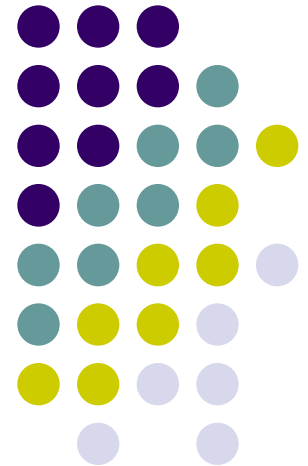


Applied Scaling & Classification Techniques in Political Science

Lecture 8 (second part)
A bit of network-analysis





The theoretical framework

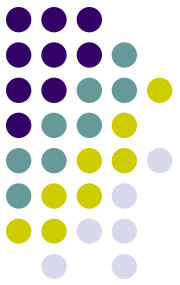
Basic vocabulary of **network analysis**:

The two primary aspects of networks are a multitude of separate entities and the connections between them

The entities are referred to as **nodes or vertices** of a graph, while the connections are **edges or links**

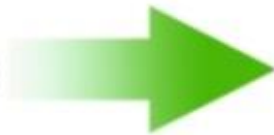
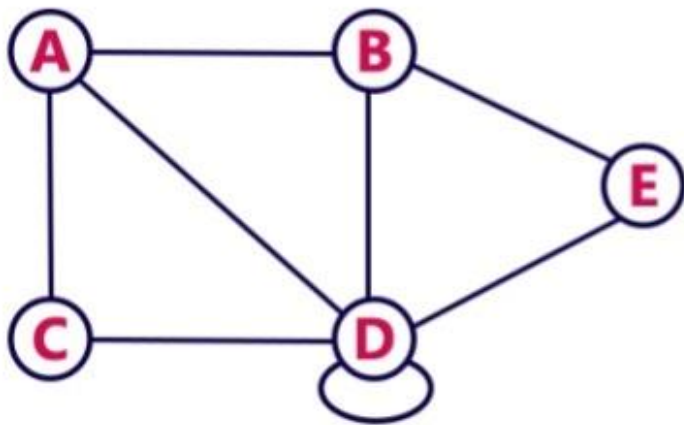
A network is based on **adjacency matrices**, also known as **sociomatrices**

An adjacency matrix is a square matrix in which the column and row names are the nodes of the network. Within the matrix a 1 indicates that there is a connection between the nodes, and a 0 indicates no connection

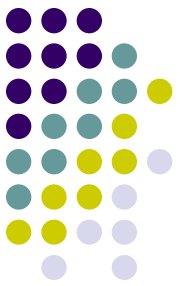


The theoretical framework

An example of a adjacency matrix



	A	B	C	D	E
A	0	1	1	1	0
B	1	0	0	1	1
C	1	0	0	1	0
D	1	1	1	1	1
E	0	1	0	1	0

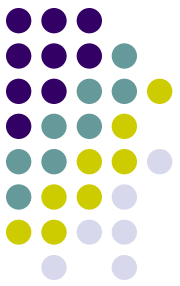


The theoretical framework

Hopefully enough, the specialized network packages can create an adjacency matrix also from an **edge-list data frame**

An edge list is a data frame that contains a minimum of two columns, one column of nodes that are **the source of a connection** and another column of nodes that are the **target of the connection**. The nodes in the data are identified by unique IDs

If the distinction between source and target is meaningful, the **network is directed**. If the distinction is not meaningful, the **network is undirected**



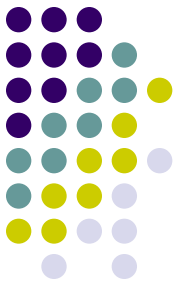
The theoretical framework

In the example of letters sent from one city to another city that we will discuss in the lab, the **distinction between source and target is clearly meaningful**, and so the network is **directed**

An edge list can also contain **additional columns that describe attributes of the edges** such as a magnitude aspect for an edge (in our case, for example, the number of letters sent from one city to the other)

If the edges have a magnitude attribute the **graph is considered weighted**

R packages to install



```
install.packages("hrbrthemes", repos=  
  "http://r.iq.harvard.edu", type="source")
```

```
install.packages("ggraph", repos= "http://r.iq.harvard.edu",  
  type="source")
```

```
install.packages("tidyverse", repos=  
  "http://r.iq.harvard.edu", type="source")
```

```
install.packages("igraph", repos= "http://r.iq.harvard.edu",  
  type="source")
```