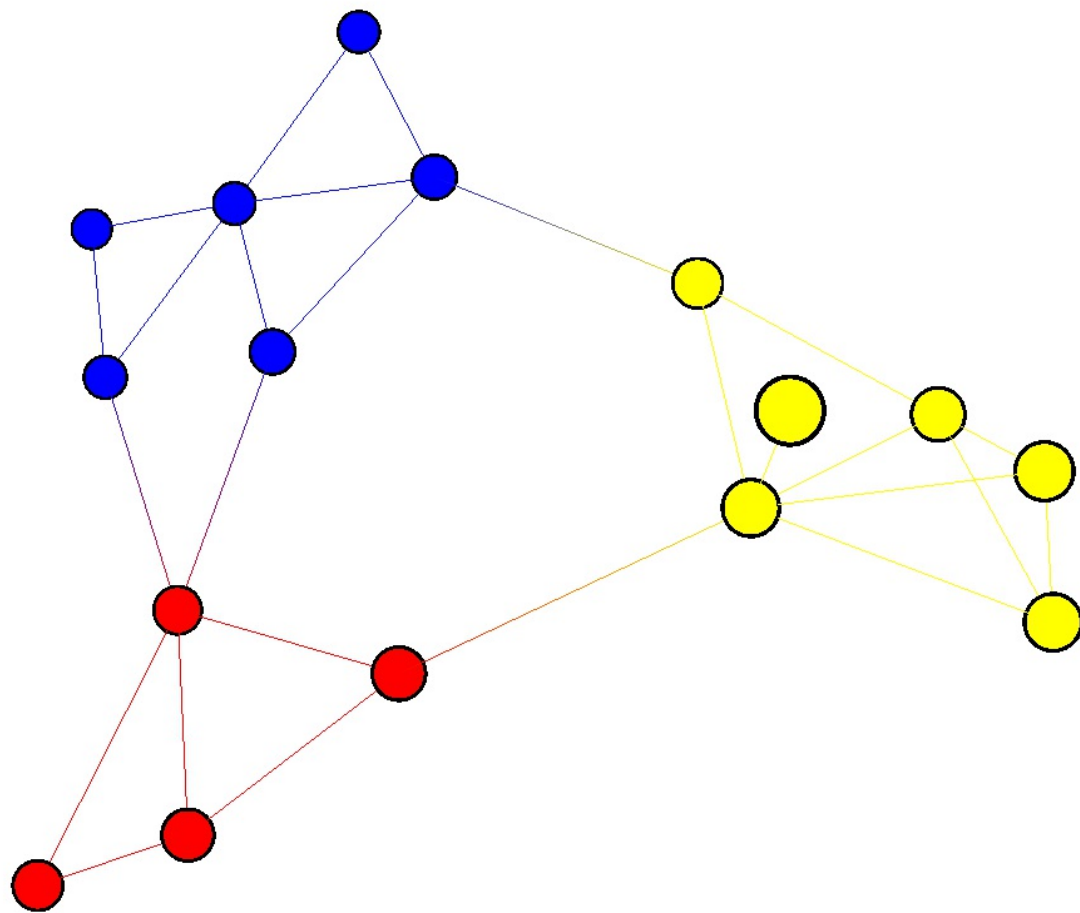


Adding Attributes



```
g <- set_vertex_attr(g, "label",  
                      value=V(g)$name)  
  
g <- set_vertex_attr(g, "color",  
                      value="mistyrose")  
  
graphjs(g, vertex.size = 1)
```


Coloring Communities



```
x = edge.betweenness.community(g)
i <- membership(x)

g <- set_vertex_attr(g, "color",
value=c("yellow", "blue", "red")[i])

graphjs(g)
```



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