# NETWORK VISUALISATION (SHORT DIGRESSION)





- How to interpret a network drawing?
- What does the position of nodes means?
- Can we draw conclusion from the drawing alone?



#### Random layout

- Assign random positions to nodes, draw edges
  - Useless for more than 5-6 nodes
- Geographical layout
  - The position of nodes is fixed apriori, often based on geographical location
  - Variant: position nodes on a circle based on a single, ID property (age...)







- Most commonly used: Automatic layout
  - Non deterministic
  - Tries to arrange nodes so that the network is easy to read and understand
    - Minimize edge crossings?
    - Most commonly, tries to put connected nodes close and unconnected nodes far



- Most common algorithms are variants of the force directed layout
  - Kamada-Kawai

• ...

- Fruchterman-Reingold
- Force directed layout: a simple physical model
  - Repulsive forces between nodes
  - Edges are attracting forces
  - Minimal (to avoid node overlap) and maximal (to avoid connected component drifting out of the figure) distances can be added.

- More recently, approaches using graph embedding/ neural networks:
- Maximize similarity between a measure of distance in the graph and the distance in the drawing
  - Graph distance can be number of hops, probability to reach by random walks, etc.

#### http://kwonoh.net/dgl/



Can we interpret a force layout?
Yes...





- Can we interpret a force layout?
  - Yes...
  - And no.





- Can we interpret a force layout?
  - Yes...
  - And no.



